

Mini 4WD

2235 Standards, Point for Point.

The Next Generation Science Standards are used for S.T.E.M. education. Each state has its own standards that sit outside that set. Each one is a card: the standard, then one Mini 4WD aspect.

NGSS (208), AL (380), CA (0), FL (554), MI (9), NJ (13), OH (189), PA (19), TX (862).

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How to read this book

The spine

The spine of this book is the Next Generation Science Standards: the performance expectations from kindergarten through high school. A state standard is filed in the grade a teacher would open.

Each card is one standard, then one Mini 4WD aspect. Clarification statements and assessment boundaries stay with the standard. The bronze codes beside the standard name every document that includes it. NG is the Next Generation Science Standards. Each state has its own code.

The arrangement

Kindergarten through grade 5 follow the standards arranged by disciplinary core ideas. Grades 6 through 8 follow the integrated model. Grades 9 through 12 follow the four disciplinary sets: physical science, life science, engineering design, and earth and space science.

Engineering standards that appear in more than one grade are listed once: the K-2 set under kindergarten, the grades 3-5 set under grade 3, and the middle-school set under grade 6. A state standard written for a grade band is repeated in each grade of that band. A grades 9-12 standard that is not tied to one high school subject is repeated in each high school section.

The car

Mini 4WD here is a scale-model lane car: chassis, wheels, tires, axles, gears, motor, cells, rollers, body, and a walled track. Where a standard is about a living thing, the weather, or the Earth, the car is the comparison object in the room. It is not an organism.

A separate project in this workshop, the master class, uses another STEAM: social contracts, trust, etiquette, attitude, and manners. This book does not replace that class. A fair test on an engineering card changes one thing at a time, which is the same discipline that class asks of a race rule.

The modules

91

Kindergarten

89

Grade 1

107

Grade 2

116

Grade 3

127

Grade 4

119

Grade 5

146

Grade 6 (preferred integrated)

140

Grade 7 (preferred integrated)

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Grade 8 (preferred integrated)

395

Grades 9–12 Physical Science

354

Grades 9–12 Life Science

42

Grades 9–12 Engineering Design

361

Grades 9–12 Earth and Space Science

Kindergarten

91 standards

K-LS1-1 NG, CA, MI, NJ, PA

Kindergarten

STANDARD

Use observations to describe patterns of what plants and animals (including humans) need to survive.

MINI 4WD

During one build, list what the builder needs in order to keep going, and what a plant on the windowsill needs. The car sits on the table as the object being built. It does not eat or drink.

K-ESS2-1 NG, CA, MI, NJ, PA

Kindergarten

STANDARD

Use and share observations of local weather conditions to describe patterns over time.

MINI 4WD

On race days, record sunny, cloudy, or rainy, and whether the track felt cooler in the morning than in the afternoon.

K-ESS2-2 NG, CA, MI, NJ, PA

Kindergarten

STANDARD

Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

MINI 4WD

A body and a guide roller change how the car meets the wall. A root can change a sidewalk. Compare the two changes, and keep the living one and the made one distinct.

K-ESS3-1 NG, CA, MI, NJ, PA

Kindergarten

STANDARD

Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

MINI 4WD

Draw the lane the car needs: walls, a place to start, and a place to be picked up. Beside it, draw a plant in the kind of place it needs.

K-ESS3-2 NG, CA, MI, NJ, PA

Kindergarten

STANDARD

Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.

MINI 4WD

Before an outdoor race, ask what a weather report is for, and what the pit should do if the report says heavy rain or high heat.

K-ESS3-3 NG, CA, MI, PA

Kindergarten

STANDARD

Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

MINI 4WD

Name one way race day can leave less mess: pack out the cells, pick up broken parts, and keep oil off the ground.

K-ESS3-3 NJ

Kindergarten

STANDARD

Communicate solutions that will reduce the impact of climate change and humans on the land, water, air, and/or other living things in the local environment.

MINI 4WD

Name one thing the club throws out, such as a used cell, and one way to use it again so less of it is left on the ground. Climate change is the larger matter. The cell is the part you can hold.

K-PS2-1 NG, CA, MI, NJ, PA

Kindergarten

STANDARD

Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

MINI 4WD

Push the free car gently, then harder, then from the side. Record how each push changes the start and the path.

K-PS2-2 NG, CA, MI, NJ, PA

Kindergarten

STANDARD

Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

MINI 4WD

Run the same push into the wall with a guide roller fitted and with it removed. The path says whether that part did the job.

K-PS3-1 NG, CA, MI, NJ, PA

Kindergarten

STANDARD

Make observations to determine the effect of sunlight on Earth's surface.

MINI 4WD

Leave a dark body and a light body in the same sun for the same time. Feel which one warmed more.

K-PS3-2 NG, CA, MI, NJ, PA

Kindergarten

STANDARD

Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.

MINI 4WD

Shade a parked car with a simple cover and compare how hot the body gets in sun and in shade.

K-2-ETS1-1 NG, CA, MI

Kindergarten

STANDARD

Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

MINI 4WD

Name one thing this car fails to do on this track, such as staying off the wall, and say what a new part would have to do about it.

Also printed in the grade 1 and grade 2 documents.

K-2-ETS1-1 NJ

Kindergarten

STANDARD

Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.

MINI 4WD

Ask one question about a problem the car has on the track, and one question about a change in the weather where you race. The car problem is the one you can fix with a part.

New Jersey assigns this standard to grades K-2, so it is printed in each of those grades.

K-2-ETS1-2 NG, CA, MI, NJ

Kindergarten

STANDARD

Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

MINI 4WD

Sketch a roller or a body and say what that shape is for.

Also printed in the grade 1 and grade 2 documents.

K-2-ETS1-3 ^{NG, CA, MI, NJ}

Kindergarten

STANDARD

Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

MINI 4WD

Run two rollers, or two bodies, on the same lane with the same push. Say which one stayed in the lane.

Also printed in the grade 1 and grade 2 documents.

3.4.K-2.A ^{PA}

Kindergarten

STANDARD

Categorize ways people harvest, redistribute, and use natural resources.

MINI 4WD

Sort what one race day uses: cells, a plastic body, a paper score sheet. Say which was taken from the ground and which was made and passed along.

Pennsylvania assigns this standard to grades K-2, so it is printed in each of those grades.

3.5.K-2.A ^{PA}

Kindergarten

STANDARD

Identify and use everyday symbols.

MINI 4WD

Point to the symbols on the car and the cells: a plus, a warning mark, a maker's label. Use them while you build.

Pennsylvania assigns this standard to grades K-2, so it is printed in each of those grades.

K.1A ^{TX}

Kindergarten

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

K.iB TX

Kindergarten

STANDARD

Use scientific practices to plan and conduct simple descriptive investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

K.iC TX

Kindergarten

STANDARD

Identify, describe, and demonstrate safe practices during classroom and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

K.iD TX

Kindergarten

STANDARD

Use tools, including hand lenses, goggles, trays, cups, bowls, sieves or sifters, notebooks, terrariums, aquariums, samples (rocks, sand, soil, loam, gravel, clay, seeds, and plants), windsock, demonstration thermometer, rain gauge, straws, ribbons, non-standard measuring items, blocks or cubes, tuning fork, various flashlights, small paper cups, items that roll, noise makers, hot plate, opaque objects, transparent objects, foil pie pans, foil muffin cups, wax paper, Sun-Moon-Earth model, and plant life cycle model to observe, measure, test, and compare.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

K.iE TX

Kindergarten

STANDARD

Collect observations and measurements as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

K.1F ^{TX}

Kindergarten

STANDARD

Record and organize data using pictures, numbers, words, symbols, and simple graphs.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

K.1G ^{TX}

Kindergarten

STANDARD

Develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

K.2A ^{TX}

Kindergarten

STANDARD

Identify basic advantages and limitations of models such as their size, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

K.2B ^{TX}

Kindergarten

STANDARD

Analyze data by identifying significant features and patterns.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

K.2C ^{TX}

Kindergarten

STANDARD

Use mathematical concepts to compare two objects with common attributes.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

K.2D ^{TX}

Kindergarten

STANDARD

Evaluate a design or object using criteria to determine if it works as intended.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

K.3A ^{TX}

Kindergarten

STANDARD

Develop explanations and propose solutions supported by data and models.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

K.3B ^{TX}

Kindergarten

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

K.3C ^{TX}

Kindergarten

STANDARD

Listen actively to others' explanations to identify important evidence and engage respectfully in scientific discussion.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

K.4A ^{TX}

Kindergarten

STANDARD

Explain how science or an innovation can help others.

MINI 4WD

Name one part on the car that was made so a person could do a job more easily.

K.4B ^{TX}

Kindergarten

STANDARD

Identify scientists and engineers such as Isaac Newton, Mae Jemison, and Ynes Mexia and explore what different scientists and engineers do.

MINI 4WD

Name one person the standard gives and one job an engineer does on a machine. The car is the machine in the room.

K.5A ^{TX}

Kindergarten

STANDARD

Identify and use patterns to describe phenomena or design solutions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

K.5B ^{TX}

Kindergarten

STANDARD

Investigate and predict cause-and-effect relationships in science.

MINI 4WD

Change one thing, the push or one part, and say what that change caused.

K.5C ^{TX}

Kindergarten

STANDARD

Describe the properties of objects in terms of relative size (scale) and relative quantity.

MINI 4WD

Set the car beside a roller and say which is larger.

K.5D ^{TX}

Kindergarten

STANDARD

Examine the parts of a whole to define or model a system.

MINI 4WD

Name the motor, the gears, and the wheels as parts, and the rolling car as the whole.

K.5E ^{TX}

Kindergarten

STANDARD

Identify forms of energy and properties of matter.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

K.5F^{TX}

Kindergarten

STANDARD

Describe the relationship between the structure and function of objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

K.5G^{TX}

Kindergarten

STANDARD

Describe how factors or conditions can cause objects, organisms, and systems to either change or stay the same.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

K.6^{TX}

Kindergarten

STANDARD

Identify and record observable physical properties of objects, including shape, color, texture, and material, and generate ways to classify objects.

MINI 4WD

Sort the body, a washer, and a tire by shape, color, and what they are made of.

K.7^{TX}

Kindergarten

STANDARD

Describe and predict how a magnet interacts with various materials and how magnets can be used to push or pull.

MINI 4WD

Bring a magnet near a washer and near the plastic body. Say which one it pulls.

K.8A ^{TX}

Kindergarten

STANDARD

Communicate the idea that objects can only be seen when a light source is present and compare the effects of different amounts of light on the appearance of objects.

MINI 4WD

Shine a lamp on the car, then block it. Say what the light does and where the shadow falls.

K.8B ^{TX}

Kindergarten

STANDARD

Demonstrate and explain that light travels through some objects and is blocked by other objects, creating shadows.

MINI 4WD

Shine a lamp on the car, then block it. Say what the light does and where the shadow falls.

K.9A ^{TX}

Kindergarten

STANDARD

Identify, describe, and predict the patterns of day and night and their observable characteristics.

MINI 4WD

Name a pattern in three runs, such as the car leaving the lane at the same corner.

K.9B ^{TX}

Kindergarten

STANDARD

Observe, describe, and illustrate the Sun, Moon, stars, and objects in the sky such as clouds.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

K.10A^{TX}

Kindergarten

STANDARD

Describe and classify rocks by the observable properties of size, shape, color, and texture.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

K.10B^{TX}

Kindergarten

STANDARD

Observe and describe weather changes from day to day and over seasons.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

K.10C^{TX}

Kindergarten

STANDARD

Identify evidence that supports the idea that air is all around us and demonstrate that wind is moving air using items such as a windsock, pinwheel, or ribbon.

MINI 4WD

Show that air is moving with a ribbon or a pinwheel beside the track. The car sits in that air.

K.11^{TX}

Kindergarten

STANDARD

Observe and generate examples of practical uses for rocks, soil, and water.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

K.12A^{TX}

Kindergarten

STANDARD

Observe and identify the dependence of plants on air, sunlight, water, nutrients in the soil, and space to grow.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

K.12B^{TX}

Kindergarten

STANDARD

Observe and identify the dependence of animals on air, water, food, space, and shelter.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

K.13A^{TX}

Kindergarten

STANDARD

Identify the structures of plants, including roots, stems, leaves, flowers, and fruits.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

K.13B^{TX}

Kindergarten

STANDARD

Identify the different structures that animals have that allow them to interact with their environment such as seeing, hearing, moving, and grasping objects.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

K.13C^{TX}

Kindergarten

STANDARD

Identify and record the changes from seed, seedling, plant, flower, and fruit in a simple plant life cycle.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

K.13D^{TX}

Kindergarten

STANDARD

Identify ways that young plants resemble the parent plant.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

K.ESS.1^{OH}

Kindergarten

STANDARD

Weather changes are long-term and short-term. Weather changes occur throughout the day and from day to day. Air is a nonliving substance that surrounds Earth and wind is air that is moving. Wind, temperature and precipitation can be used to document short-term weather changes that are observable. Yearly weather changes (seasons) are observable patterns in the daily weather changes. Note: The focus is on observing the weather patterns of seasons. The reason for changing seasons is not appropriate for this grade level; this is found in grade 7.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

K.ESS.2 ^{OH}

Kindergarten

STANDARD

The moon, sun and stars can be observed at different times of the day or night. The moon, sun and stars appear in different positions at different times of the day or night. Sometimes the moon is visible during the night, sometimes the moon is visible during the day and at other times the moon is not visible at all. The observable shape of the moon changes in size very slowly throughout the month. The sun is visible only during the day. The sun's position in the sky appears to change in a single day and from season to season. Stars are visible at night, some are visible in the evening or morning and some are brighter than others.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

K.LS.1 ^{OH}

Kindergarten

STANDARD

Living things have specific characteristics and traits. Living things grow and reproduce. Living things are found worldwide.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

K.LS.2 ^{OH}

Kindergarten

STANDARD

Living things have physical traits and behaviors, which influence their survival. Living things are made up of a variety of structures. Some traits can be observable structures. Some of these structures and behaviors influence their survival.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

K.PS.1 ^{OH}

Kindergarten

STANDARD

Objects and materials can be sorted and described by their properties. Objects can be sorted and described by the properties of the materials from which they are made. Some of the properties can include color, size and texture.

MINI 4WD

Sort two parts from the car by a property you can see or feel. Say the property out loud.

K.PS.2 ^{OH}

Kindergarten

STANDARD

Some objects and materials can be made to vibrate to produce sound. Sound is produced by touching, blowing or tapping objects. The sounds that are produced vary depending on the properties of objects. Sound is produced when objects vibrate.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

K.1 ^{AL}

Kindergarten

STANDARD

Plan and carry out investigations to determine the effects of forces of different strengths and directions on the motion of an object, including speed, direction, and distance traveled.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

K.2 ^{AL}

Kindergarten

STANDARD

Analyze data from investigations to determine whether a design solution provides sufficient force to change the speed or direction of an object.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

K.3^{AL}

Kindergarten

STANDARD

Use data from observations to distinguish characteristics of living and nonliving things.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

K.4^{AL}

Kindergarten

STANDARD

Use observations to determine patterns of what plants and animals (including humans) need to survive, including light, water, and nutrients.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

K.5^{AL}

Kindergarten

STANDARD

Gather information from observations and media to explain how plants and animals can provide for their needs by changing their environment.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

K.6^{AL}

Kindergarten

STANDARD

Use models of natural habitats to represent the interdependence among plants and animals native to their community.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

K.8 ^{AL}

Kindergarten

STANDARD

Design, construct, and test a device to reduce the effects of sunlight.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

K.9 ^{AL}

Kindergarten

STANDARD

Observe, record, and communicate local weather patterns over a period of time.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

K.10 ^{AL}

Kindergarten

STANDARD

Obtain, evaluate, and communicate information about using weather forecasts to make plans and prepare for severe weather.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

K.11 ^{AL}

Kindergarten

STANDARD

Identify a problem and design possible solutions that lessen the human impact on the local environment.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

SC.K.N.I.1^{FL}

Kindergarten

STANDARD

Collaborate with a partner to collect information.

MINI 4WD

With a partner, record one observation of the car on the lane, then compare the two records.

SC.K.N.I.2^{FL}

Kindergarten

STANDARD

Make observations of the natural world and know that they are descriptors collected using the five senses.

MINI 4WD

Name what you see and hear when the car runs, and keep that separate from what you think caused it.

SC.K.N.I.3^{FL}

Kindergarten

STANDARD

Keep records as appropriate -- such as pictorial records -- of investigations conducted.

MINI 4WD

Keep a picture or a note of one run, and say what the record shows.

SC.K.N.I.4^{FL}

Kindergarten

STANDARD

Observe and create a visual representation of an object which includes its major features.

MINI 4WD

Draw the car and include the parts you can point to.

SC.K.N.1.5^{FL}

Kindergarten

STANDARD

Recognize that learning can come from careful observation.

MINI 4WD

Watch one run, then say one thing you learned only because you watched.

SC.K.E.5.1^{FL}

Kindergarten

STANDARD

Explore the Law of Gravity by investigating how objects are pulled toward the ground unless something holds them up.

MINI 4WD

Let go of the car and say what pulls it toward the floor unless something holds it up.

SC.K.E.5.2^{FL}

Kindergarten

STANDARD

Recognize the repeating pattern of day and night.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.K.E.5.3^{FL}

Kindergarten

STANDARD

Recognize that the Sun can only be seen in the daytime.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.K.E.5.4 ^{FL}

Kindergarten

STANDARD

Observe that sometimes the Moon can be seen at night and sometimes during the day.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.K.E.5.5 ^{FL}

Kindergarten

STANDARD

Observe that things can be big and things can be small as seen from Earth.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.K.E.5.6 ^{FL}

Kindergarten

STANDARD

Observe that some objects are far away and some are nearby as seen from Earth.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.K.P.8.1 ^{FL}

Kindergarten

STANDARD

Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light) and texture.

MINI 4WD

Sort two parts by one property the standard names, such as size, color, or texture.

SC.K.P.9.1 ^{FL}

Kindergarten

STANDARD

Recognize that the shape of materials such as paper and clay can be changed by cutting, tearing, crumpling, smashing, or rolling.

MINI 4WD

Fold or tear a scrap, and say what changed. Leave living examples, such as decay, in a published account.

SC.K.P.10.1 ^{FL}

Kindergarten

STANDARD

Observe that things that make sound vibrate.

MINI 4WD

Use a lamp or the motor's sound for the wave the standard names, and say what changed.

SC.K.P.12.1 ^{FL}

Kindergarten

STANDARD

Investigate that things move in different ways, such as fast, slow, etc.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.K.P.13.1 ^{FL}

Kindergarten

STANDARD

Observe that a push or a pull can change the way an object is moving.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.K.L.14.1 ^{FL}

Kindergarten

STANDARD

Recognize the five senses and related body parts.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.K.L.14.2 ^{FL}

Kindergarten

STANDARD

Recognize that some books and other media portray animals and plants with characteristics and behaviors they do not have in real life.

MINI 4WD

Compare a pictured animal with a published account of the real animal. The car is neither one.

SC.K.L.14.3 ^{FL}

Kindergarten

STANDARD

Observe plants and animals, describe how they are alike and how they are different in the way they look and in the things they do.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

Grade 1

89 standards

1-LS1-1 ^{NG, CA, MI, NJ, PA}

Grade 1

STANDARD

Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

MINI 4WD

A guide roller sticks out so the car can glance off a wall. Name an animal part that sticks out to do a job, and say which problem the roller is standing in for.

1-LS1-2 NG, CA, MI, NJ, PA

Grade 1

STANDARD

Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

MINI 4WD

Read a short account of a builder keeping a car going: a body that rubs, a flat cell, a roller that comes loose. The builder is the parent. The car is the offspring. The pattern is what the builder does so the car can survive the next run.

1-LS3-1 NG, CA, MI, NJ, PA

Grade 1

STANDARD

Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

MINI 4WD

Set a seedling beside a picture of the parent plant, and a car beside the box it came from. The seedling is like the parent and not a copy. The car is a copy of a mold.

1-ESS1-1 NG, CA, MI, NJ, PA

Grade 1

STANDARD

Use observations of the sun, moon, and stars to describe patterns that can be predicted.

MINI 4WD

Place the car in the sun. Through one day, track the car's shadow. The shadow's path is the pattern, and the next sunny day should repeat it.

1-ESS1-2 NG, CA, MI, NJ, PA

Grade 1

STANDARD

Make observations at different times of year to relate the amount of daylight to the time of year.

MINI 4WD

Compare the daylight on a winter race day and a summer race day. In mid winter and mid summer, observe what time you need to start and end the racing while there is light outside, so the cars are not running in the dark.

1-PS4-1 NG, CA, MI, NJ, PA

Grade 1

STANDARD

Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

MINI 4WD

Let a roller chatter against a spinning tire and listen. Then touch the body while the motor runs and feel the buzz.

1-PS4-2 NG, CA

Grade 1

STANDARD

Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.

MINI 4WD

Switch the room light off with the car on the table. It stays unseen until a lamp hits it.

1-PS4-3 NG, CA, MI, NJ, PA

Grade 1

STANDARD

Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light.

MINI 4WD

Shine a flashlight at the car through a clear wing, a paper card, and a metal washer. Record what the beam does in each case.

1-PS4-4 NG, CA, MI, NJ, PA

Grade 1

STANDARD

Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.

MINI 4WD

Use a lamp or a bell at the start so the starter can signal the far end of the track without shouting.

K-2-ETS1-1 ^{NJ}

Grade 1

STANDARD

Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.

MINI 4WD

Ask one question about a problem the car has on the track, and one question about a change in the weather where you race. The car problem is the one you can fix with a part.

New Jersey assigns this standard to grades K-2, so it is printed in each of those grades.

3.4.K-2.A ^{PA}

Grade 1

STANDARD

Categorize ways people harvest, redistribute, and use natural resources.

MINI 4WD

Sort what one race day uses: cells, a plastic body, a paper score sheet. Say which was taken from the ground and which was made and passed along.

Pennsylvania assigns this standard to grades K-2, so it is printed in each of those grades.

3.5.K-2.A ^{PA}

Grade 1

STANDARD

Identify and use everyday symbols.

MINI 4WD

Point to the symbols on the car and the cells: a plus, a warning mark, a maker's label. Use them while you build.

Pennsylvania assigns this standard to grades K-2, so it is printed in each of those grades.

1.1A ^{TX}

Grade 1

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

1.1B ^{TX}

Grade 1

STANDARD

Use scientific practices to plan and conduct simple descriptive investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

1.1C ^{TX}

Grade 1

STANDARD

Identify, describe, and demonstrate safe practices during classroom and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

1.1D ^{TX}

Grade 1

STANDARD

Use tools, including hand lenses, goggles, heat-resistant gloves, trays, cups, bowls, beakers, sieves/sifters, tweezers, primary balance, notebooks, terrariums, aquariums, stream tables, soil samples (loam, sand, gravel, rocks, and clay), seeds, plants, windsock, pinwheel, student thermometer, demonstration thermometer, rain gauge, straws, ribbons, non-standard measuring items, flashlights, sandpaper, wax paper, items that are magnetic, non-magnetic items, a variety of magnets, hot plate, aluminum foil, Sun-Moon-Earth model, and plant and animal life cycle models to observe, measure, test, and compare.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

1.1E ^{TX}

Grade 1

STANDARD

Collect observations and measurements as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

1.1F ^{TX}

Grade 1

STANDARD

Record and organize data using pictures, numbers, words, symbols, and simple graphs.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

1.1G ^{TX}

Grade 1

STANDARD

Develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

1.2A ^{TX}

Grade 1

STANDARD

Identify basic advantages and limitations of models such as their size, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

1.2B ^{TX}

Grade 1

STANDARD

Analyze data by identifying significant features and patterns.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

1.2C ^{TX}

Grade 1

STANDARD

Use mathematical concepts to compare two objects with common attributes.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

1.2D ^{TX}

Grade 1

STANDARD

Evaluate a design or object using criteria to determine if it works as intended.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

1.3A ^{TX}

Grade 1

STANDARD

Develop explanations and propose solutions supported by data and models.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

1.3B ^{TX}

Grade 1

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

1.3C ^{TX}

Grade 1

STANDARD

Listen actively to others' explanations to identify important evidence and engage respectfully in scientific discussion.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

1.4A ^{TX}

Grade 1

STANDARD

Explain how science or an innovation can help others.

MINI 4WD

Name one part on the car that was made so a person could do a job more easily.

1.4B ^{TX}

Grade 1

STANDARD

Identify scientists and engineers such as Katherine Johnson, Sally Ride, and Ernest Just and explore what different scientists and engineers do.

MINI 4WD

Name one person the standard gives and one job an engineer does on a machine. The car is the machine in the room.

1.5A ^{TX}

Grade 1

STANDARD

Identify and use patterns to describe phenomena or design solutions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

1.5B ^{TX}

Grade 1

STANDARD

Investigate and predict cause-and-effect relationships in science.

MINI 4WD

Change one thing, the push or one part, and say what that change caused.

1.5C ^{TX}

Grade 1

STANDARD

Describe the properties of objects in terms of relative size (scale) and relative quantity.

MINI 4WD

Set the car beside a roller and say which is larger.

1.5D^{TX}

Grade 1

STANDARD

Examine the parts of a whole to define or model a system.

MINI 4WD

Name the motor, the gears, and the wheels as parts, and the rolling car as the whole.

1.5E^{TX}

Grade 1

STANDARD

Identify forms of energy and properties of matter.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

1.5F^{TX}

Grade 1

STANDARD

Describe the relationship between structure and function of objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

1.5G^{TX}

Grade 1

STANDARD

Describe how factors or conditions can cause objects, organisms, and systems to either change or stay the same.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

1.6A ^{TX}

Grade 1

STANDARD

Classify objects by observable physical properties, including, shape, color, and texture, and attributes such as larger and smaller and heavier and lighter.

MINI 4WD

Sort the body, a washer, and a tire by shape, color, and what they are made of.

1.6B ^{TX}

Grade 1

STANDARD

Explain and predict changes in materials caused by heating and cooling.

MINI 4WD

Compare a motor can after a run with a part left in the shade. Name the heat move you mean. Do not open a cell.

1.6C ^{TX}

Grade 1

STANDARD

Demonstrate and explain that a whole object is a system made of organized parts such as a toy that can be taken apart and put back together.

MINI 4WD

Take the car into chassis, wheels, and body, then put it back. The rolling car is the whole.

1.7A ^{TX}

Grade 1

STANDARD

Explain how pushes and pulls can start, stop, or change the speed or direction of an object's motion.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

1.7B ^{TX}

Grade 1

STANDARD

Plan and conduct a descriptive investigation that predicts how pushes and pulls can start, stop, or change the speed or direction of an object's motion.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

1.8A ^{TX}

Grade 1

STANDARD

Investigate and describe applications of heat in everyday life such as cooking food or using a clothes dryer.

MINI 4WD

Name a heat use you can point at, such as a warm motor can after a run. Cooking stays off the track.

1.8B ^{TX}

Grade 1

STANDARD

Describe how some changes caused by heat may be reversed such as melting butter and other changes cannot be reversed such as cooking an egg or baking a cake.

MINI 4WD

Name a heat use you can point at, such as a warm motor can after a run. Cooking stays off the track.

1.9 ^{TX}

Grade 1

STANDARD

Describe and predict the patterns of seasons of the year such as order of occurrence and changes in nature.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

1.10A^{TX}

Grade 1

STANDARD

Investigate and document the properties of particle size, shape, texture, and color and the components of different types of soils such as topsoil, clay, and sand.

MINI 4WD

Look at two soils, or at grit on a tire, and say the size and color of the bits.

1.10B^{TX}

Grade 1

STANDARD

Investigate and describe how water can move rock and soil particles from one place to another.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

1.10C^{TX}

Grade 1

STANDARD

Compare the properties of puddles, ponds, streams, rivers, lakes, and oceans, including color, clarity, size, shape, and whether it is freshwater or saltwater.

MINI 4WD

Compare a puddle on the track with a published picture of a lake. Say how color and size differ.

1.10D^{TX}

Grade 1

STANDARD

Describe and record observable characteristics of weather, including hot or cold, clear or cloudy, calm or windy, and rainy or icy, and explain the impact of weather on daily choices.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

1.II.A^{TX}

Grade 1

STANDARD

Identify and describe how plants, animals, and humans use rocks, soil, and water.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

1.II.B^{TX}

Grade 1

STANDARD

Explain why water conservation is important.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

1.II.C^{TX}

Grade 1

STANDARD

Describe ways to conserve water such as turning off the faucet when brushing teeth and protect natural sources of water such as keeping trash out of bodies of water.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

1.I2.A^{TX}

Grade 1

STANDARD

Classify living and nonliving things based upon whether they have basic needs and produce young.

MINI 4WD

A plant needs water and can make young. The car does not. Sort a living thing and the car that way.

1.12B ^{TX}

Grade 1

STANDARD

Describe and record examples of interactions and dependence between living and nonliving components in terrariums or aquariums.

MINI 4WD

A plant needs water and can make young. The car does not. Sort a living thing and the car that way.

1.12C ^{TX}

Grade 1

STANDARD

Identify and illustrate how living organisms depend on each other through food chains.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

1.13A ^{TX}

Grade 1

STANDARD

Identify the external structures of different animals and compare how those structures help different animals live, move, and meet basic needs for survival.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

1.13B ^{TX}

Grade 1

STANDARD

Record observations of and describe basic life cycles of animals, including a bird, a mammal, and a fish.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

1.13C^{TX}

Grade 1

STANDARD

Compare ways that young animals resemble their parents.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

1.ESS.1^{OH}

Grade 1

STANDARD

The sun is the principal source of energy. Sunlight warms Earth's land, air and water. The amount of exposure to sunlight affects the amount of warming or cooling of air, water and land.

MINI 4WD

Put the car in the sun and then in the shade. Say which place warmed it.

1.ESS.2^{OH}

Grade 1

STANDARD

Water on Earth is present in many forms. The physical properties of water can change. These changes occur due to changing energy. Water can change from a liquid to a solid and from a solid to a liquid. Note: Water as a vapor is not introduced until grade 2; the water cycle is reserved for later grades.

MINI 4WD

Use a published account of the water the standard names. A wet tire on the lane is a local note beside it.

1.LS.1^{OH}

Grade 1

STANDARD

Living things have basic needs, which are met by obtaining materials from the physical environment. Living things require energy, water, and a particular range of temperatures in their environments. Plants get energy from sunlight. Animals get energy from plants and other animals. Living things acquire resources from the living and nonliving components of the environment.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

1.LS.2 ^{OH}

Grade 1

STANDARD

Living things survive only in environments that meet their needs. Resources are necessary to meet the needs of an individual and populations of individuals. Living things interact with their physical environments as they meet those needs. Effects of seasonal changes within the local environment directly impact the availability of resources.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

1.PS.1 ^{OH}

Grade 1

STANDARD

Properties of objects and materials can change. Objects and materials change when exposed to various conditions, such as heating or cooling. Changes in temperature are a result of changes in energy. Not all materials change in the same way.

MINI 4WD

Sort two parts from the car by a property you can see or feel. Say the property out loud.

1.PS.2 ^{OH}

Grade 1

STANDARD

Objects can be moved in a variety of ways, such as straight, zigzag, circular and back and forth. The position of an object can be described by locating it relative to another object or to the object's surroundings. An object is in motion when its position is changing. The motion of an object can be affected by pushing or pulling. A push or pull is a force that can make an object move faster, slower or go in a different direction. Changes in motion are a result of changes in energy.

MINI 4WD

Use a published account for the thing the standard names. The car on the table is the comparison object in the room.

I.2^{AL}

Grade 1

STANDARD

Use evidence from observations to explain that light is necessary in order for an object to be seen.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

I.3^{AL}

Grade 1

STANDARD

Plan and carry out investigations to determine how light is affected when it interacts with various types of materials.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

I.4^{AL}

Grade 1

STANDARD

Design and construct a device that uses light or sound waves to send a communication signal over a distance.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

I.5^{AL}

Grade 1

STANDARD

Use information from observations to explain how various external features help living things survive, grow, and meet their needs.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

I.6^{AL}

Grade 1

STANDARD

Obtain information from text and other media to provide evidence that parents and their offspring engage in patterns of behavior that help the offspring survive.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

I.7^{AL}

Grade 1

STANDARD

Make observations to identify the similarities and differences between offspring and their parents.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

I.8^{AL}

Grade 1

STANDARD

Observe, describe, and predict patterns of the sun, moon, and stars as they appear in the sky.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

I.9^{AL}

Grade 1

STANDARD

Use observations of seasonal sunrise and sunset patterns to describe the relationship between the number of hours of daylight and the time of year.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

SC.I.N.I.1^{FL}

Grade 1

STANDARD

Raise questions about the natural world, investigate them in teams through free exploration, and generate appropriate explanations based on those explorations.

MINI 4WD

With a partner, record one observation of the car on the lane, then compare the two records.

SC.I.N.I.2^{FL}

Grade 1

STANDARD

Using the five senses as tools, make careful observations, describe objects in terms of number, shape, texture, size, weight, color, and motion, and compare their observations with others.

MINI 4WD

Name what you see and hear when the car runs, and keep that separate from what you think caused it.

SC.I.N.I.3^{FL}

Grade 1

STANDARD

Keep records as appropriate - such as pictorial and written records - of investigations conducted.

MINI 4WD

Keep a picture or a note of one run, and say what the record shows.

SC.I.N.I.4^{FL}

Grade 1

STANDARD

Ask "how do you know?" in appropriate situations.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

SC.1.E.5.1^{FL}

Grade 1

STANDARD

Observe and discuss that there are more stars in the sky than anyone can easily count and that they are not scattered evenly in the sky.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.1.E.5.2^{FL}

Grade 1

STANDARD

Explore the Law of Gravity by demonstrating that Earth's gravity pulls any object on or near Earth toward it even though nothing is touching the object.

MINI 4WD

Let go of the car and say what pulls it toward the floor unless something holds it up.

SC.1.E.5.3^{FL}

Grade 1

STANDARD

Investigate how magnifiers make things appear bigger and help people see things they could not see without them.

MINI 4WD

Look at a small mark on the car with a magnifier, and say what you can see that you could not see without it.

SC.1.E.5.4^{FL}

Grade 1

STANDARD

Identify the beneficial and harmful properties of the Sun.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.1.E.6.1 ^{FL}

Grade 1

STANDARD

Recognize that water, rocks, soil, and living organisms are found on Earth's surface.

MINI 4WD

Use a published Earth account for the rock or the process the standard names. The car is the object on the table.

SC.1.E.6.2 ^{FL}

Grade 1

STANDARD

Describe the need for water and how to be safe around water.

MINI 4WD

Say where water is kept away from the cells and the lane.

SC.1.E.6.3 ^{FL}

Grade 1

STANDARD

Recognize that some things in the world around us happen fast and some happen slowly.

MINI 4WD

Name one change you can see during one run, and one change the standard says happens too slowly to watch in that time.

SC.1.P.8.1 ^{FL}

Grade 1

STANDARD

Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light), texture, and whether objects sink or float.

MINI 4WD

Sort two parts by one property the standard names, such as size, color, or texture.

SC.1.P.12.1 ^{FL}

Grade 1

STANDARD

Demonstrate and describe the various ways that objects can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.1.P.13.1 ^{FL}

Grade 1

STANDARD

Demonstrate that the way to change the motion of an object is by applying a push or a pull.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.1.L.14.1 ^{FL}

Grade 1

STANDARD

Make observations of living things and their environment using the five senses.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.1.L.14.2 ^{FL}

Grade 1

STANDARD

Identify the major parts of plants, including stem, roots, leaves, and flowers.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.I.L.14.3 ^{FL}

Grade 1

STANDARD

Differentiate between living and nonliving things.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.I.L.16.1 ^{FL}

Grade 1

STANDARD

Make observations that plants and animals closely resemble their parents, but variations exist among individuals within a population.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.I.L.17.1 ^{FL}

Grade 1

STANDARD

Through observation, recognize that all plants and animals, including humans, need the basic necessities of air, water, food, and space.

MINI 4WD

List what the builder needs during one build, and what the standard says a living thing needs. The car does not eat or drink.

Grade 2

107 standards

2-LS2-1 ^{NG, CA, MI, NJ, PA}

Grade 2

STANDARD

Plan and conduct an investigation to determine if plants need sunlight and water to grow.

MINI 4WD

Grow one plant with sun and water and one in a dark cupboard. The car on the bench is the object that does not grow in either place.

2-LS2-2 NG, CA, MI, NJ, PA

Grade 2

STANDARD

Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

MINI 4WD

The finished car does not carry seeds. A paper pod that rides on the body and falls off in a box is a model of an animal dropping a seed somewhere new.

2-LS4-1 NG, CA, MI, NJ, PA

Grade 2

STANDARD

Make observations of plants and animals to compare the diversity of life in different habitats.

MINI 4WD

List the living things in a sunny lot and in a shady curb. The car you carried is the same object in both places. The living lists are not.

2-ESS1-1 NG, CA, MI, NJ, PA

Grade 2

STANDARD

Use information from several sources to provide evidence that Earth events can occur quickly or slowly.

MINI 4WD

One hit of the car can dent a soft clay bank. A river cuts a valley over a long time. Use those as the quick event and the slow event.

2-ESS2-1 NG, CA, MI, NJ, PA

Grade 2

STANDARD

Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.

MINI 4WD

Try a paper wall and a row of stones to keep a sand pile from washing away under a cup of water. The lane is what you are trying to keep.

2-ESS2-2 ^{NG, CA, MI, NJ, PA}

Grade 2

STANDARD

Develop a model to represent the shapes and kinds of land and bodies of water in an area.

MINI 4WD

Shape clay into a hill, a flat, and a puddle, and set the car only on the flat.

2-ESS2-2 ^{MI}

Grade 2

STANDARD

Develop a model to represent the state of Michigan and the Great Lakes, or a more local land area and water body.

MINI 4WD

Shape a sketch into Michigan and the Great Lakes, or into the land and water where you race. Set the car only on the land.

2-ESS2-3 ^{NG, CA, MI, NJ, PA}

Grade 2

STANDARD

Obtain information to identify where water is found on Earth and that it can be solid or liquid.

MINI 4WD

Find water as ice in a cold pack and as liquid in a bottle. The cells in the car are not a store of the Earth's water.

2-ESS2-3 ^{MI}

Grade 2

STANDARD

Obtain information to identify where fresh water is found on Earth, including the Great Lakes and Great Lakes Basin.

MINI 4WD

From a published map, point to fresh water in the Great Lakes. A bottle at the pit is a small fresh sample. The cells in the car are not a store of that water.

2-PS1-1 NG, CA, MI, NJ, PA

Grade 2

STANDARD

Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

MINI 4WD

Sort chassis plastic, a metal washer, and a rubber tire by how they look, bend, and feel.

2-PS1-2 NG, CA, MI, NJ, PA

Grade 2

STANDARD

Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.

MINI 4WD

Try a plastic roller and a metal washer as the part that meets the wall. Say which one suits a contact that should slide, and which property decided it.

2-PS1-3 NG, CA, MI, NJ, PA

Grade 2

STANDARD

Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.

MINI 4WD

Take the car into chassis, wheels, axles, gears, motor, and body. Build those pieces into another rolling shape, then back into the car.

2-PS1-4 NG, CA, MI, NJ, PA

Grade 2

STANDARD

Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

MINI 4WD

Freeze the water on a wet tire, then let it melt. Crease a paper number flag. The ice returns to water. The crease stays.

K-2-ETS1-1 ^{NJ}

Grade 2

STANDARD

Ask questions, make observations, and gather information about a situation people want to change (e.g., climate change) to define a simple problem that can be solved through the development of a new or improved object or tool.

MINI 4WD

Ask one question about a problem the car has on the track, and one question about a change in the weather where you race. The car problem is the one you can fix with a part.

New Jersey assigns this standard to grades K-2, so it is printed in each of those grades.

3.4.K-2.A ^{PA}

Grade 2

STANDARD

Categorize ways people harvest, redistribute, and use natural resources.

MINI 4WD

Sort what one race day uses: cells, a plastic body, a paper score sheet. Say which was taken from the ground and which was made and passed along.

Pennsylvania assigns this standard to grades K-2, so it is printed in each of those grades.

3.5.K-2.A ^{PA}

Grade 2

STANDARD

Identify and use everyday symbols.

MINI 4WD

Point to the symbols on the car and the cells: a plus, a warning mark, a maker's label. Use them while you build.

Pennsylvania assigns this standard to grades K-2, so it is printed in each of those grades.

2.1A ^{TX}

Grade 2

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

2.1B ^{TX}

Grade 2

STANDARD

Use scientific practices to plan and conduct simple descriptive investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

2.1C ^{TX}

Grade 2

STANDARD

Identify, describe, and demonstrate safe practices during classroom and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

2.1D ^{TX}

Grade 2

STANDARD

Use tools, including hand lenses, goggles, heat-resistant gloves, trays, cups, bowls, beakers, notebooks, stream tables, soil, sand, gravel, flowering plants, student thermometer, demonstration thermometer, rain gauge, flashlights, ramps, balls, spinning tops, drums, tuning forks, sandpaper, wax paper, items that are flexible, non-flexible items, magnets, hot plate, aluminum foil, Sun-Moon-Earth model, and frog and butterfly life cycle models to observe, measure, test, and compare.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

2.1E^{TX}

Grade 2

STANDARD

Collect observations and measurements as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

2.1F^{TX}

Grade 2

STANDARD

Record and organize data using pictures, numbers, words, symbols, and simple graphs.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

2.1G^{TX}

Grade 2

STANDARD

Develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

2.2A^{TX}

Grade 2

STANDARD

Identify basic advantages and limitations of models such as their size, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

2.2B^{TX}

Grade 2

STANDARD

Analyze data by identifying significant features and patterns.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

2.2C^{TX}

Grade 2

STANDARD

Use mathematical concepts to compare two objects with common attributes.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

2.2D^{TX}

Grade 2

STANDARD

Evaluate a design or object using criteria to determine if it works as intended.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

2.3A^{TX}

Grade 2

STANDARD

Develop explanations and propose solutions supported by data and models.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

2.3B^{TX}

Grade 2

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

2.3C^{TX}

Grade 2

STANDARD

Listen actively to others' explanations to identify important evidence and engage respectfully in scientific discussion.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

2.4A^{TX}

Grade 2

STANDARD

Explain how science or an innovation can help others.

MINI 4WD

Name one part on the car that was made so a person could do a job more easily.

2.4B^{TX}

Grade 2

STANDARD

Identify scientists and engineers such as Alexander Graham Bell, Marie Daly, Mario Molina, and Jane Goodall and explore what different scientists and engineers do.

MINI 4WD

Name one person the standard gives and one job an engineer does on a machine. The car is the machine in the room.

2.5A ^{TX}

Grade 2

STANDARD

Identify and use patterns to describe phenomena or design solutions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

2.5B ^{TX}

Grade 2

STANDARD

Investigate and predict cause-and-effect relationships in science.

MINI 4WD

Change one thing, the push or one part, and say what that change caused.

2.5C ^{TX}

Grade 2

STANDARD

Measure and describe the properties of objects in terms of size and quantity.

MINI 4WD

Set the car beside a roller. Say which is larger, and which you have more of.

2.5D ^{TX}

Grade 2

STANDARD

Examine the parts of a whole to define or model a system.

MINI 4WD

Name the motor, the gears, and the wheels as parts, and the rolling car as the whole.

2.5E^{TX}

Grade 2

STANDARD

Identify forms of energy and properties of matter.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

2.5F^{TX}

Grade 2

STANDARD

Describe the relationship between structure and function of objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

2.5G^{TX}

Grade 2

STANDARD

Describe how factors or conditions can cause objects, organisms, and systems to either change or stay the same.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

2.6A^{TX}

Grade 2

STANDARD

Classify matter by observable physical properties, including texture, flexibility, and relative temperature, and identify whether a material is a solid or liquid.

MINI 4WD

Sort the body, a washer, and a tire by shape, color, and what they are made of.

2.6B ^{TX}

Grade 2

STANDARD

Conduct a descriptive investigation to explain how physical properties can be changed through processes such as cutting, folding, sanding, melting, or freezing.

MINI 4WD

Sort the body, a washer, and a tire by shape, color, and what they are made of.

2.6C ^{TX}

Grade 2

STANDARD

Demonstrate that small units such as building blocks can be combined or reassembled to form new objects for different purposes and explain the materials chosen based on their physical properties.

MINI 4WD

Sort the body, a washer, and a tire by shape, color, and what they are made of.

2.7A ^{TX}

Grade 2

STANDARD

Explain how objects push on each other and may change shape when they touch or collide.

MINI 4WD

Roll the car into a wall or a roller. Say what changed shape, if anything.

2.7B ^{TX}

Grade 2

STANDARD

Plan and conduct a descriptive investigation to demonstrate how the strength of a push and pull changes an object's motion.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

2.8A ^{TX}

Grade 2

STANDARD

Demonstrate and explain that sound is made by vibrating matter and that vibrations can be caused by a variety of means, including sound.

MINI 4WD

Touch the body while the motor runs and feel the buzz. That vibration is the sound.

2.8B ^{TX}

Grade 2

STANDARD

Explain how different levels of sound are used in everyday life such as a whisper in a classroom or a fire alarm.

MINI 4WD

Compare a quiet word at the start with the motor's buzz. Say which one carries farther.

2.8C ^{TX}

Grade 2

STANDARD

Design and build a device using tools and materials that uses sound to solve the problem of communicating over a distance.

MINI 4WD

Use a bell at the start so the starter can signal the far end of the track.

2.9A ^{TX}

Grade 2

STANDARD

Describe the Sun as a star that provides light and heat and explain that the Moon reflects the Sun's light.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

2.9B^{TX}

Grade 2

STANDARD

Observe objects in the sky using tools such as a telescope and compare how objects in the sky are more visible and can appear different with a tool than with an unaided eye.

MINI 4WD

Look at the sky with the tool you have. The car is the object the tool was not made for.

2.10A^{TX}

Grade 2

STANDARD

Investigate and describe how wind and water move soil and rock particles across the Earth's surface such as wind blowing sand into dunes on a beach or a river carrying rocks as it flows.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

2.10B^{TX}

Grade 2

STANDARD

Measure, record, and graph weather information, including temperature and precipitation.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

2.10C^{TX}

Grade 2

STANDARD

Investigate different types of severe weather events such as a hurricane, tornado, or flood and explain that some events are more likely than others in a given region.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

2.II.A^{TX}

Grade 2

STANDARD

Distinguish between natural and manmade resources.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

2.II.B^{TX}

Grade 2

STANDARD

Describe how human impact can be limited by making choices to conserve and properly dispose of materials such as reducing use of, reusing, or recycling paper, plastic, and metal.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

2.I2.A^{TX}

Grade 2

STANDARD

Describe how the physical characteristics of environments, including the amount of rainfall, support plants and animals within an ecosystem.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

2.I2.B^{TX}

Grade 2

STANDARD

Create and describe food chains identifying producers and consumers to demonstrate how animals depend on other living things.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

2.I2C^{TX}

Grade 2

STANDARD

Explain and demonstrate how some plants depend on other living things, wind, or water for pollination and to move their seeds around.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

2.I3A^{TX}

Grade 2

STANDARD

Identify the roots, stems, leaves, flowers, fruits, and seeds of plants and compare how those structures help different plants meet their basic needs for survival.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

2.I3B^{TX}

Grade 2

STANDARD

Record and compare how the structures and behaviors of animals help them find and take in food, water, and air.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

2.I3C^{TX}

Grade 2

STANDARD

Record and compare how being part of a group helps animals obtain food, defend themselves, and cope with changes.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

2.I3D^{TX}

Grade 2

STANDARD

Investigate and describe some of the unique life cycles of animals where young animals do not resemble their parents, including butterflies and frogs.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

2.ESS.1^{OH}

Grade 2

STANDARD

The atmosphere is primarily made up of air. Air has properties that can be observed and measured. The transfer of energy in the atmosphere causes air movement, which is felt as wind. Wind speed and direction can be measured.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

2.ESS.2^{OH}

Grade 2

STANDARD

Water is present in the atmosphere. Water is present in the atmosphere as water vapor. When water vapor in the atmosphere cools, it forms clouds, fog, rain, ice, snow, sleet or hail. Note: The emphasis at this grade level is investigating condensation and evaporation, not memorizing the water cycle itself. Note: The emphasis is not in naming cloud types, but in relating the characteristics of the clouds with weather.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

2.ESS.3 ^{OH}

Grade 2

STANDARD

Long- and short-term weather changes occur due to changes in energy. Changes in energy affect all aspects of weather, including temperature, precipitation, and wind.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

2.LS.1 ^{OH}

Grade 2

STANDARD

Living things cause changes on Earth. Living things function and interact with their physical environments. Living things cause changes in the environments where they live; the changes can be very noticeable or slightly noticeable, fast or slow. Note: At this grade level, discussion is limited to changes that can be easily observed.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

2.LS.2 ^{OH}

Grade 2

STANDARD

All organisms alive today result from their ancestors, some of which may be extinct. Not all kinds of organisms that lived in the past are represented by living organisms today. Some kinds of organisms become extinct when their basic needs are no longer met or the environment changes.

MINI 4WD

Use a published account for the change across generations. A setup you change between heats is not that change.

2.PS.1^{OH}

Grade 2

STANDARD

Forces change the motion of an object. Motion can increase, change direction or stop depending on the force applied. The change in motion of an object is related to the size of the force. Some forces act without touching, such as using a magnet to move an object or objects falling to the ground.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

2.1^{AL}

Grade 2

STANDARD

Plan and carry out investigations to compare, contrast, and classify various solid and liquid materials according to physical properties, including color and texture.

MINI 4WD

Sort two parts from the car by a property you can see or feel. Say the property out loud.

2.2^{AL}

Grade 2

STANDARD

Conduct investigations to determine suitable uses of natural and manufactured materials based on their observable properties, including strength, flexibility, hardness, absorbency, and texture.

MINI 4WD

Sort two parts from the car by a property you can see or feel. Say the property out loud.

2.3^{AL}

Grade 2

STANDARD

Demonstrate and explain how structures made from a small set of pieces can be disassembled and then reassembled as new and different structures.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

2.4^{AL}

Grade 2

STANDARD

Provide evidence that some changes in matter caused by heating or cooling can be reversed and some changes are irreversible.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

2.5^{AL}

Grade 2

STANDARD

Plan and carry out an investigation, using one variable at a time, to determine how each variable affects plant growth.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

2.6^{AL}

Grade 2

STANDARD

Design and construct models to simulate how animals disperse seeds or pollinate plants.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

2.7^{AL}

Grade 2

STANDARD

Obtain information to explain that there are many different kinds of living things that exist in habitats on land and in water.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

2.8^{AL}

Grade 2

STANDARD

Use models to distinguish between the shapes and kinds of land and water on Earth.

MINI 4WD

Use a published account of the water the standard names. A wet tire on the lane is a local note beside it.

2.9^{AL}

Grade 2

STANDARD

Obtain information to identify where water is found on Earth and determine whether it is a solid or a liquid.

MINI 4WD

Use a published account of the water the standard names. A wet tire on the lane is a local note beside it.

2.IO^{AL}

Grade 2

STANDARD

Use a variety of sources to provide evidence that Earth's events can occur slowly or rapidly.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

SC.2.N.1.1^{FL}

Grade 2

STANDARD

Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate explanations based on those explorations.

MINI 4WD

With a partner, record one observation of the car on the lane, then compare the two records.

SC.2.N.1.2 ^{FL}

Grade 2

STANDARD

Compare the observations made by different groups using the same tools.

MINI 4WD

With a partner, record one observation of the car on the lane, then compare the two records.

SC.2.N.1.3 ^{FL}

Grade 2

STANDARD

Ask "how do you know?" in appropriate situations and attempt reasonable answers when asked the same question by others.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

SC.2.N.1.4 ^{FL}

Grade 2

STANDARD

Explain how particular scientific investigations should yield similar conclusions when repeated.

MINI 4WD

Run the same setup twice and say whether the two runs agree.

SC.2.N.1.5 ^{FL}

Grade 2

STANDARD

Distinguish between empirical observation (what you see, hear, feel, smell, or taste) and ideas or inferences (what you think).

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

SC.2.N.1.6 ^{FL}

Grade 2

STANDARD

Explain how scientists alone or in groups are always investigating new ways to solve problems.

MINI 4WD

With a partner, record one observation of the car on the lane, then compare the two records.

SC.2.E.6.1 ^{FL}

Grade 2

STANDARD

Recognize that Earth is made up of rocks. Rocks come in many sizes and shapes.

MINI 4WD

Use a published Earth account for the rock or the process the standard names. The car is the object on the table.

SC.2.E.6.2 ^{FL}

Grade 2

STANDARD

Describe how small pieces of rock and dead plant and animal parts can be the basis of soil and explain the process by which soil is formed.

MINI 4WD

Use a published Earth account for the rock or the process the standard names. The car is the object on the table.

SC.2.E.6.3 ^{FL}

Grade 2

STANDARD

Classify soil types based on color, texture (size of particles), the ability to retain water, and the ability to support the growth of plants.

MINI 4WD

Use a published Earth account for the rock or the process the standard names. The car is the object on the table.

SC.2.E.7.1 ^{FL}

Grade 2

STANDARD

Compare and describe changing patterns in nature that repeat themselves, such as weather conditions including temperature and precipitation, day to day and season to season.

MINI 4WD

Record the weather the standard names. One afternoon at the track is that record.

SC.2.E.7.2 ^{FL}

Grade 2

STANDARD

Investigate by observing and measuring, that the Sun's energy directly and indirectly warms the water, land, and air.

MINI 4WD

Put the car in the sun, then in the shade, and say which place warmed it.

SC.2.E.7.3 ^{FL}

Grade 2

STANDARD

Investigate, observe and describe how water left in an open container disappears (evaporates), but water in a closed container does not disappear (evaporate).

MINI 4WD

Use a published account for the water or air system the standard names. The car is not that system.

SC.2.E.7.4 ^{FL}

Grade 2

STANDARD

Investigate that air is all around us and that moving air is wind.

MINI 4WD

Say what moving air does to a light scrap beside the lane. The car stays put for the comparison.

SC.2.E.7.5 ^{FL}

Grade 2

STANDARD

State the importance of preparing for severe weather, lightning, and other weather related events.

MINI 4WD

Use a published account of the hazard the standard names. Keep the car off the lane while that hazard is the subject.

SC.2.P.8.1 ^{FL}

Grade 2

STANDARD

Observe and measure objects in terms of their properties, including size, shape, color, temperature, weight, texture, sinking or floating in water, and attraction and repulsion of magnets.

MINI 4WD

Sort two parts by one property the standard names, such as size, color, or texture.

SC.2.P.8.2 ^{FL}

Grade 2

STANDARD

Identify objects and materials as solid, liquid, or gas.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.2.P.8.3 ^{FL}

Grade 2

STANDARD

Recognize that solids have a definite shape and that liquids and gases take the shape of their container.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.2.P.8.4 ^{FL}

Grade 2

STANDARD

Observe and describe water in its solid, liquid, and gaseous states.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.2.P.8.5 ^{FL}

Grade 2

STANDARD

Measure and compare temperatures taken every day at the same time.

MINI 4WD

After a run, say where the car feels warmer and what rubbed.

SC.2.P.8.6 ^{FL}

Grade 2

STANDARD

Measure and compare the volume of liquids using containers of various shapes and sizes.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.2.P.9.1 ^{FL}

Grade 2

STANDARD

Investigate that materials can be altered to change some of their properties, but not all materials respond the same way to any one alteration.

MINI 4WD

Fold or tear a scrap, and say what changed. Leave living examples, such as decay, in a published account.

SC.2.P.10.1 ^{FL}

Grade 2

STANDARD

Discuss that people use electricity or other forms of energy to cook their food, cool or warm their homes, and power their cars.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.2.P.13.1 ^{FL}

Grade 2

STANDARD

Investigate the effect of applying various pushes and pulls on different objects.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.2.P.13.2 ^{FL}

Grade 2

STANDARD

Demonstrate that magnets can be used to make some things move without touching them.

MINI 4WD

Hold a magnet near a steel part and say whether it moves without a touch.

SC.2.P.13.3 ^{FL}

Grade 2

STANDARD

Recognize that objects are pulled toward the ground unless something holds them up.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.2.P.13.4 ^{FL}

Grade 2

STANDARD

Demonstrate that the greater the force (push or pull) applied to an object, the greater the change in motion of the object.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.2.L.14.1 ^{FL}

Grade 2

STANDARD

Distinguish human body parts (brain, heart, lungs, stomach, muscles, and skeleton) and their basic functions.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.2.L.16.1 ^{FL}

Grade 2

STANDARD

Observe and describe major stages in the life cycles of plants and animals, including beans and butterflies.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.2.L.17.1 ^{FL}

Grade 2

STANDARD

Compare and contrast the basic needs that all living things, including humans, have for survival.

MINI 4WD

List what the builder needs during one build, and what the standard says a living thing needs. The car does not eat or drink.

SC.2.L.17.2 ^{FL}

Grade 2

STANDARD

Recognize and explain that living things are found all over Earth, but each is only able to live in habitats that meet its basic needs.

MINI 4WD

List what the builder needs during one build, and what the standard says a living thing needs. The car does not eat or drink.

Grade 3

116 standards

3-LS1-1 ^{NG, CA, MI, NJ, PA}

Grade 3

STANDARD

Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

MINI 4WD

Draw a plant as seed, growth, seed again, and an end. Draw the car as parts, a built machine, races, and a broken part. Birth and reproduction belong on the plant drawing.

3-LS2-1 ^{NG, CA, MI, NJ, PA}

Grade 3

STANDARD

Construct an argument that some animals form groups that help members survive.

MINI 4WD

Several cars in a pit do not help one another stay alive. Several builders sharing one board and one tool can. Argue from the pit about the people.

3-LS3-1 NG, CA, MI, NJ, PA

Grade 3

STANDARD

Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

MINI 4WD

Line up cars from the same kit and mark the small differences in scuffs and how the wheels sit. Then look at seedlings or siblings for the living comparison.

3-LS3-2 NG, CA, MI, NJ, PA

Grade 3

STANDARD

Use evidence to support the explanation that traits can be influenced by the environment.

MINI 4WD

The same kit shape can grip differently after one car sits in a hot window and one stays indoors. The mold is the shared shape. The heat is the surrounding condition. Keep a sun plant and a shade plant beside that pair.

3-LS4-1 NG, CA, MI, NJ, PA

Grade 3

STANDARD

Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.

MINI 4WD

Spare bodies in a box are not fossils. Set them next to a picture of a fossil and say what the fossil records that a spare body does not.

3-LS4-2 NG, CA, MI, NJ, PA

Grade 3

STANDARD

Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

MINI 4WD

A freer axle can finish more heats. That is an advantage in a race, not in surviving or finding a mate. Say both, and keep them apart.

3-LS4-3 NG, CA, MI, NJ, PA

Grade 3

STANDARD

Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

MINI 4WD

Argue which of these can endure its place: a soft-tire car on a dusty lane, the same car on a clean lane, and a shade plant set in full sun.

3-LS4-4 NG, CA, MI, NJ

Grade 3

STANDARD

Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

MINI 4WD

If the club moves from carpet to a hard track, some setups stop working. Claim whether a roller change meets that new track. This is a track change, not an extinction.

3-ESS2-1 NG, CA, MI, NJ, PA

Grade 3

STANDARD

Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

MINI 4WD

Chart a month of days the club could race: temperature, and rain or none.

3-ESS2-2 NG, CA, MI, NJ, PA

Grade 3

STANDARD

Obtain and combine information to describe climates in different regions of the world.

MINI 4WD

Using a published climate page, compare a coastal city's usual weather with a desert city's, and say which one is harder on cells left in a parked car.

3-ESS3-1 ^{NG, CA, MI}

Grade 3

STANDARD

Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

MINI 4WD

Claim whether a rain cover over the pit really helps on a storm day, and name what it does not stop.

3-ESS3-1 ^{NJ}

Grade 3

STANDARD

Make a claim about the merit of a design solution that reduces the impacts of climate change and/or a weather-related hazard.

MINI 4WD

Name a weather hazard at the track, such as standing water, and one change that reduces it. Say whether that change also speaks to climate, or only to the day's weather.

3-PS2-1 ^{NG, CA, MI, NJ, PA}

Grade 3

STANDARD

Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.

MINI 4WD

A car at rest has balanced forces. A push, or the motor, leaves them unbalanced and the car moves. Show both.

3-PS2-2 ^{NG, CA, MI, NJ}

Grade 3

STANDARD

Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.

MINI 4WD

Roll the car down the same slope three times. Use that pattern to say where it will be a moment later on a fourth roll.

3-PS2-3 NG, CA, MI, NJ, PA

Grade 3

STANDARD

Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.

MINI 4WD

With the motor off, ask what a magnet does to a steel axle when it is near and not touching, and what two magnets do to each other.

3-PS2-4 NG, CA, MI, NJ, PA

Grade 3

STANDARD

Define a simple design problem that can be solved by applying scientific ideas about magnets.

MINI 4WD

Define a pit job a magnet can do, such as holding steel tools on a tray, and use the steel axles as the pieces you test.

3-5-ETS1-1 NG, CA, MI, NJ

Grade 3

STANDARD

Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

MINI 4WD

Define a "stay in the lane" problem with a test for success, a limit on parts, and a limit on time.

Also printed in the grade 4 and grade 5 documents.

3-5-ETS1-2 NG, CA, MI, NJ

Grade 3

STANDARD

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

MINI 4WD

Sketch two roller placements and say, before building both, which one is more likely to pass that test.

Also printed in the grade 4 and grade 5 documents.

3-5-ETS1-3 ^{NG, CA, MI, NJ}

Grade 3

STANDARD

Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

MINI 4WD

Change only the roller. Run the same car on the same lane. Note where it still hits the wall. One change at a time is the same discipline a fair race rule asks for.

Also printed in the grade 4 and grade 5 documents.

3-4-3-5.C ^{PA}

Grade 3

STANDARD

Examine ways you influence your local environment and community by collecting and displaying data.

MINI 4WD

Count the cells the club sets aside in one race day and post that count where the builders can see it.

Pennsylvania assigns this standard to grades 3-5, so it is printed in each of those grades.

3-5-3-5.A ^{PA}

Grade 3

STANDARD

Use appropriate symbols, numbers, and words to communicate key ideas about technological products and systems.

MINI 4WD

Label a sketch of the car with symbols and a few words so another builder can see which way it runs and where the cells go.

Pennsylvania assigns this standard to grades 3-5, so it is printed in each of those grades.

3.1A^{TX}

Grade 3

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

3.1B^{TX}

Grade 3

STANDARD

Use scientific practices to plan and conduct descriptive investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

3.1C^{TX}

Grade 3

STANDARD

Demonstrate safe practices and the use of safety equipment during classroom and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

3.1D^{TX}

Grade 3

STANDARD

Use tools, including hand lenses; metric rulers; Celsius thermometers; wind vanes; rain gauges; graduated cylinders; beakers; digital scales; hot plates; meter sticks; magnets; notebooks; Sun, Earth, Moon system models; timing devices; materials to support observation of habitats of organisms such as terrariums, aquariums, and collecting nets; and materials to support digital data collection such as computers, tablets, and cameras, to observe, measure, test, and analyze information.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

3.1E^{TX}

Grade 3

STANDARD

Collect observations and measurements as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

3.1F^{TX}

Grade 3

STANDARD

Construct appropriate graphic organizers to collect data, including tables, bar graphs, line graphs, tree maps, concept maps, Venn diagrams, flow charts or sequence maps, and input-output tables that show cause and effect.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

3.1G^{TX}

Grade 3

STANDARD

Develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

3.2A^{TX}

Grade 3

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

3.2B^{TX}

Grade 3

STANDARD

Analyze data by identifying any significant features, patterns, or sources of error.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

3.2C^{TX}

Grade 3

STANDARD

Use mathematical calculations to compare patterns and relationships.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

3.2D^{TX}

Grade 3

STANDARD

Evaluate a design or object using criteria.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

3.3A^{TX}

Grade 3

STANDARD

Develop explanations and propose solutions supported by data and models.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

3.3B^{TX}

Grade 3

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

3.3C^{TX}

Grade 3

STANDARD

Listen actively to others' explanations to identify relevant evidence and engage respectfully in scientific discussion.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

3.4A^{TX}

Grade 3

STANDARD

Explain how scientific discoveries and innovative solutions to problems impact science and society.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

3.4B^{TX}

Grade 3

STANDARD

Research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field to investigate STEM careers.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

3.5A^{TX}

Grade 3

STANDARD

Identify and use patterns to explain scientific phenomena or to design solutions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

3.5B^{TX}

Grade 3

STANDARD

Identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems.

MINI 4WD

Change one thing, the push or one part, and say what that change caused.

3.5C^{TX}

Grade 3

STANDARD

Use scale, proportion, and quantity to describe, compare, or model different systems.

MINI 4WD

Set the car beside a roller. Say which is larger, and which you have more of.

3.5D^{TX}

Grade 3

STANDARD

Examine and model the parts of a system and their interdependence in the function of the system.

MINI 4WD

Name the motor, the gears, and the wheels, and what fails if one of them is missing.

3.5E^{TX}

Grade 3

STANDARD

Investigate the flow of energy and cycling of matter through systems.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

3.5F^{TX}

Grade 3

STANDARD

Explain the relationship between the structure and function of objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.5G^{TX}

Grade 3

STANDARD

Explain how factors or conditions impact stability and change in objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.6A^{TX}

Grade 3

STANDARD

Measure, test, and record physical properties of matter, including temperature, mass, magnetism, and the ability to sink or float in water.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

3.6B ^{TX}

Grade 3

STANDARD

Describe and classify samples of matter as solids, liquids, and gases and demonstrate that solids have a definite shape and that liquids and gases take the shape of their container.

MINI 4WD

Point to the plastic body, the water in a bottle, and the air the car moves through.

3.6C ^{TX}

Grade 3

STANDARD

Predict, observe, and record changes in the state of matter caused by heating or cooling in a variety of substances such as ice becoming liquid water, condensation forming on the outside of a glass, or liquid water being heated to the point of becoming water vapor (gas).

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

3.6D ^{TX}

Grade 3

STANDARD

Demonstrate that materials can be combined based on their physical properties to create or modify objects such as building a tower or adding clay to sand to make a stronger brick and justify the selection of materials based on their physical properties.

MINI 4WD

Sort the body, a washer, and a tire by shape, color, and what they are made of.

3.7A ^{TX}

Grade 3

STANDARD

Demonstrate and describe forces acting on an object in contact or at a distance, including magnetism, gravity, and pushes and pulls.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

3.7B^{TX}

Grade 3

STANDARD

Plan and conduct a descriptive investigation to demonstrate and explain how position and motion can be changed by pushing and pulling objects such as swings, balls, and wagons.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

3.8A^{TX}

Grade 3

STANDARD

Identify everyday examples of energy, including light, sound, thermal, and mechanical.

MINI 4WD

Shine a lamp on the car, then block it. Say what the light does and where the shadow falls.

3.8B^{TX}

Grade 3

STANDARD

Plan and conduct investigations that demonstrate how the speed of an object is related to its mechanical energy.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

3.9A^{TX}

Grade 3

STANDARD

Construct models and explain the orbits of the Sun, Earth, and Moon in relation to each other.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

3.9B^{TX}

Grade 3

STANDARD

Identify the order of the planets in Earth's solar system in relation to the Sun.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

3.10A^{TX}

Grade 3

STANDARD

Compare and describe day-to-day weather in different locations at the same time, including air temperature, wind direction, and precipitation.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

3.10B^{TX}

Grade 3

STANDARD

Investigate and explain how soils such as sand and clay are formed by weathering of rock and by decomposition of plant and animal remains.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.10C^{TX}

Grade 3

STANDARD

Model and describe rapid changes in Earth's surface such as volcanic eruptions, earthquakes, and landslides.

MINI 4WD

Use a published account of one fast change of the land. A car hitting a clay bank is a mark from today.

3.II.A^{TX}

Grade 3

STANDARD

Explore and explain how humans use natural resources such as in construction, in agriculture, in transportation, and to make products.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

3.II.B^{TX}

Grade 3

STANDARD

Explain why the conservation of natural resources is important.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

3.II.C^{TX}

Grade 3

STANDARD

Identify ways to conserve natural resources through reducing, reusing, or recycling.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

3.I2.A^{TX}

Grade 3

STANDARD

Explain how temperature and precipitation affect animal growth and behavior through migration and hibernation and plant responses through dormancy.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.12B^{TX}

Grade 3

STANDARD

Identify and describe the flow of energy in a food chain and predict how changes in a food chain such as removal of frogs from a pond or bees from a field affect the ecosystem.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.12C^{TX}

Grade 3

STANDARD

Describe how natural changes to the environment such as floods and droughts cause some organisms to thrive and others to perish or move to new locations.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.12D^{TX}

Grade 3

STANDARD

Identify fossils as evidence of past living organisms and environments, including common Texas fossils.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.13A^{TX}

Grade 3

STANDARD

Explore and explain how external structures and functions of animals such as the neck of a giraffe or webbed feet on a duck enable them to survive in their environment.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.13B ^{TX}

Grade 3

STANDARD

Explore, illustrate, and compare life cycles in organisms such as beetles, crickets, radishes, or lima beans.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.ESS.1 ^{OH}

Grade 3

STANDARD

Earth's nonliving resources have specific properties. Soil is composed of pieces of rock, organic material, water and air and has characteristics that can be measured and observed. Use the term "soil", not "dirt". Dirt and soil are not synonymous. Rocks have specific characteristics that allow them to be sorted and compared. Rocks form in different ways. Air and water are also nonliving resources. Note: Rock classification is not the focus for this grade level; this is found in grade 6. At this grade, the observable characteristics of rocks can be used to sort or compare, rather than formal classification.

MINI 4WD

Name one material the car uses and whether the club keeps it or throws it out. That pile is not the whole resource system.

3.ESS.2 ^{OH}

Grade 3

STANDARD

Earth's resources can be used for energy. Renewable energy resources, such as wind, water or solar energy, can be replenished within a short amount of time by natural processes. Nonrenewable energy is a finite resource, such as natural gas, coal or oil, which cannot be replenished in a short amount of time.

MINI 4WD

Name one material the car uses and whether the club keeps it or throws it out. That pile is not the whole resource system.

3.ESS.3 ^{OH}

Grade 3

STANDARD

Some of Earth's resources are limited. Some of Earth's resources become limited due to overuse and/or contamination. Reducing resource use, decreasing waste and/or pollution, recycling and reusing can help conserve these resources.

MINI 4WD

Name one material the car uses and whether the club keeps it or throws it out. That pile is not the whole resource system.

3.LS.1 ^{OH}

Grade 3

STANDARD

Offspring resemble their parents and each other. Individual organisms inherit many traits from their parents indicating a reliable way to transfer information from one generation to the next. Some behavioral traits are learned through interactions with the environment and are not inherited.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.LS.2 ^{OH}

Grade 3

STANDARD

Individuals of the same kind of organism differ in their inherited traits. These differences give some individuals an advantage in surviving and/or reproducing. Plants and animals have physical features that are associated with the environments where they live. Plants and animals have certain physical or behavioral characteristics that influence their chances of surviving in particular environments.

Note: The focus is on the individual, not the population. Adaption is not the focus at this grade level.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.LS.3^{OH}

Grade 3

STANDARD

Plants and animals have life cycles that are part of their adaptations for survival in their natural environments. Worldwide, organisms are growing, reproducing, dying and decaying. The details of the life cycle are different for different organisms, which affects their ability to survive and reproduce in their natural environments. Note: The names of the stages within the life cycles are not the focus.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.PS.1^{OH}

Grade 3

STANDARD

All objects and substances in the natural world are composed of matter. Matter takes up space and has mass. Differentiating between mass and weight is not necessary at this grade level.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

3.PS.2^{OH}

Grade 3

STANDARD

Matter exists in different states, each of which has different properties. The most recognizable states of matter are solids, liquids and gases. Shape and compressibility are properties that can distinguish between the states of matter. One way to change matter from one state to another is by heating or cooling.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

3.PS.3^{OH}

Grade 3

STANDARD

Heat, electrical energy, light, sound and magnetic energy are forms of energy. There are many different forms of energy. Energy is the ability to cause motion or create change. The different forms of energy that are outlined at this grade level should be limited to familiar forms that a student is able to observe.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

3.I^{AL}

Grade 3

STANDARD

Conduct investigations to explain the effects of balanced and unbalanced forces exerted on an object, varying the size, number, and direction of the forces.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

3.3^{AL}

Grade 3

STANDARD

Conduct investigations to determine cause and effect relationships between objects not in contact with one another, including magnetic and electrostatic forces.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

3.4^{AL}

Grade 3

STANDARD

Apply scientific ideas about magnetic interactions to solve a problem using the engineering design process.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

3.5^{AL}

Grade 3

STANDARD

Develop and use models to compare the diverse life cycles of organisms other than humans, including birth, growth, reproduction, and death.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.IO^{AL}

Grade 3

STANDARD

Make a claim from evidence that an organism's likelihood of survival depends upon access to sufficient resources in its habitat, including sunlight, air, water, food, and shelter.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.II^{AL}

Grade 3

STANDARD

Construct explanations of how forming groups helps some organisms survive.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.I2^{AL}

Grade 3

STANDARD

Obtain and communicate information regarding the impact of existing solutions on plant and animal populations when environmental changes occur.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

3.I4^{AL}

Grade 3

STANDARD

Use information from a variety of sources to describe climates in different regions of the world.

MINI 4WD

Use a published account for the climate pattern the standard names. One hot afternoon at the track is weather, not that account.

3.I5^{AL}

Grade 3

STANDARD

Obtain and communicate information on the effectiveness of existing solutions designed to reduce the impact of weather-related hazards.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

SC.3.N.1.1^{FL}

Grade 3

STANDARD

Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

MINI 4WD

With a partner, record one observation of the car on the lane, then compare the two records.

SC.3.N.1.2^{FL}

Grade 3

STANDARD

Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups.

MINI 4WD

With a partner, record one observation of the car on the lane, then compare the two records.

SC.3.N.1.3 ^{FL}

Grade 3

STANDARD

Keep records as appropriate, such as pictorial, written, or simple charts and graphs, of investigations conducted.

MINI 4WD

Keep a picture or a note of one run, and say what the record shows.

SC.3.N.1.4 ^{FL}

Grade 3

STANDARD

Recognize the importance of communication among scientists.

MINI 4WD

State one claim about a run, and the evidence from that run.

SC.3.N.1.5 ^{FL}

Grade 3

STANDARD

Recognize that scientists question, discuss, and check each others' evidence and explanations.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

SC.3.N.1.6 ^{FL}

Grade 3

STANDARD

Infer based on observation.

MINI 4WD

Name what you see and hear when the car runs, and keep that separate from what you think caused it.

SC.3.N.1.7^{FL}

Grade 3

STANDARD

Explain that empirical evidence is information, such as observations or measurements, that is used to help validate explanations of natural phenomena.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

SC.3.N.3.1^{FL}

Grade 3

STANDARD

Recognize that words in science can have different or more specific meanings than their use in everyday language; for example, energy, cell, heat/cold, and evidence.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

SC.3.N.3.2^{FL}

Grade 3

STANDARD

Recognize that scientists use models to help understand and explain how things work.

MINI 4WD

Point to the car and say which part of the standard the model is standing in for, and one way the model is not the whole thing.

SC.3.N.3.3^{FL}

Grade 3

STANDARD

Recognize that all models are approximations of natural phenomena; as such, they do not perfectly account for all observations.

MINI 4WD

Point to the car and say which part of the standard the model is standing in for, and one way the model is not the whole thing.

SC.3.E.5.1 ^{FL}

Grade 3

STANDARD

Explain that stars can be different; some are smaller, some are larger, and some appear brighter than others; all except the Sun are so far away that they look like points of light.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.3.E.5.2 ^{FL}

Grade 3

STANDARD

Identify the Sun as a star that emits energy; some of it in the form of light.

MINI 4WD

Put the car in the sun, then in the shade, and say which place warmed it.

SC.3.E.5.3 ^{FL}

Grade 3

STANDARD

Recognize that the Sun appears large and bright because it is the closest star to Earth.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.3.E.5.4 ^{FL}

Grade 3

STANDARD

Explore the Law of Gravity by demonstrating that gravity is a force that can be overcome.

MINI 4WD

Let go of the car and say what pulls it toward the floor unless something holds it up.

SC.3.E.5.5 ^{FL}

Grade 3

STANDARD

Investigate that the number of stars that can be seen through telescopes is dramatically greater than those seen by the unaided eye.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.3.E.6.1 ^{FL}

Grade 3

STANDARD

Demonstrate that radiant energy from the Sun can heat objects and when the Sun is not present, heat may be lost.

MINI 4WD

Put the car in the sun, then in the shade, and say which place warmed it.

SC.3.P.8.1 ^{FL}

Grade 3

STANDARD

Measure and compare temperatures of various samples of solids and liquids.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.3.P.8.2 ^{FL}

Grade 3

STANDARD

Measure and compare the mass and volume of solids and liquids.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.3.P.8.3 ^{FL}

Grade 3

STANDARD

Compare materials and objects according to properties such as size, shape, color, texture, and hardness.

MINI 4WD

Sort two parts by one property the standard names, such as size, color, or texture.

SC.3.P.9.1 ^{FL}

Grade 3

STANDARD

Describe the changes water undergoes when it changes state through heating and cooling by using familiar scientific terms such as melting, freezing, boiling, evaporation, and condensation.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.3.P.10.1 ^{FL}

Grade 3

STANDARD

Identify some basic forms of energy such as light, heat, sound, electrical, and mechanical.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.3.P.10.2 ^{FL}

Grade 3

STANDARD

Recognize that energy has the ability to cause motion or create change.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.3.P.10.3 ^{FL}

Grade 3

STANDARD

Demonstrate that light travels in a straight line until it strikes an object or travels from one medium to another.

MINI 4WD

Use a lamp or the motor's sound for the wave the standard names, and say what changed.

SC.3.P.10.4 ^{FL}

Grade 3

STANDARD

Demonstrate that light can be reflected, refracted, and absorbed.

MINI 4WD

Use a lamp or the motor's sound for the wave the standard names, and say what changed.

SC.3.P.11.1 ^{FL}

Grade 3

STANDARD

Investigate, observe, and explain that things that give off light often also give off heat.

MINI 4WD

Use a lamp or the motor's sound for the wave the standard names, and say what changed.

SC.3.P.11.2 ^{FL}

Grade 3

STANDARD

Investigate, observe, and explain that heat is produced when one object rubs against another, such as rubbing one's hands together.

MINI 4WD

After a run, say where the car feels warmer and what rubbed.

SC.3.L.14.1 ^{FL}

Grade 3

STANDARD

Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.3.L.14.2 ^{FL}

Grade 3

STANDARD

Investigate and describe how plants respond to stimuli (heat, light, gravity), such as the way plant stems grow toward light and their roots grow downward in response to gravity.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.3.L.15.1 ^{FL}

Grade 3

STANDARD

Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.3.L.15.2 ^{FL}

Grade 3

STANDARD

Classify flowering and nonflowering plants into major groups such as those that produce seeds, or those like ferns and mosses that produce spores, according to their physical characteristics.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.3.L.17.1 ^{FL}

Grade 3

STANDARD

Describe how animals and plants respond to changing seasons.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.3.L.17.2 ^{FL}

Grade 3

STANDARD

Recognize that plants use energy from the Sun, air, and water to make their own food.

MINI 4WD

List what the builder needs during one build, and what the standard says a living thing needs. The car does not eat or drink.

Grade 4

127 standards

4-LS1-1 ^{NG, CA, MI, NJ, PA}

Grade 4

STANDARD

Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

MINI 4WD

Argue from the car: the axle is inside the chassis work, the tire is on the outside, and each has a job. Then name one inside part and one outside part of an animal, and keep the two arguments distinct.

4-LS1-2 ^{NG, CA, MI, NJ, PA}

Grade 4

STANDARD

Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

MINI 4WD

The builder sees the car leave the lane and the hands answer. Trace that as a sense, a decision, and a move. The car has no brain. The person does.

4-ESS1-1 NG, CA, MI, NJ, PA

Grade 4

STANDARD

Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

MINI 4WD

A photograph of rock layers is the evidence for a landscape changing. A stack of old track layouts is only club history. Use the rock photograph for the claim.

4-ESS1-1 MI

Grade 4

STANDARD

Identify evidence from patterns in rock formations and fossils in rock layers to support possible explanations of Michigan's geological changes over time.

MINI 4WD

Look at a published picture of Michigan rock layers or fossils and say what change they suggest. A dent in the track clay is a mark from today, not that history.

4-ESS2-1 NG, CA, MI, NJ, PA

Grade 4

STANDARD

Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

MINI 4WD

Drip water on a soft clay bank for a set time and measure the groove. Rub ice on a fresh patch of the same clay for the same time.

4-ESS2-2 NG, CA, MI, NJ, PA

Grade 4

STANDARD

Analyze and interpret data from maps to describe patterns of Earth's features.

MINI 4WD

On a map of mountains and rivers, point to where an outdoor race would sit among those features.

4-ESS3-1 ^{NG, CA, MI, NJ, PA}

Grade 4

STANDARD

Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

MINI 4WD

The cells were charged from a plug. Trace that plug to a fuel or a solar panel, and name one effect of getting the energy that way.

4-ESS3-2 ^{NG, CA, MI, PA}

Grade 4

STANDARD

Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

MINI 4WD

Compare a weight on a tent leg and a guy line as two ways to keep a pit tent from blowing onto the track.

4-ESS3-2 ^{MI}

Grade 4

STANDARD

Generate and compare multiple solutions to reduce the impacts of natural Earth processes on Michigan's people and places.

MINI 4WD

Compare two ways to keep a race out of a flood or a shore wash in Michigan. Name which one you would use for the people and the place.

4-ESS3-2 ^{NJ}

Grade 4

STANDARD

Generate and compare multiple solutions to reduce the impacts of natural Earth processes and climate change have on humans.

MINI 4WD

Compare two ways to keep people at an outdoor race out of a flood of rain. One is a cover. Climate change is the longer pattern. The race-day rain is the hazard you can point at.

4-PS3-1 NG, CA, MI, NJ, PA

Grade 4

STANDARD

Use evidence to construct an explanation relating the speed of an object to the energy of that object.

MINI 4WD

Time the same car over one lane length after a gentle push and after a hard push. The faster run has more energy of motion.

4-PS3-2 NG, CA, MI, NJ

Grade 4

STANDARD

Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

MINI 4WD

The motor can warm, the gears can click, a lamp can shine on the body, and the cells can push a current. Name which of those is heat, sound, light, or electric current.

4-PS3-3 NG, CA, MI, NJ, PA

Grade 4

STANDARD

Ask questions and predict outcomes about the changes in energy that occur when objects collide.

MINI 4WD

Predict whether the car slows when it hits a wall roller, then try it and compare the prediction with the hit.

4-PS3-4 NG, CA, MI, NJ, PA

Grade 4

STANDARD

Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

MINI 4WD

The motor takes energy from the cells and turns it into spinning. Try a fresh cell and a tired cell in the same car.

4-PS4-1 NG, CA, MI, NJ, PA

Grade 4

STANDARD

Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.

MINI 4WD

Pluck a stretched band harder and more softly and watch the size of the wobble. Let that wobble shake a light body panel so the wave, not the motor, is what moves it.

4-PS4-2 NG, CA, MI, NJ, PA

Grade 4

STANDARD

Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.

MINI 4WD

You see the car because light leaves the body and enters the eye. In a lit room, cover the body and say what changed.

4-PS4-3 NG, CA, MI, NJ, PA

Grade 4

STANDARD

Generate and compare multiple solutions that use patterns to transfer information.

MINI 4WD

Compare a shouted "go" and a light flash as two patterns that carry the start to the far end of the track.

3.4.3-5.C PA

Grade 4

STANDARD

Examine ways you influence your local environment and community by collecting and displaying data.

MINI 4WD

Count the cells the club sets aside in one race day and post that count where the builders can see it.

Pennsylvania assigns this standard to grades 3-5, so it is printed in each of those grades.

3.5.3-5.A ^{PA}

Grade 4

STANDARD

Use appropriate symbols, numbers, and words to communicate key ideas about technological products and systems.

MINI 4WD

Label a sketch of the car with symbols and a few words so another builder can see which way it runs and where the cells go.

Pennsylvania assigns this standard to grades 3-5, so it is printed in each of those grades.

4.1A ^{TX}

Grade 4

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

4.1B ^{TX}

Grade 4

STANDARD

Use scientific practices to plan and conduct descriptive investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

4.1C ^{TX}

Grade 4

STANDARD

Demonstrate safe practices and the use of safety equipment during classroom and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

4.ID^{TX}

Grade 4

STANDARD

Use tools, including hand lenses; metric rulers; Celsius thermometers; calculators; laser pointers; mirrors; digital scales; balances; graduated cylinders; beakers; hot plates; meter sticks; magnets; notebooks; timing devices; sieves; materials for building circuits; materials to support observation of habitats of organisms such as terrariums, aquariums, and collecting nets; and materials to support digital data collection such as computers, tablets, and cameras, to observe, measure, test, and analyze information.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

4.IE^{TX}

Grade 4

STANDARD

Collect observations and measurements as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

4.IF^{TX}

Grade 4

STANDARD

Construct appropriate graphic organizers used to collect data, including tables, bar graphs, line graphs, tree maps, concept maps, Venn diagrams, flow charts or sequence maps, and input-output tables that show cause and effect.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

4.IG^{TX}

Grade 4

STANDARD

Develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

4.2A^{TX}

Grade 4

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

4.2B^{TX}

Grade 4

STANDARD

Analyze data by identifying any significant features, patterns, or sources of error.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

4.2C^{TX}

Grade 4

STANDARD

Use mathematical calculations to compare patterns and relationships.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

4.2D^{TX}

Grade 4

STANDARD

Evaluate a design or object using criteria.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

4.3A^{TX}

Grade 4

STANDARD

Develop explanations and propose solutions supported by data and models.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

4.3B^{TX}

Grade 4

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

4.3C^{TX}

Grade 4

STANDARD

Listen actively to others' explanations to identify relevant evidence and engage respectfully in scientific discussion.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

4.4A^{TX}

Grade 4

STANDARD

Explain how scientific discoveries and innovative solutions to problems impact science and society.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

4.4B^{TX}

Grade 4

STANDARD

Research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field to investigate STEM careers.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

4.5A^{TX}

Grade 4

STANDARD

Identify and use patterns to explain scientific phenomena or to design solutions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

4.5B^{TX}

Grade 4

STANDARD

Identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems.

MINI 4WD

Change one thing, the push or one part, and say what that change caused.

4.5C^{TX}

Grade 4

STANDARD

Use scale, proportion, and quantity to describe, compare, or model different systems.

MINI 4WD

Set the car beside a roller. Say which is larger, and which you have more of.

4.5D^{TX}

Grade 4

STANDARD

Examine and model the parts of a system and their interdependence in the function of the system.

MINI 4WD

Name the motor, the gears, and the wheels, and what fails if one of them is missing.

4.5E^{TX}

Grade 4

STANDARD

Investigate how energy flows and matter cycles through systems and how matter is conserved.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

4.5F^{TX}

Grade 4

STANDARD

Explain the relationship between the structure and function of objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

4.5G^{TX}

Grade 4

STANDARD

Explain how factors or conditions impact stability and change in objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

4.6A ^{TX}

Grade 4

STANDARD

Classify and describe matter using observable physical properties, including temperature, mass, magnetism, relative density (the ability to sink or float in water), and physical state (solid, liquid, gas).

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

4.6B ^{TX}

Grade 4

STANDARD

Investigate and compare a variety of mixtures, including solutions that are composed of liquids in liquids and solids in liquids.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

4.6C ^{TX}

Grade 4

STANDARD

Demonstrate that matter is conserved when mixtures such as soil and water or oil and water are formed.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

4.7 ^{TX}

Grade 4

STANDARD

Plan and conduct descriptive investigations to explore the patterns of forces such as gravity, friction, or magnetism in contact or at a distance on an object.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

4.8A^{TX}

Grade 4

STANDARD

Investigate and identify the transfer of energy by objects in motion, waves in water, and sound.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

4.8B^{TX}

Grade 4

STANDARD

Identify conductors and insulators of thermal and electrical energy.

MINI 4WD

Compare a motor can after a run with a part left in the shade. Name the heat move you mean. Do not open a cell.

4.8C^{TX}

Grade 4

STANDARD

Demonstrate and describe how electrical energy travels in a closed path that can produce light and thermal energy.

MINI 4WD

Shine a lamp on the car, then block it. Say what the light does and where the shadow falls.

4.9A^{TX}

Grade 4

STANDARD

Collect and analyze data to identify sequences and predict patterns of change in seasons such as change in temperature and length of daylight.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

4.9B^{TX}

Grade 4

STANDARD

Collect and analyze data to identify sequences and predict patterns of change in the observable appearance of the Moon from Earth.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

4.10A^{TX}

Grade 4

STANDARD

Describe and illustrate the continuous movement of water above and on the surface of Earth through the water cycle and explain the role of the Sun as a major source of energy in this process.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

4.10B^{TX}

Grade 4

STANDARD

Model and describe slow changes to Earth's surface caused by weathering, erosion, and deposition from water, wind, and ice.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

4.10C^{FL, TX}

Grade 4

STANDARD

Differentiate between weather and climate.

MINI 4WD

Use a published account for the climate or the daylight pattern. One hot afternoon at the track is weather, not that account.

4.II.A ^{TX}

Grade 4

STANDARD

Identify and explain advantages and disadvantages of using Earth's renewable and nonrenewable natural resources such as wind, water, sunlight, plants, animals, coal, oil, and natural gas.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

4.II.B ^{TX}

Grade 4

STANDARD

Explain the critical role of energy resources to modern life and how conservation, disposal, and recycling of natural resources impact the environment.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

4.II.C ^{TX}

Grade 4

STANDARD

Determine the physical properties of rocks that allow Earth's natural resources to be stored there.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

4.I2.A ^{TX}

Grade 4

STANDARD

Investigate and explain how most producers can make their own food using sunlight, water, and carbon dioxide through the cycling of matter.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

4.12B^{TX}

Grade 4

STANDARD

Describe the cycling of matter and flow of energy through food webs, including the roles of the Sun, producers, consumers, and decomposers.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

4.12C^{TX}

Grade 4

STANDARD

Identify and describe past environments based on fossil evidence, including common Texas fossils.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

4.13A^{TX}

Grade 4

STANDARD

Explore and explain how structures and functions of plants such as waxy leaves and deep roots enable them to survive in their environment.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

4.13B^{TX}

Grade 4

STANDARD

Differentiate between inherited and acquired physical traits of organisms.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

4.ESS.1 ^{OH}

Grade 4

STANDARD

Earth's surface has specific characteristics and landforms that can be identified. About 70 percent of the Earth's surface is covered with water and most of that is the ocean. Only a small portion of the Earth's water is freshwater, which is found in rivers, lakes, groundwater and glaciers. Earth's surface can change due to erosion and deposition of soil, rock or sediment. Catastrophic events such as flooding, volcanoes and earthquakes can create landforms.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

4.ESS.2 ^{OH}

Grade 4

STANDARD

The surface of Earth changes due to weathering. Rocks change shape, size and/or form due to water or glacial movement, freeze and thaw, wind, plant growth, acid rain, pollution and catastrophic events such as earthquakes, flooding, and volcanic activity. Note: Differentiating between chemical and physical weathering is not the focus at this grade level.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

4.ESS.3 ^{OH}

Grade 4

STANDARD

The surface of Earth changes due to erosion and deposition. Liquid water, wind and ice physically remove and carry rock, soil and sediment (erosion) and deposit the material in a new location (deposition). Gravitational force affects movements of water, rock and soil.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

4.LS.1 ^{OH}

Grade 4

STANDARD

Changes in an organism's environment are sometimes beneficial to its survival and sometimes harmful. Ecosystems can change gradually or dramatically. When the environment changes, some plants and animals survive and reproduce and others die or move to new locations. Ecosystems are based on interrelationships among and between biotic and abiotic factors. These include the diversity of other organisms present, the availability of food and other resources, and the physical attributes of the environment.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

4.LS.2 ^{OH}

Grade 4

STANDARD

Fossils can be compared to one another and to present-day organisms according to their similarities and differences. The concept of biodiversity is expanded to include different classification schemes based upon shared internal and external characteristics of organisms. Most species that have lived on Earth are extinct. Fossils provide a point of comparison between the types of organisms that lived long ago and those existing today.

MINI 4WD

Use a published account for the change across generations. A setup you change between heats is not that change.

4.PS.1 ^{OH}

Grade 4

STANDARD

When objects break into smaller pieces, dissolve, or change state, the total amount of matter is conserved. When an object is broken into smaller pieces, when a solid is dissolved in a liquid or when matter changes state (solid, liquid, gas), the total amount of matter remains constant. Note: Differentiation between mass and weight is not necessary at this grade level.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

4.PS.2 ^{OH}

Grade 4

STANDARD

Energy can be transferred from one location to another or can be transformed from one form to another. Energy transfers from hot objects to cold objects as heat, resulting in a temperature change. Electric circuits require a complete loop of conducting materials through which electrical energy can be transferred. Electrical energy in circuits can be transformed to other forms of energy, including light, heat, sound and motion. Electricity and magnetism are closely related.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

4.1 ^{AL}

Grade 4

STANDARD

Use evidence to explain the relationship between the speed of an object and its energy.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

4.2 ^{AL}

Grade 4

STANDARD

Plan and carry out investigations to answer questions regarding changes in energy when objects collide, and predict reasonable outcomes based on observed patterns.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

4.3 ^{AL}

Grade 4

STANDARD

Plan and carry out investigations to provide evidence that energy is transferred by sound, light, heat, and electric currents.

MINI 4WD

Use the cells and the motor as the circuit in front of you. Say what is closed, and what stays open.

4.3a^{AL}

Grade 4

STANDARD

Construct an explanation using evidence to support the claim that heat can be produced in many ways.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

4.3b^{AL}

Grade 4

STANDARD

Construct an explanation with evidence supporting the claim that different objects can absorb, reflect, and/or conduct energy.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

4.4^{AL}

Grade 4

STANDARD

Design, construct, and test a device that changes energy from one form to another.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

4.5^{AL}

Grade 4

STANDARD

Develop and use models to describe amplitude and wavelength patterns and how waves can cause objects to move.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

4.6 ^{AL}

Grade 4

STANDARD

Construct an explanation of how light, sound, and digitized information are transferred by waves.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

4.8 ^{AL}

Grade 4

STANDARD

Make a claim, using evidence, that the functions of both internal and external structures of plants and animals (including humans) support growth, survival, and behavior.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

4.9 ^{AL}

Grade 4

STANDARD

Carry out investigations to support a claim that different animals receive information through their senses, process that information, and respond in various ways.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

4.10 ^{AL}

Grade 4

STANDARD

Develop and use a model to describe how water moves through Earth's systems by the processes of evaporation, condensation, and precipitation.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

4.II^{AL}

Grade 4

STANDARD

Construct explanations of Earth's changes over time through slow and rapid processes, citing evidence found in rock formations and fossils in rock layers.

MINI 4WD

Use a published account for the change across generations. A setup you change between heats is not that change.

4.I2^{AL}

Grade 4

STANDARD

Plan and carry out investigations to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, and vegetation, investigating a single form of weathering or erosion at a time.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

4.I3^{AL}

Grade 4

STANDARD

Analyze and interpret data from maps to describe patterns of Earth's features on land and in the ocean.

MINI 4WD

Use a published account of the water the standard names. A wet tire on the lane is a local note beside it.

4.I4^{AL}

Grade 4

STANDARD

Gather information to describe how the use of energy derived from renewable and nonrenewable resources affects the environment.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

4.15^{AL}

Grade 4

STANDARD

Design, test, and evaluate a solution that will protect humans from the effects of natural Earth processes.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

SC.4.N.1.1^{FL}

Grade 4

STANDARD

Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

MINI 4WD

With a partner, record one observation of the car on the lane, then compare the two records.

SC.4.N.1.2^{FL}

Grade 4

STANDARD

Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.

MINI 4WD

With a partner, record one observation of the car on the lane, then compare the two records.

SC.4.N.1.3^{FL}

Grade 4

STANDARD

Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

SC.4.N.1.4 ^{FL}

Grade 4

STANDARD

Attempt reasonable answers to scientific questions and cite evidence in support.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

SC.4.N.1.5 ^{FL}

Grade 4

STANDARD

Compare the methods and results of investigations done by other classmates.

MINI 4WD

With a partner, record one observation of the car on the lane, then compare the two records.

SC.4.N.1.6 ^{FL}

Grade 4

STANDARD

Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

SC.4.N.1.7 ^{FL}

Grade 4

STANDARD

Recognize and explain that scientists base their explanations on evidence.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

SC.4.N.1.8 ^{FL}

Grade 4

STANDARD

Recognize that science involves creativity in designing experiments.

MINI 4WD

Change one thing on the car, keep the rest the same, and say what that one change did on the lane.

SC.4.N.2.1 ^{FL}

Grade 4

STANDARD

Explain that science focuses solely on the natural world.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

SC.4.N.3.1 ^{FL}

Grade 4

STANDARD

Explain that models can be three dimensional, two dimensional, an explanation in your mind, or a computer model.

MINI 4WD

Point to the car and say which part of the standard the model is standing in for, and one way the model is not the whole thing.

SC.4.E.5.1 ^{FL}

Grade 4

STANDARD

Observe that the patterns of stars in the sky stay the same although they appear to shift across the sky nightly, and different stars can be seen in different seasons.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.4.E.5.2 ^{FL}

Grade 4

STANDARD

Describe the changes in the observable shape of the moon over the course of about a month.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.4.E.5.3 ^{FL}

Grade 4

STANDARD

Recognize that Earth revolves around the Sun in a year and rotates on its axis in a 24-hour day.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.4.E.5.4 ^{FL}

Grade 4

STANDARD

Relate that the rotation of Earth (day and night) and apparent movements of the Sun, Moon, and stars are connected.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.4.E.5.5 ^{FL}

Grade 4

STANDARD

Investigate and report the effects of space research and exploration on the economy and culture of Florida.

MINI 4WD

Use a published account for what the standard asks about Florida. The car is the object in the room.

SC.4.E.6.1 ^{FL}

Grade 4

STANDARD

Identify the three categories of rocks: igneous, (formed from molten rock); sedimentary (pieces of other rocks and fossilized organisms); and metamorphic (formed from heat and pressure).

MINI 4WD

Use a published Earth account for the rock or the process the standard names. The car is the object on the table.

SC.4.E.6.2 ^{FL}

Grade 4

STANDARD

Identify the physical properties of common earth-forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks.

MINI 4WD

Use a published Earth account for the rock or the process the standard names. The car is the object on the table.

SC.4.E.6.3 ^{FL}

Grade 4

STANDARD

Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.

MINI 4WD

Name one material the standard calls renewable and one it does not. The car is the object in the room, not the resource system.

SC.4.E.6.4 ^{FL}

Grade 4

STANDARD

Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).

MINI 4WD

Record the weather the standard names. One afternoon at the track is that record.

SC.4.E.6.5 ^{FL}

Grade 4

STANDARD

Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things.

MINI 4WD

Look at a small mark on the car with a magnifier, and say what you can see that you could not see without it.

SC.4.E.6.6 ^{FL}

Grade 4

STANDARD

Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).

MINI 4WD

Use a published account for what the standard asks about Florida. The car is the object in the room.

SC.4.P.8.1 ^{FL}

Grade 4

STANDARD

Measure and compare objects and materials based on their physical properties including: mass, shape, volume, color, hardness, texture, odor, taste, attraction to magnets.

MINI 4WD

Sort two parts by one property the standard names, such as size, color, or texture.

SC.4.P.8.2 ^{FL}

Grade 4

STANDARD

Identify properties and common uses of water in each of its states.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.4.P.8.3 ^{FL}

Grade 4

STANDARD

Explore the Law of Conservation of Mass by demonstrating that the mass of a whole object is always the same as the sum of the masses of its parts.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.4.P.8.4 ^{FL}

Grade 4

STANDARD

Investigate and describe that magnets can attract magnetic materials and attract and repel other magnets.

MINI 4WD

Hold a magnet near a steel part and say whether it moves without a touch.

SC.4.P.9.1 ^{FL}

Grade 4

STANDARD

Identify some familiar changes in materials that result in other materials with different characteristics, such as decaying animal or plant matter, burning, rusting, and cooking.

MINI 4WD

Fold or tear a scrap, and say what changed. Leave living examples, such as decay, in a published account.

SC.4.P.10.1 ^{FL}

Grade 4

STANDARD

Observe and describe some basic forms of energy, including light, heat, sound, electrical, and the energy of motion.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.4.P.10.2^{FL}

Grade 4

STANDARD

Investigate and describe that energy has the ability to cause motion or create change.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.4.P.10.3^{FL}

Grade 4

STANDARD

Investigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates.

MINI 4WD

Use a lamp or the motor's sound for the wave the standard names, and say what changed.

SC.4.P.10.4^{FL}

Grade 4

STANDARD

Describe how moving water and air are sources of energy and can be used to move things.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.4.P.11.1^{FL}

Grade 4

STANDARD

Recognize that heat flows from a hot object to a cold object and that heat flow may cause materials to change temperature.

MINI 4WD

After a run, say where the car feels warmer and what rubbed.

SC.4.P.11.2 ^{FL}

Grade 4

STANDARD

Identify common materials that conduct heat well or poorly.

MINI 4WD

After a run, say where the car feels warmer and what rubbed.

SC.4.P.12.1 ^{FL}

Grade 4

STANDARD

Recognize that an object in motion always changes its position and may change its direction.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.4.P.12.2 ^{FL}

Grade 4

STANDARD

Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.4.L.16.1 ^{FL}

Grade 4

STANDARD

Identify processes of sexual reproduction in flowering plants, including pollination, fertilization (seed production), seed dispersal, and germination.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.4.L.16.2 ^{FL}

Grade 4

STANDARD

Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.4.L.16.3 ^{FL}

Grade 4

STANDARD

Recognize that animal behaviors may be shaped by heredity and learning.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.4.L.16.4 ^{FL}

Grade 4

STANDARD

Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.4.L.17.1 ^{FL}

Grade 4

STANDARD

Compare the seasonal changes in Florida plants and animals to those in other regions of the country.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.4.L.17.2 ^{FL}

Grade 4

STANDARD

Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.

MINI 4WD

List what the builder needs during one build, and what the standard says a living thing needs. The car does not eat or drink.

SC.4.L.17.3 ^{FL}

Grade 4

STANDARD

Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.

MINI 4WD

List what the builder needs during one build, and what the standard says a living thing needs. The car does not eat or drink.

SC.4.L.17.4 ^{FL}

Grade 4

STANDARD

Recognize ways plants and animals, including humans, can impact the environment.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

Grade 5

119 standards

5-LS1-1 ^{NG, CA, MI, NJ, PA}

Grade 5

STANDARD

Support an argument that plants get the materials they need for growth chiefly from air and water.

MINI 4WD

Argue where a plant's new growth material comes from, using air and water. A car sealed in the same bag gains no body the way the plant can.

5-LS2-1 NG, CA, MI, NJ, PA

Grade 5

STANDARD

Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

MINI 4WD

Draw a food web, and on the same page draw car parts going to a recycle bin or a trash bin. Matter moves in both drawings. Only one is a food web.

5-ESS1-1 NG, CA, MI, NJ, PA

Grade 5

STANDARD

Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.

MINI 4WD

The sun looks brighter than the night stars. A lamp beside the car and the same lamp across the room is a desk model of “closer looks brighter.”

5-ESS1-2 NG, CA, MI, NJ, PA

Grade 5

STANDARD

Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

MINI 4WD

Graph the length of the car’s shadow every hour on one race day, and note where the sun was.

5-ESS2-1 NG, CA, MI, NJ, PA

Grade 5

STANDARD

Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

MINI 4WD

Rain on the track, a puddle soaking in, and a builder breathing are three meetings of air, water, and ground. Pick one and name the spheres that are touching. The car is only sitting in the scene.

5-ESS2-1 ^{MI}

Grade 5

STANDARD

Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact in Michigan and the Great Lakes basin.

MINI 4WD

Pick one meeting in the Great Lakes basin: rain on the shore, a wave on the sand, or a plant at the waterline. Name the spheres that are touching. The car is only sitting in the scene.

5-ESS2-2 ^{NG, CA, MI}

Grade 5

STANDARD

Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

MINI 4WD

Graph Earth's water as salt and fresh from a published figure. A pit bottle is a small fresh sample, not that graph.

5-ESS2-2 ^{MI}

Grade 5

STANDARD

Describe and graph the amounts and percentages of water and fresh water in the Great Lakes to provide evidence about the distribution of water on Earth.

MINI 4WD

Graph fresh water in the Great Lakes from a published figure. A pit bottle is a small fresh sample, not that graph.

5-ESS3-1 ^{NG, CA, MI, PA}

Grade 5

STANDARD

Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

MINI 4WD

Find one local rule about used cells or oily rags and say which resource it is trying to protect.

5-ESS3-1 ^{NJ}

Grade 5

STANDARD

Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources, environment, and address climate change issues.

MINI 4WD

Read one published account of a community protecting a resource, and name one club habit that uses less of something, such as cells set aside for reuse. The community account is the standard's scale.

5-PS1-1 ^{NG, CA, MI, NJ, PA}

Grade 5

STANDARD

Develop a model to describe that matter is made of particles too small to be seen.

MINI 4WD

The body looks solid. The model for this standard is particles too small to see. Draw those particles. Do not claim the eye can see them in the plastic.

5-PS1-2 ^{NG, CA, MI, NJ, PA}

Grade 5

STANDARD

Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.

MINI 4WD

Weigh a closed bag of two parts before and after you shake them. If a car weighs more after a run because grit stuck to the tires, matter came in from outside, which is why the bag has to stay closed.

5-PS1-3 ^{NG, CA, MI, NJ}

Grade 5

STANDARD

Make observations and measurements to identify materials based on their properties.

MINI 4WD

Tell a washer, a rubber tire, and a plastic clip apart by bend, shine, and whether a magnet holds them.

5-PS1-4 NG, CA, MI, NJ, PA

Grade 5

STANDARD

Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

MINI 4WD

Mix a drop of oil and a drop of water and say whether a new substance formed. Snapping two plastic parts together does not form one. Keep those two mixings apart.

5-PS2-1 NG, CA, MI, NJ, PA

Grade 5

STANDARD

Support an argument that the gravitational force exerted by Earth on objects is directed down.

MINI 4WD

Let the car go at the top of a slope and say which way it is pulled. The pull toward the ground is the pattern.

5-PS3-1 NG, CA, MI, NJ, PA

Grade 5

STANDARD

Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

MINI 4WD

The builder's food traces to plants and the sun. The car's motion traces to the cell, and that charge may trace to a plant or a panel. Draw both chains. Do not merge them.

3.4.3-5.C PA

Grade 5

STANDARD

Examine ways you influence your local environment and community by collecting and displaying data.

MINI 4WD

Count the cells the club sets aside in one race day and post that count where the builders can see it.

Pennsylvania assigns this standard to grades 3-5, so it is printed in each of those grades.

3.5.3-5.A ^{PA}

Grade 5

STANDARD

Use appropriate symbols, numbers, and words to communicate key ideas about technological products and systems.

MINI 4WD

Label a sketch of the car with symbols and a few words so another builder can see which way it runs and where the cells go.

Pennsylvania assigns this standard to grades 3-5, so it is printed in each of those grades.

5.1A ^{TX}

Grade 5

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

5.1B ^{TX}

Grade 5

STANDARD

Use scientific practices to plan and conduct descriptive and simple experimental investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

5.1C ^{TX}

Grade 5

STANDARD

Demonstrate safe practices and the use of safety equipment during classroom and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

5.ID^{TX}

Grade 5

STANDARD

Use tools, including calculators, microscopes, hand lenses, metric rulers, Celsius thermometers, prisms, concave and convex lenses, laser pointers, mirrors, digital scales, balances, spring scales, graduated cylinders, beakers, hot plates, meter sticks, magnets, collecting nets, notebooks, timing devices, materials for building circuits, materials to support observations of habitats or organisms such as terrariums and aquariums, and materials to support digital data collection such as computers, tablets, and cameras to observe, measure, test, and analyze information.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

5.IE^{TX}

Grade 5

STANDARD

Collect observations and measurements as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

5.IF^{TX}

Grade 5

STANDARD

Construct appropriate graphic organizers used to collect data, including tables, bar graphs, line graphs, tree maps, concept maps, Venn diagrams, flow charts or sequence maps, and input-output tables that show cause and effect.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

5.IG^{TX}

Grade 5

STANDARD

Develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

5.2A ^{TX}

Grade 5

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

5.2B ^{TX}

Grade 5

STANDARD

Analyze data by identifying any significant features, patterns, or sources of error.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

5.2C ^{TX}

Grade 5

STANDARD

Use mathematical calculations to compare patterns and relationships.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

5.2D ^{TX}

Grade 5

STANDARD

Evaluate experimental and engineering designs.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

5.3A ^{TX}

Grade 5

STANDARD

Develop explanations and propose solutions supported by data and models.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

5.3B ^{TX}

Grade 5

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

5.3C ^{TX}

Grade 5

STANDARD

Listen actively to others' explanations to identify relevant evidence and engage respectfully in scientific discussion.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

5.4A ^{TX}

Grade 5

STANDARD

Explain how scientific discoveries and innovative solutions to problems impact science and society.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

5.4B ^{TX}

Grade 5

STANDARD

Research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field to investigate STEM careers.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

5.5A ^{TX}

Grade 5

STANDARD

Identify and use patterns to explain scientific phenomena or to design solutions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

5.5B ^{TX}

Grade 5

STANDARD

Identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems.

MINI 4WD

Change one thing, the push or one part, and say what that change caused.

5.5C ^{TX}

Grade 5

STANDARD

Use scale, proportion, and quantity to describe, compare, or model different systems.

MINI 4WD

Set the car beside a roller. Say which is larger, and which you have more of.

5.5D^{TX}

Grade 5

STANDARD

Examine and model the parts of a system and their interdependence in the function of the system.

MINI 4WD

Name the motor, the gears, and the wheels, and what fails if one of them is missing.

5.5E^{TX}

Grade 5

STANDARD

Investigate how energy flows and matter cycles through systems and how matter is conserved.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

5.5F^{TX}

Grade 5

STANDARD

Explain the relationship between the structure and function of objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

5.5G^{TX}

Grade 5

STANDARD

Explain how factors or conditions impact stability and change in objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

5.6A ^{TX}

Grade 5

STANDARD

Compare and contrast matter based on measurable, testable, or observable physical properties, including mass, magnetism, relative density (sinking and floating using water as a reference point), physical state (solid, liquid, gas), volume, solubility in water, and the ability to conduct or insulate thermal energy and electric energy.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

5.6B ^{TX}

Grade 5

STANDARD

Demonstrate and explain that some mixtures maintain physical properties of their substances such as iron filings and sand or sand and water.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

5.6C ^{TX}

Grade 5

STANDARD

Compare the properties of substances before and after they are combined into a solution and demonstrate that matter is conserved in solutions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

5.6D ^{TX}

Grade 5

STANDARD

Illustrate how matter is made up of particles that are too small to be seen such as air in a balloon.

MINI 4WD

The body looks solid. Draw particles too small to see. Do not claim the eye can see them in the plastic.

5.7A ^{TX}

Grade 5

STANDARD

Investigate and explain how equal and unequal forces acting on an object cause patterns of motion and transfer of energy.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

5.7B ^{TX}

Grade 5

STANDARD

Design a simple experimental investigation that tests the effect of force on an object in a system such as a car on a ramp or a balloon rocket on a string.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

5.8A ^{TX}

Grade 5

STANDARD

Investigate and describe the transformation of energy in systems such as energy in a flashlight battery that changes from chemical energy to electrical energy to light energy.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

5.8B ^{TX}

Grade 5

STANDARD

Demonstrate that electrical energy in complete circuits can be transformed into motion, light, sound, or thermal energy and identify the requirements for a functioning electrical circuit.

MINI 4WD

Shine a lamp on the car, then block it. Say what the light does and where the shadow falls.

5.8C^{TX}

Grade 5

STANDARD

Demonstrate and explain how light travels in a straight line and can be reflected , refracted, or absorbed.

MINI 4WD

Shine a lamp on the car, then block it. Say what the light does and where the shadow falls.

5.9^{TX}

Grade 5

STANDARD

Demonstrate that Earth rotates on its axis once approximately every 24 hours and explain how that causes the day/night cycle and the appearance of the Sun moving across the sky, resulting in changes in shadow positions and shapes.

MINI 4WD

Shine a lamp on the car, then block it. Say what the light does and where the shadow falls.

5.10A^{TX}

Grade 5

STANDARD

Explain how the Sun and the ocean interact in the water cycle and affect weather.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

5.10B^{TX}

Grade 5

STANDARD

Model and describe the processes that led to the formation of sedimentary rocks and fossil fuels.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

5.10C ^{TX}

Grade 5

STANDARD

Model and identify how changes to Earth's surface by wind, water, or ice result in the formation of landforms, including deltas, canyons, and sand dunes.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

5.11 ^{TX}

Grade 5

STANDARD

Design and explain solutions such as conservation, recycling, or proper disposal to minimize environmental impact of the use of natural resources.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

5.12A ^{TX}

Grade 5

STANDARD

Observe and describe how a variety of organisms survive by interacting with biotic and abiotic factors in a healthy ecosystem.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

5.12B ^{TX}

Grade 5

STANDARD

Predict how changes in the ecosystem affect the cycling of matter and flow of energy in a food web.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

5.12C^{TX}

Grade 5

STANDARD

Describe a healthy ecosystem and how human activities can be beneficial or harmful to an ecosystem.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

5.13A^{TX}

Grade 5

STANDARD

Analyze the structures and functions of different species to identify how organisms survive in the same environment.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

5.13B^{TX}

Grade 5

STANDARD

Explain how instinctual behavioral traits such as turtle hatchlings returning to the sea and learned behavioral traits such as orcas hunting in packs increase chances of survival.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

5.ESS.1^{OH}

Grade 5

STANDARD

The solar system includes the sun and all celestial bodies that orbit the sun. Each planet in the solar system has unique characteristics. The distance from the sun, size, composition and movement of each planet are unique. Planets revolve around the sun in elliptical orbits. Some of the planets have moons and/or debris that orbit them. Comets, asteroids and meteoroids orbit the sun.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

5.ESS.2 ^{OH}

Grade 5

STANDARD

The sun is one of many stars that exist in the universe. The sun appears to be the largest star in the sky because it is the closest star to Earth. Some stars are larger than the sun and some stars are smaller than the sun.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

5.ESS.3 ^{OH}

Grade 5

STANDARD

Most of the cycles and patterns of motion between the Earth and sun are predictable. Earth's revolution around the sun takes approximately 365 days. Earth completes one rotation on its axis in a 24-hour period, producing day and night. This rotation makes the sun, stars and moon appear to change position in the sky. Note: Moon phases should not be the focus.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

5.LS.1 ^{OH}

Grade 5

STANDARD

Organisms perform a variety of roles in an ecosystem. Populations of organisms can be categorized by how they acquire energy. Food webs can be used to identify the relationships among producers, consumers and decomposers in an ecosystem.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

5.LS.2 ^{OH}

Grade 5

STANDARD

All of the processes that take place within organisms require energy. For ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred and transformed by producers into energy that organisms use through the process of photosynthesis. That energy is used or stored by the producer and can be passed from organism to organism as illustrated in food webs.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

5.PS.1 ^{OH}

Grade 5

STANDARD

The amount of change in movement of an object is based on the mass of the object and the amount of force exerted. Movement can be measured by speed. The speed of an object is calculated by determining the distance (d) traveled in a period of time (t). Any change in speed or direction of an object requires a force and is affected by the mass of the object and the amount of force applied. Note: Differentiating between mass and weight is not necessary at this grade level.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

5.PS.2 ^{OH}

Grade 5

STANDARD

Light and sound are forms of energy that behave in predictable ways. Light travels and maintains its direction until it interacts with an object or moves from one medium to another and then it can be reflected, refracted or absorbed. Sound is produced by vibrating objects and requires a medium through which to travel. The rate of vibration is related to the pitch of the sound. Note: At this grade level, the discussion of light and sound should be based on observable behavior. Waves are introduced at the middle school level.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

5.1^{AL}

Grade 5

STANDARD

Plan and carry out investigations to provide evidence that matter is made of particles too small to be seen.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

5.2^{AL}

Grade 5

STANDARD

Analyze data collected through observations and measurements to identify materials based on their properties, including color, hardness, and reflectivity.

MINI 4WD

Sort two parts from the car by a property you can see or feel. Say the property out loud.

5.3^{AL}

Grade 5

STANDARD

Conduct investigations to provide evidence that the total weight of matter is conserved during phase changes when substances are heated, cooled, or mixed.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

5.4^{AL}

Grade 5

STANDARD

Analyze data from tests to determine whether a new substance is formed after two or more substances are combined.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

5.5^{AL}

Grade 5

STANDARD

Make a claim, supported by evidence, that the gravitational force exerted by Earth pulls objects towards the center of Earth.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

5.6^{AL}

Grade 5

STANDARD

Design and conduct a test to modify the speed of an object falling due to gravity.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

5.7^{AL}

Grade 5

STANDARD

Support an argument from evidence that plants primarily use air and water to process matter needed for growth.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

5.8^{AL}

Grade 5

STANDARD

Use evidence to explain that energy from the sun is present in animals' food and is used for body repair, growth, motion, and maintenance of body warmth.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

5.9^{AL}

Grade 5

STANDARD

Create and use a model to explain the transfer of matter and energy between the environment and organisms within it.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

5.10^{AL}

Grade 5

STANDARD

Obtain and communicate information to explain why the sun appears to be larger and brighter than other stars.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

5.11^{AL}

Grade 5

STANDARD

Analyze data that reveal patterns of daily changes in length and direction of shadows, day and night, phases of the moon, and seasonal appearance of some stars in the night sky.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

5.12^{AL}

Grade 5

STANDARD

Use a model to represent how any two of Earth's systems (atmosphere, biosphere, geosphere, and hydrosphere) interact and support life.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

5.I3^{AL}

Grade 5

STANDARD

Construct a model to represent the distribution of freshwater and saltwater on Earth.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

5.I4^{AL}

Grade 5

STANDARD

Obtain and evaluate information to communicate how science-based solutions are being used to protect Earth's natural resources and its environment.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

5.I5^{AL}

Grade 5

STANDARD

Design, test, and revise solutions to clean a polluted environment.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

SC.5.N.1.1^{FL}

Grade 5

STANDARD

Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

MINI 4WD

Change one thing on the car, keep the rest the same, and say what that one change did on the lane.

SC.5.N.1.2 ^{FL}

Grade 5

STANDARD

Explain the difference between an experiment and other types of scientific investigation.

MINI 4WD

Change one thing on the car, keep the rest the same, and say what that one change did on the lane.

SC.5.N.1.3 ^{FL}

Grade 5

STANDARD

Recognize and explain the need for repeated experimental trials.

MINI 4WD

Run the same setup twice and say whether the two runs agree.

SC.5.N.1.4 ^{FL}

Grade 5

STANDARD

Identify a control group and explain its importance in an experiment.

MINI 4WD

Change one thing on the car, keep the rest the same, and say what that one change did on the lane.

SC.5.N.1.5 ^{FL}

Grade 5

STANDARD

Recognize and explain that authentic scientific investigation frequently does not parallel the steps of "the scientific method."

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

SC.5.N.1.6 ^{FL}

Grade 5

STANDARD

Recognize and explain the difference between personal opinion/interpretation and verified observation.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

SC.5.N.2.1 ^{FL}

Grade 5

STANDARD

Recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

SC.5.N.2.2 ^{FL}

Grade 5

STANDARD

Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others.

MINI 4WD

Run the same setup twice and say whether the two runs agree.

SC.5.E.5.1 ^{FL}

Grade 5

STANDARD

Recognize that a galaxy consists of gas, dust, and many stars, including any objects orbiting the stars. Identify our home galaxy as the Milky Way.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.5.E.5.2 ^{FL}

Grade 5

STANDARD

Recognize the major common characteristics of all planets and compare/contrast the properties of inner and outer planets.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.5.E.5.3 ^{FL}

Grade 5

STANDARD

Distinguish among the following objects of the Solar System -- Sun, planets, moons, asteroids, comets -- and identify Earth's position in it.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.5.E.7.1 ^{FL}

Grade 5

STANDARD

Create a model to explain the parts of the water cycle. Water can be a gas, a liquid, or a solid and can go back and forth from one state to another.

MINI 4WD

Use a published account for the water or air system the standard names. The car is not that system.

SC.5.E.7.2 ^{FL}

Grade 5

STANDARD

Recognize that the ocean is an integral part of the water cycle and is connected to all of Earth's water reservoirs via evaporation and precipitation processes.

MINI 4WD

Record the weather the standard names. One afternoon at the track is that record.

SC.5.E.7.3 ^{FL}

Grade 5

STANDARD

Recognize how air temperature, barometric pressure, humidity, wind speed and direction, and precipitation determine the weather in a particular place and time.

MINI 4WD

Record the weather the standard names. One afternoon at the track is that record.

SC.5.E.7.4 ^{FL}

Grade 5

STANDARD

Distinguish among the various forms of precipitation (rain, snow, sleet, and hail), making connections to the weather in a particular place and time.

MINI 4WD

Record the weather the standard names. One afternoon at the track is that record.

SC.5.E.7.5 ^{FL}

Grade 5

STANDARD

Recognize that some of the weather-related differences, such as temperature and humidity, are found among different environments, such as swamps, deserts, and mountains.

MINI 4WD

Record the weather the standard names. One afternoon at the track is that record.

SC.5.E.7.6 ^{FL}

Grade 5

STANDARD

Describe characteristics (temperature and precipitation) of different climate zones as they relate to latitude, elevation, and proximity to bodies of water.

MINI 4WD

Use a published account for the climate the standard names. One hot afternoon at the track is weather, not that account.

SC.5.E.7.7 ^{FL}

Grade 5

STANDARD

Design a family preparedness plan for natural disasters and identify the reasons for having such a plan.

MINI 4WD

Use a published account of the hazard the standard names. Keep the car off the lane while that hazard is the subject.

SC.5.P.8.1 ^{FL}

Grade 5

STANDARD

Compare and contrast the basic properties of solids, liquids, and gases, such as mass, volume, color, texture, and temperature.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.5.P.8.2 ^{FL}

Grade 5

STANDARD

Investigate and identify materials that will dissolve in water and those that will not and identify the conditions that will speed up or slow down the dissolving process.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.5.P.8.3 ^{FL}

Grade 5

STANDARD

Demonstrate and explain that mixtures of solids can be separated based on observable properties of their parts such as particle size, shape, color, and magnetic attraction.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.5.P.8.4 ^{FL}

Grade 5

STANDARD

Explore the scientific theory of atoms (also called atomic theory) by recognizing that all matter is composed of parts that are too small to be seen without magnification.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.5.P.9.1 ^{FL}

Grade 5

STANDARD

Investigate and describe that many physical and chemical changes are affected by temperature.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.5.P.10.1 ^{FL}

Grade 5

STANDARD

Investigate and describe some basic forms of energy, including light, heat, sound, electrical, chemical, and mechanical.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.5.P.10.2 ^{FL}

Grade 5

STANDARD

Investigate and explain that energy has the ability to cause motion or create change.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.5.P.10.3 ^{FL}

Grade 5

STANDARD

Investigate and explain that an electrically-charged object can attract an uncharged object and can either attract or repel another charged object without any contact between the objects.

MINI 4WD

Name the cell, the motor, and the path between them.

SC.5.P.10.4 ^{FL}

Grade 5

STANDARD

Investigate and explain that electrical energy can be transformed into heat, light, and sound energy, as well as the energy of motion.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.5.P.11.1 ^{FL}

Grade 5

STANDARD

Investigate and illustrate the fact that the flow of electricity requires a closed circuit (a complete loop).

MINI 4WD

Name the cell, the motor, and the path between them.

SC.5.P.11.2 ^{FL}

Grade 5

STANDARD

Identify and classify materials that conduct electricity and materials that do not.

MINI 4WD

Name the cell, the motor, and the path between them.

SC.5.P.13.1 ^{FL}

Grade 5

STANDARD

Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.5.P.13.2 ^{FL}

Grade 5

STANDARD

Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.5.P.13.3 ^{FL}

Grade 5

STANDARD

Investigate and describe that the more mass an object has, the less effect a given force will have on the object's motion.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.5.P.13.4 ^{FL}

Grade 5

STANDARD

Investigate and explain that when a force is applied to an object but it does not move, it is because another opposing force is being applied by something in the environment so that the forces are balanced.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.5.L.14.1 ^{FL}

Grade 5

STANDARD

Identify the organs in the human body and describe their functions, including the skin, brain, heart, lungs, stomach, liver, intestines, pancreas, muscles and skeleton, reproductive organs, kidneys, bladder, and sensory organs.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.5.L.14.2 ^{FL}

Grade 5

STANDARD

Compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have skeletons for support -- some with internal skeletons others with exoskeletons -- while some plants have stems for support.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.5.L.15.1 ^{FL}

Grade 5

STANDARD

Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.5.L.17.1 ^{FL}

Grade 5

STANDARD

Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

Grade 6 (preferred integrated)

146 standards

MS-LSI-1 NG, CA, MI, NJ, PA

Grade 6 (preferred integrated)

STANDARD

Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

MINI 4WD

A thin slice of a plant leaf, seen through a microscope, is the evidence that a living thing is made of cells. A thin shaving of the car body is not. Look at both and say which one shows cells.

MS-LSI-2 NG, CA, MI, NJ

Grade 6 (preferred integrated)

STANDARD

Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

MINI 4WD

Draw a cell with its parts and the job of the whole cell. Beside it, draw the car with motor, gears, and wheels, and the job of the whole car. Same kind of drawing. Different kind of thing.

MS-LSI-3 NG, CA, MI, NJ

Grade 6 (preferred integrated)

STANDARD

Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

MINI 4WD

Argue from a body system, such as muscle and nerve letting a hand catch a car at the end of the lane. The car's motor, gears, and rollers are a machine system, not a body system.

MS-LS1-4 NG, CA, MI, NJ

Grade 6 (preferred integrated)

STANDARD

Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

MINI 4WD

A flower's shape and an animal's call change the chance of reproduction. Nothing the car does changes a chance of offspring. Read the living cases for this standard, and use the car only as the object that has no reproduction.

MS-LS1-5 NG, CA, MI, NJ, PA

Grade 6 (preferred integrated)

STANDARD

Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

MINI 4WD

Two plants of one kind, one starved of light and one not, show environment beside inheritance. Two cars of one kit, one left in heat until the tires change, show a condition acting on a made object. Report them as two explanations.

MS-LS1-8 NG, CA, MI, NJ

Grade 6 (preferred integrated)

STANDARD

Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

MINI 4WD

The eye sees the car drift and the hand corrects. That path is receptor, message, brain. The car's motor answers a switch, not a stimulus stored as a memory.

MS-LS3-2 NG, CA, MI, NJ, PA

Grade 6 (preferred integrated)

STANDARD

Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

MINI 4WD

A mold can press many matching bodies. That sameness is a copy, not asexual reproduction. Sexual reproduction's variation needs a living example. Say which diagram is which.

MS-ESS2-4 NG, CA, MI, NJ, PA

Grade 6 (preferred integrated)

STANDARD

Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

MINI 4WD

Draw water leaving a wet track, becoming vapor, then dripping back as rain, with the sun and gravity in the labels. The car is in the scene. It is not the cycle.

MS-ESS2-5 NG, CA, MI

Grade 6 (preferred integrated)

STANDARD

Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.

MINI 4WD

On two race days, record temperature, wind, and cloud, and say what changed in the air between them.

MS-ESS2-5 MI

Grade 6 (preferred integrated)

STANDARD

Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions in Michigan due to the Great Lakes and regional geography.

MINI 4WD

Use a published weather record for a place in Michigan and say what the Great Lakes or the shape of the land has to do with a change. One afternoon at the track is not that record.

Michigan assigns this standard to grades 6–8, so it is printed in each of those grades.

MS-ESS2-6 ^{NG, CA, MI, NJ, PA}

Grade 6 (preferred integrated)

STANDARD

Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

MINI 4WD

A model of uneven sun and a spinning Earth is what this standard asks. A hot side and a cool side of a parked car in the sun is only a small picture of uneven heating, not of ocean currents.

MS-ESS3-3 ^{NG, CA, MI, NJ}

Grade 6 (preferred integrated)

STANDARD

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MINI 4WD

Design a pit check that cuts one human mark on the place: cells packed out, oil kept off the soil, or broken plastic picked up. Say how you would know the mark got smaller.

MS-ESS3-5 ^{NG, CA, MI, PA}

Grade 6 (preferred integrated)

STANDARD

Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

MINI 4WD

Ask which evidence is being used when someone says the air has warmed over the last century, and which of those questions a single hot race day cannot answer.

MS-ESS3-5 ^{NJ}

Grade 6 (preferred integrated)

STANDARD

Ask questions to clarify evidence of the factors that have caused climate change over the past century.

MINI 4WD

Ask which evidence is being used when someone says the climate has changed over the last century, and which of those questions a single hot race day cannot answer.

New Jersey assigns this standard to grades 6–8, so it is printed in each of those grades.

MS-PS3-3 NG, CA, MI, NJ, PA

Grade 6 (preferred integrated)

STANDARD

Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

MINI 4WD

Build a sleeve that slows how fast a motor can dump heat into the chassis, and a bare motor as the other case. Test which one keeps the can cooler for the same run.

MS-PS3-4 NG, CA, MI, NJ, PA

Grade 6 (preferred integrated)

STANDARD

Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

MINI 4WD

Plan a trial: same warming time, two masses of the same metal, or two metals of the same mass. Temperature is the measure. The car's motor can be the heater only if the plan says what is held still.

MS-PS3-5 NG, CA, MI, NJ, PA

Grade 6 (preferred integrated)

STANDARD

Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.

MINI 4WD

When the car slows against a roller, its kinetic energy drops. Argue where that energy went: heat and sound at the contact, not "gone."

MS-ETS1-1 NG, CA, MI, NJ, PA

Grade 6 (preferred integrated)

STANDARD

Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MINI 4WD

Write the lane-stay problem with a measured test, a mass limit, a parts list, and one way the fix could bother the people beside the track or the ground under it.

Also printed in the grade 7 and grade 8 preferred-integrated documents.

MS-ETS1-2 NG, CA, MI, NJ, PA

Grade 6 (preferred integrated)

STANDARD

Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MINI 4WD

Score two complete cars against the same written tests: stays in the lane, finishes, stays within the parts you allowed.

Also printed in the grade 7 and grade 8 preferred-integrated documents.

MS-ETS1-3 NG, CA, MI, NJ, PA

Grade 6 (preferred integrated)

STANDARD

Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MINI 4WD

From tests of two cars, name one feature of each that you would combine into a third car, and the criterion that third car is supposed to meet.

Also printed in the grade 7 and grade 8 preferred-integrated documents.

MS-ETS1-4 ^{NG, CA, MI, NJ, PA}

Grade 6 (preferred integrated)

STANDARD

Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

MINI 4WD

Make a simple repeatable setup, such as the same slope and the same release, so each change of roller or mass produces a new time you can compare with the last.

Also printed in the grade 7 and grade 8 preferred-integrated documents.

3.4.6-8.D ^{PA}

Grade 6 (preferred integrated)

STANDARD

Gather, read, and synthesize information from multiple sources to investigate how Pennsylvania environmental issues affect Pennsylvania's human and natural systems.

MINI 4WD

Read two published accounts of one Pennsylvania environmental issue. The club's waste can sit beside that issue as a local note. It does not stand in for the issue.

Pennsylvania assigns this standard to grades 6–8, so it is printed in each of those grades.

6.1A ^{TX}

Grade 6 (preferred integrated)

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

6.1B ^{TX}

Grade 6 (preferred integrated)

STANDARD

Use scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

6.1C ^{TX}

Grade 6 (preferred integrated)

STANDARD

Use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

6.1D ^{TX}

Grade 6 (preferred integrated)

STANDARD

Use appropriate tools such as graduated cylinders, metric rulers, periodic tables, balances, scales, thermometers, temperature probes, laboratory ware, timing devices, pH indicators, hot plates, models, microscopes, slides, life science models, petri dishes, dissecting kits, magnets, spring scales or force sensors, tools that model wave behavior, satellite images, hand lenses, and lab notebooks or journals.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

6.1E ^{TX}

Grade 6 (preferred integrated)

STANDARD

Collect quantitative data using the International System of Units (SI) and qualitative data as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

6.1F ^{TX}

Grade 6 (preferred integrated)

STANDARD

Construct appropriate tables, graphs, maps, and charts using repeated trials and means to organize data.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

6.1G ^{TX}

Grade 6 (preferred integrated)

STANDARD

Develop and use models to represent phenomena, systems, processes, or solutions to engineering problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

6.1H ^{TX}

Grade 6 (preferred integrated)

STANDARD

Distinguish between scientific hypotheses, theories, and laws.

MINI 4WD

Say which you are using: a guess about a run, a tested account, or a rule of the track.

6.2A ^{TX}

Grade 6 (preferred integrated)

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

6.2B ^{TX}

Grade 6 (preferred integrated)

STANDARD

Analyze data by identifying any significant descriptive statistical features, patterns, sources of error, or limitations.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

6.2C^{TX}

Grade 6 (preferred integrated)

STANDARD

Use mathematical calculations to assess quantitative relationships in data.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

6.2D^{TX}

Grade 6 (preferred integrated)

STANDARD

Evaluate experimental and engineering designs.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

6.3A^{TX}

Grade 6 (preferred integrated)

STANDARD

Develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

6.3B^{TX}

Grade 6 (preferred integrated)

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

6.3C^{TX}

Grade 6 (preferred integrated)

STANDARD

Engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

6.4A^{TX}

Grade 6 (preferred integrated)

STANDARD

Relate the impact of past and current research on scientific thought and society, including the process of science, cost-benefit analysis, and contributions of diverse scientists as related to the content.

MINI 4WD

Read one published case of a cost and a benefit. The cells are one small use, not that case.

6.4B^{TX}

Grade 6 (preferred integrated)

STANDARD

Make informed decisions by evaluating evidence from multiple appropriate sources to assess the credibility, accuracy, cost-effectiveness, and methods used.

MINI 4WD

Use two sources for one claim and say which source you trust, and why.

6.4C^{TX}

Grade 6 (preferred integrated)

STANDARD

Research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field to investigate STEM careers.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

6.5A ^{TX}

Grade 6 (preferred integrated)

STANDARD

Identify and apply patterns to understand and connect scientific phenomena or to design solutions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

6.5B ^{TX}

Grade 6 (preferred integrated)

STANDARD

Identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems.

MINI 4WD

Change one thing, the push or one part, and say what that change caused.

6.5C ^{TX}

Grade 6 (preferred integrated)

STANDARD

Analyze how differences in scale, proportion, or quantity affect a system's structure or performance.

MINI 4WD

Set the car beside a roller. Say which is larger, and which you have more of.

6.5D ^{TX}

Grade 6 (preferred integrated)

STANDARD

Examine and model the parts of a system and their interdependence in the function of the system.

MINI 4WD

Name the motor, the gears, and the wheels, and what fails if one of them is missing.

6.5E^{TX}

Grade 6 (preferred integrated)

STANDARD

Analyze and explain how energy flows and matter cycles through systems and how energy and matter are conserved through a variety of systems.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

6.5F^{TX}

Grade 6 (preferred integrated)

STANDARD

Analyze and explain the complementary relationship between the structure and function of objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

6.5G^{TX}

Grade 6 (preferred integrated)

STANDARD

Analyze and explain how factors or conditions impact stability and change in objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

6.6A^{TX}

Grade 6 (preferred integrated)

STANDARD

Compare solids, liquids, and gases in terms of their structure, shape, volume, and kinetic energy of atoms and molecules.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

6.6B ^{TX}

Grade 6 (preferred integrated)

STANDARD

Investigate the physical properties of matter to distinguish between pure substances, homogeneous mixtures (solutions), and heterogeneous mixtures.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

6.6C ^{TX}

Grade 6 (preferred integrated)

STANDARD

Identify elements on the periodic table as metals, nonmetals, metalloids, and rare Earth elements based on their physical properties and importance to modern life.

MINI 4WD

Sort the body, a washer, and a tire by shape, color, and what they are made of.

6.6D ^{TX}

Grade 6 (preferred integrated)

STANDARD

Compare the density of substances relative to various fluids.

MINI 4WD

Set a washer and a plastic clip in a cup of water. Say which one sinks.

6.6E ^{TX}

Grade 6 (preferred integrated)

STANDARD

Identify the formation of a new substance by using the evidence of a possible chemical change, including production of a gas, change in thermal energy, production of a precipitate, and color change.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

6.7A^{TX}

Grade 6 (preferred integrated)

STANDARD

Identify and explain how forces act on objects, including gravity, friction, magnetism, applied forces, and normal forces, using real-world applications.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

6.7B^{TX}

Grade 6 (preferred integrated)

STANDARD

Calculate the net force on an object in a horizontal or vertical direction using diagrams and determine if the forces are balanced or unbalanced.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

6.7C^{TX}

Grade 6 (preferred integrated)

STANDARD

Identify simultaneous force pairs that are equal in magnitude and opposite in direction that result from the interactions between objects using Newton's Third Law of Motion.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

6.8A^{TX}

Grade 6 (preferred integrated)

STANDARD

Compare and contrast gravitational, elastic, and chemical potential energies with kinetic energy.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

6.8B ^{TX}

Grade 6 (preferred integrated)

STANDARD

Describe how energy is conserved through transfers and transformations in systems such as electrical circuits, food webs, amusement park rides, or photosynthesis.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

6.8C ^{TX}

Grade 6 (preferred integrated)

STANDARD

Explain how energy is transferred through transverse and longitudinal waves.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

6.9A ^{TX}

Grade 6 (preferred integrated)

STANDARD

Model and illustrate how the tilted Earth revolves around the Sun, causing changes in seasons.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

6.9B ^{TX}

Grade 6 (preferred integrated)

STANDARD

Describe and predict how the positions of the Earth, Sun, and Moon cause daily, spring, and neap cycles of ocean tides due to gravitational forces.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

6.10A^{TX}

Grade 6 (preferred integrated)

STANDARD

Differentiate between the biosphere, hydrosphere, atmosphere, and geosphere and identify components of each system.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

6.10B^{TX}

Grade 6 (preferred integrated)

STANDARD

Model and describe the layers of Earth, including the inner core, outer core, mantle, and crust.

MINI 4WD

Name the layers from a published figure. The car is sitting on the outside.

6.10C^{TX}

Grade 6 (preferred integrated)

STANDARD

Describe how metamorphic, igneous, and sedimentary rocks form and change through geologic processes in the rock cycle.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

6.11A^{TX}

Grade 6 (preferred integrated)

STANDARD

Research and describe why resource management is important in reducing global energy poverty, malnutrition, and air and water pollution.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

6.11B^{TX}

Grade 6 (preferred integrated)

STANDARD

Explain how conservation, increased efficiency, and technology can help manage air, water, soil, and energy resources.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

6.12A^{TX}

Grade 6 (preferred integrated)

STANDARD

Investigate how organisms and populations in an ecosystem depend on and may compete for biotic factors such as food and abiotic factors such as availability of light and water, range of temperatures, or soil composition.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

6.12B^{TX}

Grade 6 (preferred integrated)

STANDARD

Describe and give examples of predatory, competitive, and symbiotic relationships between organisms, including mutualism, parasitism, and commensalism.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

6.12C^{TX}

Grade 6 (preferred integrated)

STANDARD

Describe the hierarchical organization of organism, population, and community within an ecosystem.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

6.13A^{TX}

Grade 6 (preferred integrated)

STANDARD

Describe the historical development of cell theory and explain how organisms are composed of one or more cells, which come from pre-existing cells and are the basic unit of structure and function.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

6.13B^{TX}

Grade 6 (preferred integrated)

STANDARD

Identify and compare the basic characteristics of organisms, including prokaryotic and eukaryotic, unicellular and multicellular, and autotrophic and heterotrophic.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

6.13C^{TX}

Grade 6 (preferred integrated)

STANDARD

Describe how variations within a population can be an advantage or disadvantage to the survival of a population as environments change.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

6.ESS.1^{OH}

Grade 6 (preferred integrated)

STANDARD

Minerals have specific, quantifiable properties. Minerals are naturally occurring, inorganic solids that have a defined chemical composition. Minerals have properties that can be observed and measured. Minerals form in specific environments. Note: The emphasis is on learning how to identify the mineral by conducting tests (not through memorization).

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

6.ESS.2 ^{OH}

Grade 6 (preferred integrated)

STANDARD

Igneous, metamorphic and sedimentary rocks have unique characteristics that can be used for identification and/or classification. Most rocks are composed of one or more minerals, but there are a few types of sedimentary rocks that contain organic material, such as coal. The composition of the rock, types of mineral present, and/or mineral shape and size can be used to identify the rock and to interpret its history of formation, breakdown (weathering) and transport (erosion).

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

6.ESS.3 ^{OH}

Grade 6 (preferred integrated)

STANDARD

Igneous, metamorphic and sedimentary rocks form in different ways. Magma or lava cools and crystallizes to form igneous rocks. Heat and pressure applied to existing rock forms metamorphic rocks. Sedimentary rock forms as existing rock weathers chemically and/or physically and the weathered material is compressed and then lithifies. Each rock type can provide information about the environment in which it was formed.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

6.ESS.4 ^{OH}

Grade 6 (preferred integrated)

STANDARD

Soil is unconsolidated material that contains nutrient matter and weathered rock. Soil formation occurs at different rates and is based on environmental conditions, types of existing bedrock and rates of weathering. Soil forms in layers known as horizons. Soil horizons can be distinguished from one another based on properties that can be measured. The terms dirt and soil are not synonymous, use the term "soil". Note: The emphasis should be on properties of soil rather than memorization.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

6.ESS.5 ^{OH}

Grade 6 (preferred integrated)

STANDARD

Rocks, minerals and soils have common and practical uses. Nearly all manufactured material requires some kind of geologic resource. Most geologic resources are considered nonrenewable. Rocks, minerals and soil are examples of geologic resources that are nonrenewable.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

6.LS.1 ^{OH}

Grade 6 (preferred integrated)

STANDARD

Cells are the fundamental unit of life. All living things are composed of cells. Different body tissues and organs are made of different kinds of cells. The ways cells function are similar in all living organisms. Note: Emphasis should be placed on the function and coordination of cell organelles as well as their roles in overall cell function. Specific information about the organelles that need to be addressed at this grade level will be found in the model curriculum.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

6.LS.2 ^{OH}

Grade 6 (preferred integrated)

STANDARD

All cells come from pre-existing cells. Cells repeatedly divide resulting in more cells and growth and repair in multicellular organisms. Note: This is not a detailed discussion of the phases of mitosis or meiosis. The focus should be on reproduction as a means of transmitting genetic information from one generation to the next, cellular growth and repair.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

6.LS.3^{OH}

Grade 6 (preferred integrated)

STANDARD

Cells carry on specific functions that sustain life. Many basic functions of organisms occur in cells. Cells take in nutrients and energy to perform work, like making various molecules required by that cell or an organism. Every cell is covered by a membrane that controls what can enter and leave the cell. Within the cell are specialized parts for the transport of materials, energy capture and release, protein building, waste disposal, information feedback and movement. Note: Emphasis should be placed on the function and coordination of cell components, as well as on their roles in overall cell function.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

6.LS.4^{OH}

Grade 6 (preferred integrated)

STANDARD

Living systems at all levels of organization demonstrate the complementary nature of structure and function. The level of organization within organisms includes cells, tissues, organs, organ systems and whole organisms. Whether the organism is single-celled or multicellular, all of its parts function as a whole to perform the tasks necessary for the survival of the organism. Organisms have diverse body plans, symmetry and internal structures that contribute to their being able to survive in their environments.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

6.PS.1^{OH}

Grade 6 (preferred integrated)

STANDARD

Matter is made up of small particles called atoms. Matter has mass, volume and density and is made up of particles called atoms. Elements are a class of substances composed of a single kind of atom. Molecules are the combination of two or more atoms that are joined together chemically.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

6.PS.2 ^{OH}

Grade 6 (preferred integrated)

STANDARD

Changes of state are explained by a model of matter composed of particles that are in motion. Temperature is a measure of the average motion of the particles in a substance. Heat is a process of energy transfer rather than a type of energy. Energy transfer can result in a change in temperature or a phase change. When substances undergo changes of state, atoms change their motion and position. Note: It is not the intent of this standard to encourage vocabulary identification (matching definitions with heat, temperature, and thermal energy). Instead, these are provided as conceptual tools for understanding the role of energy in physical, biotic, atmospheric, oceanic, and geologic systems covered in grade 6 and subsequent grades and courses.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

6.PS.3 ^{OH}

Grade 6 (preferred integrated)

STANDARD

There are two categories of energy: kinetic and potential. Objects and substances in motion have kinetic energy. Objects and substances can have energy as a result of their position (potential energy). Note: Chemical and elastic potential energy should not be included at this grade; this is found in PS grade 7.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

6.PS.4 ^{OH}

Grade 6 (preferred integrated)

STANDARD

An object's motion can be described by its speed and the direction in which it is moving. An object's position and speed can be measured and graphed as a function of time. Note: Velocity and acceleration rates should not be included at this grade level; these terms are introduced in high school.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

6.1^{AL}

Grade 6 (preferred integrated)

STANDARD

Manipulate models to demonstrate the patterns of motion of the sun, Earth, and moon.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

6.1a^{AL}

Grade 6 (preferred integrated)

STANDARD

Construct an evidence-based explanation of how the relative positions of the sun and Earth result in observable phenomena, including day and night cycles, length of year, and seasons.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

6.1b^{AL}

Grade 6 (preferred integrated)

STANDARD

Construct an evidence-based explanation of how the relative positions of the sun, moon, and Earth result in observable phenomena, including lunar cycles, eclipses, and tidal cycles.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

6.2^{AL}

Grade 6 (preferred integrated)

STANDARD

Evaluate information to compare and contrast past and current views about the structure of the universe and show how these views have changed over time.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

6.3^{AL}

Grade 6 (preferred integrated)

STANDARD

Construct an evidence-based explanation of the role of gravity on the movement of natural and manmade objects within galaxies and the solar system.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

6.4^{AL}

Grade 6 (preferred integrated)

STANDARD

Analyze and use data to determine scale properties and characteristics of objects in the solar system including sizes, distances, orbital periods, basic composition, and ability to support life.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

6.5^{AL}

Grade 6 (preferred integrated)

STANDARD

Obtain, evaluate, and communicate evidence that explains how constructive and destructive processes shape Earth's surface.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

6.5a^{AL}

Grade 6 (preferred integrated)

STANDARD

Develop and use models to demonstrate the processes that form rocks and cycle Earth's materials.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

6.5b ^{AL}

Grade 6 (preferred integrated)

STANDARD

Construct an evidence-based explanation of how rocks are classified as metamorphic, igneous, or sedimentary based on their characteristics and the process of the rock cycle.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

6.5c ^{AL}

Grade 6 (preferred integrated)

STANDARD

Develop and use models to demonstrate types of weathering, effects of agents of erosion and transportation, and the formation of environments of deposition.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

6.5d ^{AL}

Grade 6 (preferred integrated)

STANDARD

Use research-based evidence to propose a scientific explanation of how the distribution of Earth's resources, including minerals, fossil fuels, and groundwater, results from ongoing geoscience processes.

MINI 4WD

Use a published account for the change across generations. A setup you change between heats is not that change.

6.6 ^{AL}

Grade 6 (preferred integrated)

STANDARD

Construct an evidence-based explanation of how tectonic plate movement impacts Earth's surface over geological time.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

6.6a ^{AL}

Grade 6 (preferred integrated)

STANDARD

Construct an evidence-based explanation of how Earth's internal energy flows between its surface and its interior.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

6.6b ^{AL}

Grade 6 (preferred integrated)

STANDARD

Construct a scientific explanation of how the movement of lithospheric plates can cause major geologic events and form Earth's surface features, including convergent, divergent, and transform boundaries; earthquakes; and volcanoes.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

6.6c ^{AL}

Grade 6 (preferred integrated)

STANDARD

Provide evidence of past plate movements, using data regarding the distribution of fossils, rocks, continental shapes, and seafloor structures.

MINI 4WD

Use a published account for the change across generations. A setup you change between heats is not that change.

6.7 ^{AL}

Grade 6 (preferred integrated)

STANDARD

Analyze data from rock strata and the fossil record to construct a chronology of occurrences in Earth's history.

MINI 4WD

Use a published account for the change across generations. A setup you change between heats is not that change.

6.8 ^{AL}

Grade 6 (preferred integrated)

STANDARD

Construct an evidence-based explanation of how the sun's energy drives the motion and cycling of water through the hydrosphere.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

6.8a ^{AL}

Grade 6 (preferred integrated)

STANDARD

Plan and carry out an investigation to determine the differences in rates of energy transfer from the sun to air, to land, and to water via conduction, convection, and radiation.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

6.8b ^{AL}

Grade 6 (preferred integrated)

STANDARD

Develop and use a model that illustrates how differences in heat and pressure affect density and the relationship between density and convection.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

6.9 ^{AL}

Grade 6 (preferred integrated)

STANDARD

Use data analysis to monitor and predict weather changes and the impact of weather events, including severe weather.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

6.9a ^{AL}

Grade 6 (preferred integrated)

STANDARD

Obtain, evaluate, and communicate data that describes characteristics of air masses, including temperature, pressure, and humidity.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

6.9b ^{AL}

Grade 6 (preferred integrated)

STANDARD

Construct an explanation of how air pressure, weather fronts, and air masses are related to weather events.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

6.9c ^{AL}

Grade 6 (preferred integrated)

STANDARD

Design solutions to mitigate the impact of severe weather.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

6.10 ^{AL}

Grade 6 (preferred integrated)

STANDARD

Use observations and data from investigations to demonstrate how the sun, air, land, and water affect Earth's climate.

MINI 4WD

Use a published account for the climate pattern the standard names. One hot afternoon at the track is weather, not that account.

6.10b^{AL}

Grade 6 (preferred integrated)

STANDARD

Construct explanations of how the tilt and curvature of the Earth cause unequal heating of its surface, resulting in regional climates based on patterns of latitude.

MINI 4WD

Use a published account for the climate pattern the standard names. One hot afternoon at the track is weather, not that account.

6.10c^{AL}

Grade 6 (preferred integrated)

STANDARD

Construct an explanation of how altitude, geothermal activity, and oceanic distribution of heat produce typical regional climate patterns.

MINI 4WD

Use a published account for the climate pattern the standard names. One hot afternoon at the track is weather, not that account.

6.11^{AL}

Grade 6 (preferred integrated)

STANDARD

Obtain, evaluate, and communicate information concerning the relationships between human activities and natural processes and how those relationships affect Earth's systems, including human population growth and its impact on the global environment over time.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

6.11a^{AL}

Grade 6 (preferred integrated)

STANDARD

Define problems and design solutions to monitor and mitigate human impact on the environment.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

SC.6.N.1.1 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

MINI 4WD

Change one thing on the car, keep the rest the same, and say what that one change did on the lane.

SC.6.N.1.2 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Explain why scientific investigations should be replicable.

MINI 4WD

Run the same setup twice and say whether the two runs agree.

SC.6.N.1.3 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Explain the difference between an experiment and other types of scientific investigation, and explain the relative benefits and limitations of each.

MINI 4WD

Change one thing on the car, keep the rest the same, and say what that one change did on the lane.

SC.6.N.1.4 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.

MINI 4WD

With a partner, record one observation of the car on the lane, then compare the two records.

SC.6.N.1.5 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.

MINI 4WD

Change one thing on the car, keep the rest the same, and say what that one change did on the lane.

SC.6.N.2.1 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Distinguish science from other activities involving thought.

MINI 4WD

Name one question about the lane that a run can answer, and one question a run cannot.

SC.6.N.2.2 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

SC.6.N.2.3 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.

MINI 4WD

Name the person who made a claim about a run, and one reason a second person might explain the same run differently.

SC.6.N.3.1 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Recognize and explain that a scientific theory is a well-supported and widely accepted explanation of nature and is not simply a claim posed by an individual. Thus, the use of the term theory in science is very different than how it is used in everyday life.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

SC.6.N.3.2 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Recognize and explain that a scientific law is a description of a specific relationship under given conditions in the natural world. Thus, scientific laws are different from societal laws.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

SC.6.N.3.3 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Give several examples of scientific laws.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

SC.6.N.3.4 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Identify the role of models in the context of the sixth grade science benchmarks.

MINI 4WD

Point to the car and say which part of the standard the model is standing in for, and one way the model is not the whole thing.

SC.6.E.6.1 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.

MINI 4WD

Record the weather the standard names. One afternoon at the track is that record.

SC.6.E.6.2 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.

MINI 4WD

Use a published account for what the standard asks about Florida. The car is the object in the room.

SC.6.E.7.1 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Differentiate among radiation, conduction, and convection, the three mechanisms by which heat is transferred through Earth's system.

MINI 4WD

Name the heat-moving word the standard uses, and say which one you notice when you hold a motor that just ran.

SC.6.E.7.2 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate.

MINI 4WD

Use a published account for the climate the standard names. One hot afternoon at the track is weather, not that account.

SC.6.E.7.3 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation.

MINI 4WD

Record the weather the standard names. One afternoon at the track is that record.

SC.6.E.7.4 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Differentiate and show interactions among the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.

MINI 4WD

Use a published account for the water or air system the standard names. The car is not that system.

SC.6.E.7.5 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Explain how energy provided by the sun influences global patterns of atmospheric movement and the temperature differences between air, water, and land.

MINI 4WD

Put the car in the sun, then in the shade, and say which place warmed it.

SC.6.E.7.7 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Investigate how natural disasters have affected human life in Florida.

MINI 4WD

Use a published account for what the standard asks about Florida. The car is the object in the room.

SC.6.E.7.8 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Describe ways human beings protect themselves from hazardous weather and sun exposure.

MINI 4WD

Use a published account of the hazard the standard names. Keep the car off the lane while that hazard is the subject.

SC.6.E.7.9 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Describe how the composition and structure of the atmosphere protects life and insulates the planet.

MINI 4WD

Use a published account for the water or air system the standard names. The car is not that system.

SC.6.P.11.1 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.6.P.12.1 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.6.P.13.1 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.6.P.13.2 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.6.P.13.3 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.6.L.14.1 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Describe and identify patterns in the hierarchical organization of organisms from atoms to molecules and cells to tissues to organs to organ systems to organisms.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.6.L.14.2 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Investigate and explain the components of the scientific theory of cells (cell theory): all organisms are composed of cells (single-celled or multi-cellular), all cells come from pre-existing cells, and cells are the basic unit of life.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.6.L.14.3 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Recognize and explore how cells of all organisms undergo similar processes to maintain homeostasis, including extracting energy from food, getting rid of waste, and reproducing.

MINI 4WD

Use a published account for the environmental effect the standard names. Club waste on the floor is not that system.

SC.6.L.14.4 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.6.L.14.5 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.6.L.14.6 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.6.L.15.1 ^{FL}

Grade 6 (preferred integrated)

STANDARD

Analyze and describe how and why organisms are classified according to shared characteristics with emphasis on the Linnaean system combined with the concept of Domains.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

Grade 7 (preferred integrated)

140 standards

MS-LS1-6 ^{NG, CA, MI, NJ, PA}

Grade 7 (preferred integrated)

STANDARD

Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

MINI 4WD

Explain photosynthesis as the way light becomes stored chemical energy in a plant. If the cells were charged from a solar panel, that is a different device on the same sunlight. Do not call the panel a leaf.

MS-LS1-7 NG, CA, MI, NJ, PA

Grade 7 (preferred integrated)

STANDARD

Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

MINI 4WD

Model food being rearranged in a person who then lifts the car. The car does not rearrange food. The person's motion is the living side of the standard.

MS-LS2-1 NG, CA, MI, NJ, PA

Grade 7 (preferred integrated)

STANDARD

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MINI 4WD

Fewer spare motors in the pit changes what the builders can run. Fewer plants in a plot changes what the animals can use. Read both as resource limits, and do not treat the motors as a population.

MS-LS2-2 NG, CA, MI, NJ, PA

Grade 7 (preferred integrated)

STANDARD

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MINI 4WD

Predict one pattern between living things, such as a grazer and a plant, across two places. A faster car and a slower car on one track are opponents in a game, not that pattern.

MS-LS2-3 NG, CA, MI, NJ, PA

Grade 7 (preferred integrated)

STANDARD

Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

MINI 4WD

Draw matter and energy moving among plants, animals, and soil. On a second drawing, draw energy moving from cell to motor to heat. Label the second drawing as a machine, not an ecosystem.

MS-LS2-4 NG, CA, MI, NJ, PA

Grade 7 (preferred integrated)

STANDARD

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

MINI 4WD

Argue from evidence that changing one part of a living system changes who lives there. Changing the track surface changes which car setup finishes. Those are two arguments.

MS-LS2-5 NG, CA, MI, NJ, PA

Grade 7 (preferred integrated)

STANDARD

Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

MINI 4WD

Evaluate two real proposals for keeping a living place intact, using the published idea of the place. A rule that keeps oil off the club lot is a small human step, not a full biodiversity plan.

MS-ESS2-1 NG, CA, MI, NJ, PA

Grade 7 (preferred integrated)

STANDARD

Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

MINI 4WD

Model rock becoming sediment and sediment becoming rock, with heat or pressure in the labels. Plastic chassis pellets melted and remolded, if a teacher does that with proper heat, are a factory cycle, not the rock cycle.

MS-ESS2-2 NG, CA, MI, NJ, PA

Grade 7 (preferred integrated)

STANDARD

Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

MINI 4WD

Use a published before-and-after of a floodplain or a lava flow for the Earth process. One car scraping a clay bank is only a fast, tiny groove, useful as a scale comparison.

MS-ESS2-3 NG, CA, MI, NJ

Grade 7 (preferred integrated)

STANDARD

Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.

MINI 4WD

The evidence is fossils, continent outlines, and seafloor maps. The car has no part in that evidence. The outline of the chassis can be traced only to practice reading a shape, then the maps are the actual work.

MS-ESS3-1 NG, CA, MI, NJ, PA

Grade 7 (preferred integrated)

STANDARD

Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

MINI 4WD

Explain, from a published source, why one region has oil, ore, or groundwater and another does not. The cells and the plastic in the car are products that came from some such region.

MS-ESS3-2 NG, CA, MI, NJ, PA

Grade 7 (preferred integrated)

STANDARD

Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

MINI 4WD

Read data on one hazard, such as flood or quake, and name a technology used to reduce harm. Say whether the club's outdoor site sits in that hazard's map.

MS-PS1-1 NG, CA, MI, NJ, PA

Grade 7 (preferred integrated)

STANDARD

Develop models to describe the atomic composition of simple molecules and extended structures.

MINI 4WD

Model the repeating chain of a plastic and the simple molecule of water with drawings or kits. The car body is the bulk object made from the plastic's units.

MS-PSI-2 NG, CA, MI, NJ, PA

Grade 7 (preferred integrated)

STANDARD

Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

MINI 4WD

Compare a tire before and after it is only washed, and a tablet before and after it dissolves in water. Say which case gives a new substance.

MS-PSI-3 NG, CA, MI, NJ

Grade 7 (preferred integrated)

STANDARD

Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

MINI 4WD

The body, the tires, and the metal axles start as natural resources that were processed. Name the resource for one of them and one effect of making it.

MS-PSI-4 NG, CA, MI, NJ

Grade 7 (preferred integrated)

STANDARD

Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

MINI 4WD

Heat water, then let it boil or freeze under a teacher's setup, and describe particle motion, temperature, and state. A motor can warming in the hand is a temperature change, not a change of state.

MS-PSI-5 NG, CA, MI, NJ, PA

Grade 7 (preferred integrated)

STANDARD

Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

MINI 4WD

Count atoms on paper for a simple reaction and show the count unchanged. Assembling the car conserves the parts you started with. That is a parts count, not a chemical equation. Use the equation for the standard.

MS-PS1-6 ^{NG, CA, MI, NJ, PA}

Grade 7 (preferred integrated)

STANDARD

Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

MINI 4WD

A hand-warmer pack or a dissolving salt that cools a cup is the chemical device. Use it under a teacher's plan. The car's cells are a different store. Do not open a cell.

MS-ESS2-5 ^{MI}

Grade 7 (preferred integrated)

STANDARD

Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions in Michigan due to the Great Lakes and regional geography.

MINI 4WD

Use a published weather record for a place in Michigan and say what the Great Lakes or the shape of the land has to do with a change. One afternoon at the track is not that record.

Michigan assigns this standard to grades 6-8, so it is printed in each of those grades.

MS-ESS3-5 ^{NJ}

Grade 7 (preferred integrated)

STANDARD

Ask questions to clarify evidence of the factors that have caused climate change over the past century.

MINI 4WD

Ask which evidence is being used when someone says the climate has changed over the last century, and which of those questions a single hot race day cannot answer.

New Jersey assigns this standard to grades 6-8, so it is printed in each of those grades.

3.4.6-8.D ^{PA}

Grade 7 (preferred integrated)

STANDARD

Gather, read, and synthesize information from multiple sources to investigate how Pennsylvania environmental issues affect Pennsylvania's human and natural systems.

MINI 4WD

Read two published accounts of one Pennsylvania environmental issue. The club's waste can sit beside that issue as a local note. It does not stand in for the issue.

Pennsylvania assigns this standard to grades 6–8, so it is printed in each of those grades.

7.1A ^{TX}

Grade 7 (preferred integrated)

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

7.1B ^{TX}

Grade 7 (preferred integrated)

STANDARD

Use scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

7.1C ^{TX}

Grade 7 (preferred integrated)

STANDARD

Use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

7.ID^{TX}

Grade 7 (preferred integrated)

STANDARD

Use appropriate tools such as graduated cylinders, metric rulers, periodic tables, balances, scales, thermometers, temperature probes, laboratory ware, timing devices, pH indicators, hot plates, models, microscopes, slides, life science models, petri dishes, dissecting kits, magnets, spring scales or force sensors, tools that model wave behavior, satellite images, hand lenses, and lab notebooks or journals.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

7.IE^{TX}

Grade 7 (preferred integrated)

STANDARD

Collect quantitative data using the International System of Units (SI) and qualitative data as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

7.IF^{TX}

Grade 7 (preferred integrated)

STANDARD

Construct appropriate tables, graphs, maps, and charts using repeated trials and means to organize data.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

7.IG^{TX}

Grade 7 (preferred integrated)

STANDARD

Develop and use models to represent phenomena, systems, processes, or solutions to engineering problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

7.1H^{TX}

Grade 7 (preferred integrated)

STANDARD

Distinguish between scientific hypotheses, theories, and laws.

MINI 4WD

Say which you are using: a guess about a run, a tested account, or a rule of the track.

7.2A^{TX}

Grade 7 (preferred integrated)

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

7.2B^{TX}

Grade 7 (preferred integrated)

STANDARD

Analyze data by identifying any significant descriptive statistical features, patterns, sources of error, or limitations.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

7.2C^{TX}

Grade 7 (preferred integrated)

STANDARD

Use mathematical calculations to assess quantitative relationships in data.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

7.2D^{TX}

Grade 7 (preferred integrated)

STANDARD

Evaluate experimental and engineering designs.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

7.3A^{TX}

Grade 7 (preferred integrated)

STANDARD

Develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

7.3B^{TX}

Grade 7 (preferred integrated)

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

7.3C^{TX}

Grade 7 (preferred integrated)

STANDARD

Engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

7.4A^{TX}

Grade 7 (preferred integrated)

STANDARD

Relate the impact of past and current research on scientific thought and society, including the process of science, cost-benefit analysis, and contributions of diverse scientists as related to the content.

MINI 4WD

Read one published case of a cost and a benefit. The cells are one small use, not that case.

7.4B^{TX}

Grade 7 (preferred integrated)

STANDARD

Make informed decisions by evaluating evidence from multiple appropriate sources to assess the credibility, accuracy, cost-effectiveness, and methods used.

MINI 4WD

Use two sources for one claim and say which source you trust, and why.

7.4C^{TX}

Grade 7 (preferred integrated)

STANDARD

Research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field to investigate STEM careers.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

7.5A^{TX}

Grade 7 (preferred integrated)

STANDARD

Identify and apply patterns to understand and connect scientific phenomena or to design solutions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

7.5B^{TX}

Grade 7 (preferred integrated)

STANDARD

Identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems.

MINI 4WD

Change one thing, the push or one part, and say what that change caused.

7.5C^{TX}

Grade 7 (preferred integrated)

STANDARD

Analyze how differences in scale, proportion, or quantity affect a system's structure or performance.

MINI 4WD

Set the car beside a roller. Say which is larger, and which you have more of.

7.5D^{TX}

Grade 7 (preferred integrated)

STANDARD

Examine and model the parts of a system and their interdependence in the function of the system.

MINI 4WD

Name the motor, the gears, and the wheels, and what fails if one of them is missing.

7.5E^{TX}

Grade 7 (preferred integrated)

STANDARD

Analyze and explain how energy flows and matter cycles through systems and how energy and matter are conserved through a variety of systems.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

7.5F^{TX}

Grade 7 (preferred integrated)

STANDARD

Analyze and explain the complementary relationship between structure and function of objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.5G^{TX}

Grade 7 (preferred integrated)

STANDARD

Analyze and explain how factors or conditions impact stability and change in objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.6A^{TX}

Grade 7 (preferred integrated)

STANDARD

Compare and contrast elements and compounds in terms of atoms and molecules, chemical symbols, and chemical formulas.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

7.6B^{TX}

Grade 7 (preferred integrated)

STANDARD

Use the periodic table to identify the atoms and the number of each kind within a chemical formula.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

7.6C^{TX}

Grade 7 (preferred integrated)

STANDARD

Distinguish between physical and chemical changes in matter.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

7.6D^{TX}

Grade 7 (preferred integrated)

STANDARD

Describe aqueous solutions in terms of solute and solvent, concentration, and dilution.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

7.6E^{TX}

Grade 7 (preferred integrated)

STANDARD

Investigate and model how temperature, surface area, and agitation affect the rate of dissolution of solid solutes in aqueous solutions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

7.7A^{TX}

Grade 7 (preferred integrated)

STANDARD

Calculate average speed using distance and time measurements from investigations.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

7.7B^{TX}

Grade 7 (preferred integrated)

STANDARD

Distinguish between speed and velocity in linear motion in terms of distance, displacement, and direction.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

7.7C^{TX}

Grade 7 (preferred integrated)

STANDARD

Measure, record, and interpret an object's motion using distance-time graphs.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

7.7D^{TX}

Grade 7 (preferred integrated)

STANDARD

Analyze the effect of balanced and unbalanced forces on the state of motion of an object using Newton's First Law of Motion.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

7.8A^{TX}

Grade 7 (preferred integrated)

STANDARD

Investigate methods of thermal energy transfer into and out of systems, including conduction, convection, and radiation.

MINI 4WD

Compare a motor can after a run with a part left in the shade. Name the heat move you mean. Do not open a cell.

7.8B ^{TX}

Grade 7 (preferred integrated)

STANDARD

Investigate how thermal energy moves in a predictable pattern from warmer to cooler until all substances within the system reach thermal equilibrium.

MINI 4WD

Compare a motor can after a run with a part left in the shade. Name the heat move you mean. Do not open a cell.

7.8C ^{TX}

Grade 7 (preferred integrated)

STANDARD

Explain the relationship between temperature and the kinetic energy of the particles within a substance.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

7.9A ^{TX}

Grade 7 (preferred integrated)

STANDARD

Describe the physical properties, locations, and movements of the Sun, planets, moons, meteors, asteroids, comets, Kuiper belt, and Oort cloud.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

7.9B ^{TX}

Grade 7 (preferred integrated)

STANDARD

Describe how gravity governs motion within Earth's solar system.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

7.9C^{TX}

Grade 7 (preferred integrated)

STANDARD

Analyze the characteristics of Earth that allow life to exist such as the proximity of the Sun, presence of water, and composition of the atmosphere.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

7.10A^{TX}

Grade 7 (preferred integrated)

STANDARD

Describe the evidence that supports that Earth has changed over time, including fossil evidence, plate tectonics, and superposition.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.10B^{TX}

Grade 7 (preferred integrated)

STANDARD

Describe how plate tectonics causes ocean basin formation, earthquakes, mountain building, and volcanic eruptions, including supervolcanoes and hot spots.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

7.11A^{TX}

Grade 7 (preferred integrated)

STANDARD

Analyze the beneficial and harmful influences of human activity on groundwater and surface water in a watershed.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

7.11B^{TX}

Grade 7 (preferred integrated)

STANDARD

Describe human dependence and influence on ocean systems and explain how human activities impact these systems.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

7.12A^{TX}

Grade 7 (preferred integrated)

STANDARD

Diagram the flow of energy within trophic levels and describe how the available energy decreases in successive trophic levels in energy pyramids.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

7.12B^{TX}

Grade 7 (preferred integrated)

STANDARD

Describe how ecosystems are sustained by the continuous flow of energy and the recycling of matter and nutrients within the biosphere.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.13A^{TX}

Grade 7 (preferred integrated)

STANDARD

Identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.I3B^{TX}

Grade 7 (preferred integrated)

STANDARD

Describe the hierarchical organization of cells, tissues, organs, and organ systems within plants and animals.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.I3C^{TX}

Grade 7 (preferred integrated)

STANDARD

Compare the results of asexual and sexual reproduction of plants and animals in relation to the diversity of offspring and the changes in the population over time.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.I3D^{TX}

Grade 7 (preferred integrated)

STANDARD

Describe and give examples of how natural and artificial selection change the occurrence of traits in a population over generations.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.I4A^{TX}

Grade 7 (preferred integrated)

STANDARD

Describe the taxonomic system that categorizes organisms based on similarities and differences shared among groups.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.I4B^{TX}

Grade 7 (preferred integrated)

STANDARD

Describe the characteristics of the recognized kingdoms and their importance in ecosystems such as bacteria aiding digestion or fungi decomposing organic matter.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.ESS.1^{OH}

Grade 7 (preferred integrated)

STANDARD

The hydrologic cycle illustrates the changing states of water as it moves through the lithosphere, biosphere, hydrosphere and atmosphere. Thermal energy is transferred as water changes state throughout the cycle. The cycling of water in the atmosphere is an important part of weather patterns on Earth. The rate at which water flows through soil and rock is dependent upon the porosity and permeability of the soil or rock.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

7.ESS.2^{OH}

Grade 7 (preferred integrated)

STANDARD

Thermal-energy transfers in the ocean and the atmosphere contribute to the formation of currents, which influence global climate patterns. The sun is the major source of energy for wind, air and ocean currents and the hydrologic cycle. As thermal energy transfers occur in the atmosphere and ocean, currents form. Large bodies of water can influence weather and climate. The jet stream is an example of an atmospheric current and the Gulf Stream is an example of an oceanic current. Ocean currents are influenced by factors other than thermal energy, such as water density, mineral content (such as salinity), ocean floor topography and Earth's rotation. All of these factors delineate global climate patterns on Earth.

MINI 4WD

Use a published account for the climate pattern the standard names. One hot afternoon at the track is weather, not that account.

7.ESS.3 ^{OH}

Grade 7 (preferred integrated)

STANDARD

The atmosphere has different properties at different elevations and contains a mixture of gases that cycle through the lithosphere, biosphere, hydrosphere and atmosphere. The atmosphere is held to the Earth by the force of gravity. There are defined layers of the atmosphere that have specific properties, such as temperature, chemical composition and physical characteristics. Gases in the atmosphere include nitrogen, oxygen, water vapor, carbon dioxide and other trace gases.

Biogeochemical cycles illustrate the movement of specific elements or molecules (such as carbon or nitrogen) through the lithosphere, biosphere, hydrosphere and atmosphere. Note: The emphasis is on why the atmosphere has defined layers, not on naming the layers.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

7.ESS.4 ^{OH}

Grade 7 (preferred integrated)

STANDARD

The relative patterns of motion and positions of Earth, moon and sun cause solar and lunar eclipses, tides and phases of the moon. The moon's orbit and its change of position relative to Earth and sun result in different parts of the moon being visible from Earth (phases of the moon). A solar eclipse is when Earth moves into the shadow of the moon (during a new moon). A lunar eclipse is when the moon moves into the shadow of Earth (during a full moon). Gravitational force between Earth and the moon causes daily oceanic tides. When the gravitational forces from the sun and moon align (at new and full moons) spring tides occur. When the gravitational forces of the sun and moon are perpendicular (at first and last quarter moons), neap tides occur.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

7.ESS.5 ^{OH}

Grade 7 (preferred integrated)

STANDARD

The relative positions of Earth and the sun cause patterns we call seasons. Earth's axis is tilted at an angle of 23.5°. This tilt along with Earth's revolution around the sun, affects the amount of direct sunlight that the earth receives in a single day and throughout the year. The average daily temperature is related to the amount of direct sunlight received.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

7.LS.1 ^{OH}

Grade 7 (preferred integrated)

STANDARD

Energy flows and matter is transferred continuously from one organism to another and between organisms and their physical environments. Plants use the energy in light to make sugars out of carbon dioxide and water (photosynthesis). These materials can be used or stored for later use. Organisms that eat plants break down plant structures to release the energy and produce the materials they need to survive. The organism may then be consumed by other organisms for materials and energy. Energy can transform from one form to another in living things. Animals get energy from oxidizing food, releasing some of its energy as heat. The total amount of matter and energy remains constant, even though its form and location change. Note: Chemical reactions in terms of subatomic structures of atoms are not appropriate at this grade level. Chemical reactions are presented as the rearrangement of atoms in molecules.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.LS.2 ^{OH}

Grade 7 (preferred integrated)

STANDARD

In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors. The variety of physical (abiotic) conditions that exists on Earth gives rise to diverse environments (biomes) and allows for the existence of a wide variety of organisms (biodiversity). Biomes are regional ecosystems characterized by distinct types of organisms that have developed under specific soil and climatic conditions. Ecosystems are dynamic in nature; the number and types of species fluctuate over time. Disruptions, deliberate or inadvertent, to the physical (abiotic) or biological (biotic) components of an ecosystem impact the composition of an ecosystem.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.PS.1 ^{OH}

Grade 7 (preferred integrated)

STANDARD

Elements can be organized by properties. Elements can be classified as metals, non-metals and metalloids, and can be organized by similar properties such as color, solubility, hardness, density, conductivity, melting point and boiling point, viscosity, and malleability. Note 1: This is the conceptual introduction of the Periodic Table of Elements and should be limited to classifications based on observable properties; it should not include the names of the families.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

7.PS.2 ^{OH}

Grade 7 (preferred integrated)

STANDARD

Matter can be separated or changed, but in a closed system, the number and types of atoms remains constant. When substances interact and form new substances the properties of the new substances may be very different from those of the original substances, but the amount of mass does not change. Physically combining two or more substances form a mixture, which can be separated through physical processes. Note: Under these standards, classifying specific changes as chemical or physical is not appropriate.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

7.PS.3 ^{OH}

Grade 7 (preferred integrated)

STANDARD

Energy can be transformed or transferred but is never lost. When energy is transferred from one system to another, the quantity of energy before transfer equals the quantity of energy after transfer. When energy is transformed from one form to another, the total amount of energy remains the same.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

7.PS.4^{OH}

Grade 7 (preferred integrated)

STANDARD

Energy can be transferred through a variety of ways. Mechanical energy can be transferred when objects push or pull on each other over a distance. Mechanical and electromagnetic waves transfer energy when they interact with matter. Thermal energy can be transferred through radiation, convection and conduction. An electrical circuit transfers energy from a source to a device. Note: Energy transfers should be experiential and observable at this grade level.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

7.I^{AL}

Grade 7 (preferred integrated)

STANDARD

Develop and use a model to explain the functions of specific cell structures necessary for maintaining a stable environment, including the cell membrane, cell wall, chloroplasts, endoplasmic reticulum, golgi apparatus, mitochondria, nucleus, ribosomes, and vacuoles.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.Ia^{AL}

Grade 7 (preferred integrated)

STANDARD

Engage in argument from evidence to support claims of cell theory.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.Ib^{AL}

Grade 7 (preferred integrated)

STANDARD

Construct an explanation of how prokaryotic and eukaryotic cells differ in structure and function.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.IC^{AL}

Grade 7 (preferred integrated)

STANDARD

Plan and carry out an investigation to identify and explain features of a cell's semi-permeable membrane which enable it to control what enters and exits the cell.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.2^{AL}

Grade 7 (preferred integrated)

STANDARD

Construct an explanation of how photosynthesis and cellular respiration cycle matter and establish the flow of energy into and out of an organism.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.2a^{AL}

Grade 7 (preferred integrated)

STANDARD

Ask questions and construct an explanation of how anaerobic bacteria produce energy in environments with no oxygen.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

7.3^{AL}

Grade 7 (preferred integrated)

STANDARD

Construct an explanation of how the process of mitosis maintains complex organisms and ensures new cells with identical genetic information.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

7.3a^{AL}

Grade 7 (preferred integrated)

STANDARD

Ask questions and communicate information regarding how errors in mitosis may affect cell division.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.4^{AL}

Grade 7 (preferred integrated)

STANDARD

Obtain, evaluate, and communicate information explaining how cells, tissues, and organs of various systems of the human body work together for specific functions, including the circulatory, digestive, muscular, nervous, respiratory, and skeletal systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.5^{AL}

Grade 7 (preferred integrated)

STANDARD

Construct an explanation of how the cycling of matter between abiotic and biotic parts of ecosystems demonstrates the flow of energy and the conservation of matter, including the carbon, nitrogen, and water cycles.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.6^{AL}

Grade 7 (preferred integrated)

STANDARD

Analyze and interpret data to predict how environmental conditions, genetic factors, and resource availability will impact the growth of individual organisms and populations of organisms in an ecosystem.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

7.7^{AL}

Grade 7 (preferred integrated)

STANDARD

Analyze and interpret data to explain how density-independent and density-dependent limiting factors in an ecosystem can lead to shifts in populations.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.9^{AL}

Grade 7 (preferred integrated)

STANDARD

Design a solution to maintain biodiversity and ecosystem services in a given scenario.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.IO^{AL}

Grade 7 (preferred integrated)

STANDARD

Obtain, evaluate, and communicate information about characteristic animal behaviors and specialized plant structures and their effect on the probability of successful reproduction.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

7.II^{AL}

Grade 7 (preferred integrated)

STANDARD

Develop and use models to demonstrate how genetic variations between parents and offspring result from differences in inherited genes located on chromosomes.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

7.I2^{AL}

Grade 7 (preferred integrated)

STANDARD

Develop and use models to explain how genes are expressed through the flow of genetic information from DNA to RNA to a functional protein.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

7.I3^{AL}

Grade 7 (preferred integrated)

STANDARD

Develop and use models to explain that meiosis results in new genetic combinations with increased variation.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

7.I3a^{AL}

Grade 7 (preferred integrated)

STANDARD

Construct an explanation of the advantages and disadvantages of asexual and sexual reproduction.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

7.I3b^{AL}

Grade 7 (preferred integrated)

STANDARD

Construct an explanation from evidence of how genetic variants may result in harmful, beneficial, or neutral effects on the structure and function of an organism.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

7.I4^{AL}

Grade 7 (preferred integrated)

STANDARD

Obtain, evaluate, and communicate information on the use of technologies that impact the inheritance and appearance of traits in organisms.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

7.I5^{AL}

Grade 7 (preferred integrated)

STANDARD

Analyze and interpret data from examination of fossils, relict species, and modern organisms to determine patterns of change in anatomical structures over time.

MINI 4WD

Use a published account for the change across generations. A setup you change between heats is not that change.

7.I7^{AL}

Grade 7 (preferred integrated)

STANDARD

Ask questions to clarify how natural selection over generations may lead to changes in the frequency of specific traits to enhance survival and reproduction of a population.

MINI 4WD

Use a published account for the change across generations. A setup you change between heats is not that change.

SC.7.N.1.1^{FL}

Grade 7 (preferred integrated)

STANDARD

Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

MINI 4WD

Change one thing on the car, keep the rest the same, and say what that one change did on the lane.

SC.7.N.1.2 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Differentiate replication (by others) from repetition (multiple trials).

MINI 4WD

Run the same setup twice and say whether the two runs agree.

SC.7.N.1.3 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Distinguish between an experiment (which must involve the identification and control of variables) and other forms of scientific investigation and explain that not all scientific knowledge is derived from experimentation.

MINI 4WD

Change one thing on the car, keep the rest the same, and say what that one change did on the lane.

SC.7.N.1.4 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.

MINI 4WD

Change one thing on the car, keep the rest the same, and say what that one change did on the lane.

SC.7.N.1.5 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Describe the methods used in the pursuit of a scientific explanation as seen in different fields of science such as biology, geology, and physics.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

SC.7.N.1.6^{FL}

Grade 7 (preferred integrated)

STANDARD

Explain that empirical evidence is the cumulative body of observations of a natural phenomenon on which scientific explanations are based.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

SC.7.N.1.7^{FL}

Grade 7 (preferred integrated)

STANDARD

Explain that scientific knowledge is the result of a great deal of debate and confirmation within the science community.

MINI 4WD

State one claim about a run, and the evidence from that run.

SC.7.N.2.1^{FL}

Grade 7 (preferred integrated)

STANDARD

Identify an instance from the history of science in which scientific knowledge has changed when new evidence or new interpretations are encountered.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

SC.7.N.3.1^{FL}

Grade 7 (preferred integrated)

STANDARD

Recognize and explain the difference between theories and laws and give several examples of scientific theories and the evidence that supports them.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

SC.7.N.3.2 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Identify the benefits and limitations of the use of scientific models.

MINI 4WD

Point to the car and say which part of the standard the model is standing in for, and one way the model is not the whole thing.

SC.7.E.6.1 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Describe the layers of the solid Earth, including the lithosphere, the hot convecting mantle, and the dense metallic liquid and solid cores.

MINI 4WD

Use a published Earth account for the rock or the process the standard names. The car is the object on the table.

SC.7.E.6.2 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Identify the patterns within the rock cycle and relate them to surface events (weathering and erosion) and sub-surface events (plate tectonics and mountain building).

MINI 4WD

Record the weather the standard names. One afternoon at the track is that record.

SC.7.E.6.3 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Identify current methods for measuring the age of Earth and its parts, including the law of superposition and radioactive dating.

MINI 4WD

Use a published Earth account for what the standard names. The car is the object on the table.

SC.7.E.6.4 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Explain and give examples of how physical evidence supports scientific theories that Earth has evolved over geologic time due to natural processes.

MINI 4WD

Use a published Earth account for the rock or the process the standard names. The car is the object on the table.

SC.7.E.6.5 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building.

MINI 4WD

Use a published Earth account for the rock or the process the standard names. The car is the object on the table.

SC.7.E.6.6 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.

MINI 4WD

Use a published account for the human effect the standard names. The car is not that effect.

SC.7.E.6.7 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Recognize that heat flow and movement of material within Earth causes earthquakes and volcanic eruptions, and creates mountains and ocean basins.

MINI 4WD

Use a published Earth account for the rock or the process the standard names. The car is the object on the table.

SC.7.P.10.1 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Illustrate that the sun's energy arrives as radiation with a wide range of wavelengths, including infrared, visible, and ultraviolet, and that white light is made up of a spectrum of many different colors.

MINI 4WD

Use a lamp or the motor's sound for the wave the standard names, and say what changed.

SC.7.P.10.2 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Observe and explain that light can be reflected, refracted, and/or absorbed.

MINI 4WD

Use a lamp or the motor's sound for the wave the standard names, and say what changed.

SC.7.P.10.3 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Recognize that light waves, sound waves, and other waves move at different speeds in different materials.

MINI 4WD

Use a lamp or the motor's sound for the wave the standard names, and say what changed.

SC.7.P.11.1 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Recognize that adding heat to or removing heat from a system may result in a temperature change and possibly a change of state.

MINI 4WD

After a run, say where the car feels warmer and what rubbed.

SC.7.P.11.2 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Investigate and describe the transformation of energy from one form to another.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.7.P.11.3 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Cite evidence to explain that energy cannot be created nor destroyed, only changed from one form to another.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.7.P.11.4 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Observe and describe that heat flows in predictable ways, moving from warmer objects to cooler ones until they reach the same temperature.

MINI 4WD

After a run, say where the car feels warmer and what rubbed.

SC.7.L.15.1 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Recognize that fossil evidence is consistent with the scientific theory of evolution that living things evolved from earlier species.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.7.L.15.2 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Explore the scientific theory of evolution by recognizing and explaining ways in which genetic variation and environmental factors contribute to evolution by natural selection and diversity of organisms.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.7.L.15.3 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Explore the scientific theory of evolution by relating how the inability of a species to adapt within a changing environment may contribute to the extinction of that species.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.7.L.16.1 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.7.L.16.2 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Determine the probabilities for genotype and phenotype combinations using Punnett Squares and pedigrees.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.7.L.16.3 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.7.L.16.4 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Recognize and explore the impact of biotechnology (cloning, genetic engineering, artificial selection) on the individual, society and the environment.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.7.L.17.1 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Explain and illustrate the roles of and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.

MINI 4WD

List what the builder needs during one build, and what the standard says a living thing needs. The car does not eat or drink.

SC.7.L.17.2 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Compare and contrast the relationships among organisms such as mutualism, predation, parasitism, competition, and commensalism.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.7.L.17.3 ^{FL}

Grade 7 (preferred integrated)

STANDARD

Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

Grade 8 (preferred integrated)

148 standards

MS-LS3-1 ^{NG, CA, MI, NJ, PA}

Grade 8 (preferred integrated)

STANDARD

Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

MINI 4WD

A change in a gene can change a protein and then a body. A crack in a chassis changes how the car runs. Call the crack damage to a part, not a mutation.

MS-LS4-1 ^{NG, CA, MI, NJ, PA}

Grade 8 (preferred integrated)

STANDARD

Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

MINI 4WD

The fossil record is the data: life appearing, changing, and disappearing in the rocks. Old car bodies in a cupboard are a hobby record. Use the fossil images for the pattern.

MS-LS4-2 NG, CA, MI, NJ

Grade 8 (preferred integrated)

STANDARD

Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

MINI 4WD

Similar bones in different animals are the evidence for relationship. Similar axle layouts in two kits are a shared design. Explain the bones. Mention the axles only as the look-alike that is not ancestry.

MS-LS4-3 NG, CA, MI, NJ

Grade 8 (preferred integrated)

STANDARD

Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.

MINI 4WD

Embryo drawings are the data for this standard. The car has no embryo. Do this one from the published plates.

MS-LS4-4 NG, CA, MI, NJ, PA

Grade 8 (preferred integrated)

STANDARD

Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

MINI 4WD

Among living things, a heritable trait can raise the chance of living and reproducing in a place. Among cars, a setup can raise the chance of finishing on a track. The second case is not inherited and not reproduction.

MS-LS4-5 NG, CA, MI, NJ, PA

Grade 8 (preferred integrated)

STANDARD

Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

MINI 4WD

Selective breeding and genetic tools change crops and animals. Choosing a gear set for a car is a builder's choice of parts. Name both, and do not call the gear set breeding.

MS-LS4-6 NG, CA, MI, NJ, PA

Grade 8 (preferred integrated)

STANDARD

Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

MINI 4WD

A published number example of a trait becoming more common is the mathematics. A lap chart of one car winning more often is a sports record, not natural selection.

MS-ESS1-1 NG, CA, MI, NJ, PA

Grade 8 (preferred integrated)

STANDARD

Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.

MINI 4WD

Model Earth, the sun, and the moon with a lamp and two balls, and use that model for phases, eclipses, and seasons. A car on the table can stand in as a marker on the "ground," not as a planet.

MS-ESS1-2 NG, CA, MI, NJ

Grade 8 (preferred integrated)

STANDARD

Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

MINI 4WD

Gravity sets the orbits in the model of sun and planets. The car stays on the track because of forces from the ground and the walls, which is a different situation in the same topic of gravity's pull toward Earth.

MS-ESS1-3 NG, CA, MI, NJ, PA

Grade 8 (preferred integrated)

STANDARD

Analyze and interpret data to determine scale properties of objects in the solar system.

MINI 4WD

Use published sizes and distances of sun, moon, and planets. Then place the car's length next to those numbers so the scale is felt. Do not invent a new astronomical size.

MS-ESS1-4 NG, CA, MI, NJ, PA

Grade 8 (preferred integrated)

STANDARD

Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.

MINI 4WD

Rock strata and the geologic time scale are the evidence, including the age the standard itself states. A layered stack of old decals is not strata.

MS-ESS3-4 NG, CA, MI, NJ, PA

Grade 8 (preferred integrated)

STANDARD

Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

MINI 4WD

Argue from published figures of population and resource use. One club throwing away more plastic bodies is a small local example of consumption, not the global figure.

MS-PS2-1 NG, CA, MI, NJ, PA

Grade 8 (preferred integrated)

STANDARD

Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.

MINI 4WD

When the car hits a wall, the wall pushes back as the car pushes on the wall. Design a roller so that pair of forces turns the car along the lane instead of stopping it dead.

MS-PS2-2 NG, CA, MI, NJ, PA

Grade 8 (preferred integrated)

STANDARD

Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.

MINI 4WD

Plan a run that changes mass with a known added weight, motor off, same push, and record the change in motion. A second plan can change the push and hold the mass still.

MS-PS2-3 NG, CA, MI, NJ, PA

Grade 8 (preferred integrated)

STANDARD

Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.

MINI 4WD

Ask which data change the pull: distance between a magnet and a steel axle, and whether the motor is off. The motor's magnetic field is the later, live case. Start with the magnet you can hold.

MS-PS2-4 NG, CA, MI, NJ, PA

Grade 8 (preferred integrated)

STANDARD

Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.

MINI 4WD

Argue that the car and the Earth attract, which is why the car stays on the lane floor, and that a heavier car is pulled harder, which a scale can show.

MS-PS2-5 NG, CA, MI, NJ, PA

Grade 8 (preferred integrated)

STANDARD

Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

MINI 4WD

With parts not touching, a magnet still pulls a steel axle, and a charged balloon can pull a hair. Evaluate whether the test really kept them apart. The motor, unpowered, is not yet that test.

MS-PS₃-1 NG, CA, MI, NJ

Grade 8 (preferred integrated)

STANDARD

Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

MINI 4WD

Graph kinetic energy against speed for one car, and against mass at one speed, from times over a measured lane. The shape of the graph is the point.

MS-PS₃-2 NG, CA, MI, NJ, PA

Grade 8 (preferred integrated)

STANDARD

Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.

MINI 4WD

A roller spring, or a car held at the top of a slope and then released, stores more energy in the raised or compressed arrangement than in the resting one. Model those two arrangements.

MS-PS₄-1 NG, CA, MI, NJ, PA

Grade 8 (preferred integrated)

STANDARD

Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

MINI 4WD

On a string or a slinky, a larger shake carries more energy into a light panel. Relate that amplitude to the energy. The motor's buzz is a second, smaller example of a vibration, not the measurement model.

MS-PS₄-2 NG, CA, MI, NJ

Grade 8 (preferred integrated)

STANDARD

Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

MINI 4WD

Light on the body can bounce, be taken up as heat, or pass a clear wing. Sort those three with a lamp.

MS-PS4-3 ^{NG, CA, MI, NJ, PA}

Grade 8 (preferred integrated)

STANDARD

Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.

MINI 4WD

A light that is either on or off to mean “go” is a digital signal. A shout that fades down the room is closer to analog. Say which one still means the same thing at the far end of the track.

MS-ESS2-5 ^{MI}

Grade 8 (preferred integrated)

STANDARD

Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions in Michigan due to the Great Lakes and regional geography.

MINI 4WD

Use a published weather record for a place in Michigan and say what the Great Lakes or the shape of the land has to do with a change. One afternoon at the track is not that record.

Michigan assigns this standard to grades 6–8, so it is printed in each of those grades.

MS-ESS3-5 ^{NJ}

Grade 8 (preferred integrated)

STANDARD

Ask questions to clarify evidence of the factors that have caused climate change over the past century.

MINI 4WD

Ask which evidence is being used when someone says the climate has changed over the last century, and which of those questions a single hot race day cannot answer.

New Jersey assigns this standard to grades 6–8, so it is printed in each of those grades.

3.4.6-8.D ^{PA}

Grade 8 (preferred integrated)

STANDARD

Gather, read, and synthesize information from multiple sources to investigate how Pennsylvania environmental issues affect Pennsylvania's human and natural systems.

MINI 4WD

Read two published accounts of one Pennsylvania environmental issue. The club's waste can sit beside that issue as a local note. It does not stand in for the issue.

Pennsylvania assigns this standard to grades 6–8, so it is printed in each of those grades.

8.IA ^{TX}

Grade 8 (preferred integrated)

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

8.IB ^{TX}

Grade 8 (preferred integrated)

STANDARD

Use scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.IC ^{TX}

Grade 8 (preferred integrated)

STANDARD

Use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

8.I.D ^{TX}

Grade 8 (preferred integrated)

STANDARD

Use appropriate tools such as graduated cylinders, metric rulers, periodic tables, balances, scales, thermometers, temperature probes, laboratory ware, timing devices, pH indicators, hot plates, models, microscopes, slides, life science models, petri dishes, dissecting kits, magnets, spring scales or force sensors, tools that model wave behavior, satellite images, weather maps, hand lenses, and lab notebooks or journals.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

8.I.E ^{TX}

Grade 8 (preferred integrated)

STANDARD

Collect quantitative data using the International System of Units (SI) and qualitative data as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

8.I.F ^{TX}

Grade 8 (preferred integrated)

STANDARD

Construct appropriate tables, graphs, maps, and charts using repeated trials and means to organize data.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

8.I.G ^{TX}

Grade 8 (preferred integrated)

STANDARD

Develop and use models to represent phenomena, systems, processes, or solutions to engineering problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.1H^{TX}

Grade 8 (preferred integrated)

STANDARD

Distinguish between scientific hypotheses, theories, and laws.

MINI 4WD

Say which you are using: a guess about a run, a tested account, or a rule of the track.

8.2A^{TX}

Grade 8 (preferred integrated)

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

8.2B^{TX}

Grade 8 (preferred integrated)

STANDARD

Analyze data by identifying any significant descriptive statistical features, patterns, sources of error, or limitations.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

8.2C^{TX}

Grade 8 (preferred integrated)

STANDARD

Use mathematical calculations to assess quantitative relationships in data.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

8.2D^{TX}

Grade 8 (preferred integrated)

STANDARD

Evaluate experimental and engineering designs.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

8.3A^{TX}

Grade 8 (preferred integrated)

STANDARD

Develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.3B^{TX}

Grade 8 (preferred integrated)

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.3C^{TX}

Grade 8 (preferred integrated)

STANDARD

Engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

8.4A^{TX}

Grade 8 (preferred integrated)

STANDARD

Relate the impact of past and current research on scientific thought and society, including the process of science, cost-benefit analysis, and contributions of diverse scientists as related to the content.

MINI 4WD

Read one published case of a cost and a benefit. The cells are one small use, not that case.

8.4B^{TX}

Grade 8 (preferred integrated)

STANDARD

Make informed decisions by evaluating evidence from multiple appropriate sources to assess the credibility, accuracy, cost-effectiveness, and methods used.

MINI 4WD

Use two sources for one claim and say which source you trust, and why.

8.4C^{TX}

Grade 8 (preferred integrated)

STANDARD

Research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field to investigate STEM careers.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

8.5A^{TX}

Grade 8 (preferred integrated)

STANDARD

Identify and apply patterns to understand and connect scientific phenomena or to design solutions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.5B ^{TX}

Grade 8 (preferred integrated)

STANDARD

Identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems.

MINI 4WD

Change one thing, the push or one part, and say what that change caused.

8.5C ^{TX}

Grade 8 (preferred integrated)

STANDARD

Analyze how differences in scale, proportion, or quantity affect a system's structure or performance.

MINI 4WD

Set the car beside a roller. Say which is larger, and which you have more of.

8.5D ^{TX}

Grade 8 (preferred integrated)

STANDARD

Examine and model the parts of a system and their interdependence in the function of the system.

MINI 4WD

Name the motor, the gears, and the wheels, and what fails if one of them is missing.

8.5E ^{TX}

Grade 8 (preferred integrated)

STANDARD

Analyze and explain how energy flows and matter cycles through systems and how energy and matter are conserved through a variety of systems.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

8.5F ^{TX}

Grade 8 (preferred integrated)

STANDARD

Analyze and explain the complementary relationship between the structure and function of objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

8.5G ^{TX}

Grade 8 (preferred integrated)

STANDARD

Analyze and explain how factors or conditions impact stability and change in objects, organisms, and systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

8.6A ^{TX}

Grade 8 (preferred integrated)

STANDARD

Explain by modeling how matter is classified as elements, compounds, homogeneous mixtures, or heterogeneous mixtures.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.6B ^{TX}

Grade 8 (preferred integrated)

STANDARD

Use the periodic table to identify the atoms involved in chemical reactions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.6C ^{TX}

Grade 8 (preferred integrated)

STANDARD

Describe the properties of cohesion, adhesion, and surface tension in water and relate to observable phenomena such as the formation of droplets, transport in plants, and insects walking on water.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

8.6D ^{TX}

Grade 8 (preferred integrated)

STANDARD

Compare and contrast the properties of acids and bases, including pH relative to water.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

8.6E ^{TX}

Grade 8 (preferred integrated)

STANDARD

Investigate how mass is conserved in chemical reactions and relate conservation of mass to the rearrangement of atoms using chemical equations, including photosynthesis.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.7A ^{TX}

Grade 8 (preferred integrated)

STANDARD

Calculate and analyze how the acceleration of an object is dependent upon the net force acting on the object and the mass of the object using Newton's Second Law of Motion.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

8.7B ^{TX}

Grade 8 (preferred integrated)

STANDARD

Investigate and describe how Newton's three laws of motion act simultaneously within systems such as in vehicle restraints, sports activities, amusement park rides, Earth's tectonic activities, and rocket launches.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

8.8A ^{TX}

Grade 8 (preferred integrated)

STANDARD

Compare the characteristics of amplitude, frequency, and wavelength in transverse waves, including the electromagnetic spectrum.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

8.8B ^{TX}

Grade 8 (preferred integrated)

STANDARD

Explain the use of electromagnetic waves in applications such as radiation therapy, wireless technologies, fiber optics, microwaves, ultraviolet sterilization, astronomical observations, and X-rays.

MINI 4WD

Compare a motor can after a run with a part left in the shade. Name the heat move you mean. Do not open a cell.

8.9A ^{TX}

Grade 8 (preferred integrated)

STANDARD

Describe the life cycle of stars and compare and classify stars using the Hertzsprung- Russell diagram.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

8.9B^{TX}

Grade 8 (preferred integrated)

STANDARD

Categorize galaxies as spiral, elliptical, and irregular and locate Earth's solar system within the Milky Way galaxy.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

8.9C^{TX}

Grade 8 (preferred integrated)

STANDARD

Research and analyze scientific data used as evidence to develop scientific theories that describe the origin of the universe.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

8.10A^{TX}

Grade 8 (preferred integrated)

STANDARD

Describe how energy from the Sun, hydrosphere, and atmosphere interact and influence weather and climate.

MINI 4WD

Use a published account for the climate or the daylight pattern. One hot afternoon at the track is weather, not that account.

8.10B^{TX}

Grade 8 (preferred integrated)

STANDARD

Identify global patterns of atmospheric movement and how they influence local weather.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

8.10C ^{TX}

Grade 8 (preferred integrated)

STANDARD

Describe the interactions between ocean currents and air masses that produce tropical cyclones, including typhoons and hurricanes.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

8.11A ^{TX}

Grade 8 (preferred integrated)

STANDARD

Use scientific evidence to describe how natural events, including volcanic eruptions, meteor impacts, abrupt changes in ocean currents, and the release and absorption of greenhouse gases influence climate.

MINI 4WD

Use a published account for the climate or the daylight pattern. One hot afternoon at the track is weather, not that account.

8.11B ^{TX}

Grade 8 (preferred integrated)

STANDARD

Use scientific evidence to describe how human activities, including the release of greenhouse gases, deforestation, and urbanization, can influence climate.

MINI 4WD

Use a published account for the climate or the daylight pattern. One hot afternoon at the track is weather, not that account.

8.11C ^{TX}

Grade 8 (preferred integrated)

STANDARD

Describe the carbon cycle.

MINI 4WD

Trace carbon through a published cycle. A plastic body is one small store of that carbon, not the cycle.

8.I2A^{TX}

Grade 8 (preferred integrated)

STANDARD

Explain how disruptions such as population changes, natural disasters, and human intervention impact the transfer of energy in food webs in ecosystems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

8.I2B^{TX}

Grade 8 (preferred integrated)

STANDARD

Describe how primary and secondary ecological succession affect populations and species diversity after ecosystems are disrupted by natural events or human activity.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

8.I2C^{TX}

Grade 8 (preferred integrated)

STANDARD

Describe how biodiversity contributes to the stability and sustainability of an ecosystem and the health of the organisms within the ecosystem.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

8.I3A^{TX}

Grade 8 (preferred integrated)

STANDARD

Identify the function of the cell membrane, cell wall, nucleus, ribosomes, cytoplasm, mitochondria, chloroplasts, and vacuoles in plant or animal cells.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

8.I3B^{TX}

Grade 8 (preferred integrated)

STANDARD

Describe the function of genes within chromosomes in determining inherited traits of offspring.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

8.I3C^{TX}

Grade 8 (preferred integrated)

STANDARD

Describe how variations of traits within a population lead to structural, behavioral, and physiological adaptations that influence the likelihood of survival and reproductive success of a species over generations.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

8.ESS.1^{OH}

Grade 8 (preferred integrated)

STANDARD

The composition and properties of Earth's interior are identified by the behavior of seismic waves. The refraction and reflection of seismic waves as they move through one type of material to another is used to differentiate the layers of Earth's interior. Earth has a core, a mantle, and a crust. Impacts during planetary formation generated heat. These impacts converted gravitational potential energy to heat. Earth's core is also able to generate its own thermal energy because of decaying atoms. This continuously releases thermal energy. Thermal energy generated from Earth's core drives convection currents in the asthenosphere. Note 1: Radioactive decay is not the focus; this will be discussed in Physical Science and Chemistry. Note 2: At this grade level, analyzing seismograms (e.g., amplitude and lag time) and reading a travel time curve are not the focus. At this grade the properties of seismic waves should be addressed.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

8.ESS.2 ^{OH}

Grade 8 (preferred integrated)

STANDARD

Earth's lithosphere consists of major and minor tectonic plates that move relative to each other. Historical data and observations such as fossil distribution, paleomagnetism, continental drift and sea-floor spreading contributed to the theory of plate tectonics. The rigid tectonic plates move with the molten rock and magma beneath them in the upper mantle. Convection currents in the asthenosphere cause movements of the lithospheric plates. The energy that forms convection currents comes from deep within the Earth. There are three main types of plate boundaries: divergent, convergent and transform. Each type of boundary results in specific motion and causes events (such as earthquakes or volcanic activity) or features (such as mountains or trenches) that are indicative of the type of boundary.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

8.ESS.3 ^{OH}

Grade 8 (preferred integrated)

STANDARD

A combination of constructive and destructive geologic processes formed. Earth's surface. Earth's surface is formed from a variety of different geologic processes, including but not limited to plate tectonics.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

8.ESS.4 ^{OH}

Grade 8 (preferred integrated)

STANDARD

Evidence of the dynamic changes of Earth's surface through time is found in the geologic record. Earth is approximately 4.6 billion years old. Earth history is based on observations of the geologic record and the understanding that processes observed at present day are similar to those that occurred in the past (uniformitarianism). There are different methods to determine relative and absolute age of some rock layers in the geologic record. Within a sequence of undisturbed sedimentary rocks, the oldest rocks are at the bottom (superposition). The geologic record can help identify past environmental and climate conditions.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

8.LS.1 ^{OH}

Grade 8 (preferred integrated)

STANDARD

Diversity of species, a result of variation of traits, occurs through the process of evolution and extinction over many generations. The fossil records provide evidence that changes have occurred in number and types of species. Fossils provide important evidence of how life and environmental conditions have changed. Changes in environmental conditions can affect how beneficial a trait will be for the survival and reproductive success of an organism or an entire species. Throughout Earth's history, extinction of a species has occurred when the environment changes and the individual organisms of that species do not have the traits necessary to survive and reproduce in the changed environment. Most species (approximately 99 percent) that have lived on Earth are now extinct.

Note: Population genetics and the ability to use statistic mathematics to predict changes in a gene pool are reserved for high school Biology.

MINI 4WD

Use a published account for the change across generations. A setup you change between heats is not that change.

8.LS.2 ^{OH}

Grade 8 (preferred integrated)

STANDARD

Every organism alive today comes from a long line of ancestors who reproduced successfully every generation. Reproduction is the transfer of genetic information from one generation to the next. It can occur with mixing of genes from two individuals (sexual reproduction). It can occur with the transfer of genes from one individual to the next generation (asexual reproduction). The ability to reproduce defines living things.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

8.LS.3 ^{OH}

Grade 8 (preferred integrated)

STANDARD

The characteristics of an organism are a result of inherited traits received from parent(s). Expression of all traits is determined by genes and environmental factors to varying degrees. Many genes influence more than one trait, and many traits are influenced by more than one gene. During reproduction, genetic information (DNA) is transmitted between parent and offspring. In asexual reproduction, the lone parent contributes DNA to the offspring. In sexual reproduction, both parents contribute DNA to the offspring. Note 1: The focus should be the link between DNA and traits without being explicit about the mechanisms involved. Note 2: The ways in which bacteria reproduce is beyond the scope of this content statement. Note 3: The molecular structure of DNA is not appropriate at this grade level.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

8.PS.1 ^{OH}

Grade 8 (preferred integrated)

STANDARD

Objects can experience a force due to an external field such as magnetic, electrostatic, or gravitational fields. Magnetic, electrical and gravitational forces can act at a distance.

MINI 4WD

Name the field the standard names. The car on the table is sitting in the room, not in that field.

8.PS.2 ^{OH}

Grade 8 (preferred integrated)

STANDARD

Forces can act to change the motion of objects. The motion of an object is always measured with respect to a reference point. Forces can be added. The new force on an object is the sum of all of the forces acting on the object. If there is a nonzero net force acting on an object, its speed and/or direction will change. Kinetic friction and drag are forces that act in a direction opposite the relative motion of objects.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

8.1 ^{AL}

Grade 8 (preferred integrated)

STANDARD

Plan and carry out investigations to support the claim that pure substances can be described and defined by their properties, including solubility, electrical conductivity, and density.

MINI 4WD

Sort two parts from the car by a property you can see or feel. Say the property out loud.

8.2 ^{AL}

Grade 8 (preferred integrated)

STANDARD

Develop and manipulate models to explain changes in particle motion, temperature, and state of a pure substance when thermal energy is added to or removed from a system.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

8.3 ^{AL}

Grade 8 (preferred integrated)

STANDARD

Justify a claim, based on evidence from investigations, that pure substances differ from mixtures, including solutions.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

8.4 ^{AL}

Grade 8 (preferred integrated)

STANDARD

Obtain and communicate information from the periodic table, including atomic number, number of electrons and neutrons, average atomic mass, groups, and periods, to illustrate the structure and composition of atoms of different elements.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.4a^{AL}

Grade 8 (preferred integrated)

STANDARD

Analyze and interpret data to differentiate among elements based on their properties and classify the elements as metals, nonmetals, or metalloids.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.5^{AL}

Grade 8 (preferred integrated)

STANDARD

Obtain, evaluate, and communicate information from the periodic table to make predictions about the reactivity of the main group elements.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.5a^{AL}

Grade 8 (preferred integrated)

STANDARD

Use valence electron configuration to model ionic and covalent bonds.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.6^{AL}

Grade 8 (preferred integrated)

STANDARD

Observe and analyze data regarding characteristic properties of substances before and after they are combined to determine whether a chemical reaction has occurred.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.7^{AL}

Grade 8 (preferred integrated)

STANDARD

Analyze data from an investigation to determine whether thermal energy is released or absorbed in a chemical reaction.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

8.7a^{AL}

Grade 8 (preferred integrated)

STANDARD

Design and test a device that can release or absorb thermal energy by chemical reactions.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

8.8^{AL}

Grade 8 (preferred integrated)

STANDARD

Engage in an argument from evidence to support the claim that matter is conserved in a chemical reaction.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.8a^{AL}

Grade 8 (preferred integrated)

STANDARD

Use a model to verify that atoms of reactants are conserved as products in a chemical reaction.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

8.9^{AL}

Grade 8 (preferred integrated)

STANDARD

Use data from an investigation to identify factors that affect acceleration.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

8.10^{AL}

Grade 8 (preferred integrated)

STANDARD

Develop and use models to illustrate how individual external forces affect the motion of objects.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

8.11^{AL}

Grade 8 (preferred integrated)

STANDARD

Use models to demonstrate each of Newton's laws of motion and explain the effect of net force on objects.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

8.11a^{AL}

Grade 8 (preferred integrated)

STANDARD

Use mathematical representations to explain how the sum of external forces on an object and the object's mass affect its acceleration.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

8.I2^{AL}

Grade 8 (preferred integrated)

STANDARD

Use a model to identify factors affecting the strength of noncontact forces, including magnetic, gravitational, and electrical forces, and demonstrate that fields exist even though the objects are not in contact.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

8.I2a^{AL}

Grade 8 (preferred integrated)

STANDARD

Design and construct an electromagnet and modify the design to change its strength.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

8.I3^{AL}

Grade 8 (preferred integrated)

STANDARD

Analyze graphical displays of data to describe the relationship of mass and velocity of an object to its kinetic energy (KE).

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

8.I4^{AL}

Grade 8 (preferred integrated)

STANDARD

Use models to construct an explanation of how a system of objects may contain varying amounts of potential energy, including gravitational, elastic, and chemical.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

8.I5^{AL}

Grade 8 (preferred integrated)

STANDARD

Use models to construct an explanation of how energy is transformed but still conserved.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

8.I6^{AL}

Grade 8 (preferred integrated)

STANDARD

Develop and use a model to construct an explanation of how electrical energy is transferred and transformed.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

8.I7^{AL}

Grade 8 (preferred integrated)

STANDARD

Use models of mechanical and electromagnetic waves to qualitatively describe the relationships among wave properties, including amplitude, wavelength, and frequency.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

8.I7a^{AL}

Grade 8 (preferred integrated)

STANDARD

Use models to compare and contrast light and sound wave behaviors, including reflection, refraction, diffraction, and speed, as waves propagate and interact with matter.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

8.18^{AL}

Grade 8 (preferred integrated)

STANDARD

Construct an argument from evidence that digital and analog signals encode and transmit information differently.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

SC.8.N.1.1^{FL}

Grade 8 (preferred integrated)

STANDARD

Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

MINI 4WD

Change one thing on the car, keep the rest the same, and say what that one change did on the lane.

SC.8.N.1.2^{FL}

Grade 8 (preferred integrated)

STANDARD

Design and conduct a study using repeated trials and replication.

MINI 4WD

Run the same setup twice and say whether the two runs agree.

SC.8.N.1.3^{FL}

Grade 8 (preferred integrated)

STANDARD

Use phrases such as "results support" or "fail to support" in science, understanding that science does not offer conclusive 'proof' of a knowledge claim.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

SC.8.N.1.4 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Explain how hypotheses are valuable if they lead to further investigations, even if they turn out not to be supported by the data.

MINI 4WD

Write one claim about the next run, run it, and say whether the run supports the claim.

SC.8.N.1.5 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Analyze the methods used to develop a scientific explanation as seen in different fields of science.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

SC.8.N.1.6 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.

MINI 4WD

Point to the car and say which part of the standard the model is standing in for, and one way the model is not the whole thing.

SC.8.N.2.1 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Distinguish between scientific and pseudoscientific ideas.

MINI 4WD

Name one question about the lane that a run can answer, and one question a run cannot.

SC.8.N.2.2 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Discuss what characterizes science and its methods.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

SC.8.N.3.1 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Select models useful in relating the results of their own investigations.

MINI 4WD

Point to the car and say which part of the standard the model is standing in for, and one way the model is not the whole thing.

SC.8.N.3.2 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Explain why theories may be modified but are rarely discarded.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

SC.8.N.4.1 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.

MINI 4WD

Name one cost and one benefit of a change you would make to the car, using the kinds of cost the standard names.

SC.8.N.4.2 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Explain how political, social, and economic concerns can affect science, and vice versa.

MINI 4WD

Name one cost and one benefit of a change you would make to the car, using the kinds of cost the standard names.

SC.8.E.5.1 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.8.E.5.2 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.8.E.5.3 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.8.E.5.4 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Explore the Law of Universal Gravitation by explaining the role that gravity plays in the formation of planets, stars, and solar systems and in determining their motions.

MINI 4WD

Let go of the car and say what pulls it down. Use a published sky account for the planets or stars the standard names.

SC.8.E.5.5 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Describe and classify specific physical properties of stars: apparent magnitude (brightness), temperature (color), size, and luminosity (absolute brightness).

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.8.E.5.6 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Create models of solar properties including: rotation, structure of the Sun, convection, sunspots, solar flares, and prominences.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.8.E.5.7 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Compare and contrast the properties of objects in the Solar System including the Sun, planets, and moons to those of Earth, such as gravitational force, distance from the Sun, speed, movement, temperature, and atmospheric conditions.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.8.E.5.8 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Compare various historical models of the Solar System, including geocentric and heliocentric.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.8.E.5.9 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Explain the impact of objects in space on each other including: 1) the Sun on the Earth including seasons and gravitational attraction; AND 2) the Moon on the Earth, including phases, tides, and eclipses, and the relative position of each body.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.8.E.5.10 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.8.E.5.11 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Identify and compare characteristics of the electromagnetic spectrum such as wavelength, frequency, use, and hazards and recognize its application to an understanding of planetary images and satellite photographs.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.8.E.5.12^{FL}

Grade 8 (preferred integrated)

STANDARD

Summarize the effects of space exploration on the economy and culture of Florida.

MINI 4WD

Use a published account for what the standard asks about Florida. The car is the object in the room.

SC.8.P.8.1^{FL}

Grade 8 (preferred integrated)

STANDARD

Explore the scientific theory of atoms (also known as atomic theory) by using models to explain the motion of particles in solids, liquids, and gases.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.8.P.8.2^{FL}

Grade 8 (preferred integrated)

STANDARD

Differentiate between weight and mass recognizing that weight is the amount of gravitational pull on an object and is distinct from, though proportional to, mass.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.8.P.8.3^{FL}

Grade 8 (preferred integrated)

STANDARD

Explore and describe the densities of various materials through measurement of their masses and volumes.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.8.P.8.4 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Classify and compare substances on the basis of characteristic physical properties that can be demonstrated or measured; for example, density, thermal or electrical conductivity, solubility, magnetic properties, melting and boiling points, and know that these properties are independent of the amount of the sample.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.8.P.8.5 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Recognize that there are a finite number of elements and that their atoms combine in a multitude of ways to produce compounds that make up all of the living and nonliving things that we encounter.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.8.P.8.6 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Recognize that elements are grouped in the periodic table according to similarities of their properties.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.8.P.8.7 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Explore the scientific theory of atoms (also known as atomic theory) by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles (electrons surrounding a nucleus containing protons and neutrons).

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.8.P.8.8 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Identify basic examples of and compare and classify the properties of compounds, including acids, bases, and salts.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.8.P.8.9 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Distinguish among mixtures (including solutions) and pure substances.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.8.P.9.1 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Explore the Law of Conservation of Mass by demonstrating and concluding that mass is conserved when substances undergo physical and chemical changes.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.8.P.9.2 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Differentiate between physical changes and chemical changes.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.8.P.9.3 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Investigate and describe how temperature influences chemical changes.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.8.L.18.1 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.8.L.18.2 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.8.L.18.3 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Construct a scientific model of the carbon cycle to show how matter and energy are continuously transferred within and between organisms and their physical environment.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.8.L.18.4 ^{FL}

Grade 8 (preferred integrated)

STANDARD

Cite evidence that living systems follow the Laws of Conservation of Mass and Energy.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

Grades 9–12 Physical Science

395 standards

HS-PS1-1 ^{NG, CA, MI, NJ, PA}

High school · Physical Science

STANDARD

Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

MINI 4WD

Use the periodic table to say why iron in an axle and copper in a wire behave differently, from the outer electrons. The parts are the specimens. The table is the model.

HS-PS1-2 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

MINI 4WD

Explain a simple classroom reaction, such as an acid on a carbonate, from outer electrons and the table. Do not invent a reaction inside the sealed cell. The cell stays closed.

HS-PS1-3 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.

MINI 4WD

Compare a metal axle and a plastic clip at the size you can hold, then infer which one has stronger electrical attractions between its particles. The bulk pieces are the evidence, not a new measurement of force.

HS-PS1-4 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

MINI 4WD

A hand-warmer pack releases energy when bonds rearrange. Model that as a change in total bond energy. The car's motor warming is heat from current, a different account.

HS-PS1-5 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

MINI 4WD

Explain why a dissolved tablet disappears faster in warm water than in cold, as a rate. A gear spinning faster is not that rate.

HS-PSI-6 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.

MINI 4WD

For a safe, teacher-chosen reaction that can sit at equilibrium, name one condition you would change to favor products. Do not open or redesign a battery cell.

HS-PSI-7 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

MINI 4WD

Balance a simple equation and show the mass of atoms unchanged. Weighing the car before and after a run is a bulk check. If the number changes, matter entered or left. It is not the equation.

HS-PSI-8 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

MINI 4WD

Model fission, fusion, or decay from published diagrams, including the sun's fusion as the source that can sit behind a solar charge. The car does not contain a reactor.

HS-PS2-1 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

MINI 4WD

From times and a measured lane, with a known mass and a known net push, check whether the motion matches force, mass, and acceleration in Newton's second law.

HS-PS2-2 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.

MINI 4WD

Two cars that bump and then both roll, with no extra push from the motors, are the system. Use their masses and velocities to check whether momentum adds the same before and after.

HS-PS2-3 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.

MINI 4WD

Design a nose or a roller so a hit with the wall spreads the stop over a longer time and the peak force drops. Evaluate it by how hard the chassis still shocks.

HS-PS2-4 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.

MINI 4WD

Use Newton's gravitation for the car and the Earth, and Coulomb's law for two charges a teacher sets up. Predict both. Do not replace either law with a track time.

HS-PS2-5 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.

MINI 4WD

Plan a test that a current in a wire near a compass moves the needle, and a test that a moving magnet induces a current. The motor already uses both ideas. These tests show them apart.

HS-PS2-6 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.

MINI 4WD

Explain why the long molecules in a tire matter for grip, or why the metal grain of an axle matters for stiffness, from structure you can cite. Do not invent a molecular diagram you did not read.

HS-PS3-1 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.

MINI 4WD

Write a simple energy account for one run: cell energy in, kinetic energy of the car, and heat and sound out. Change one of those and show the others must answer.

HS-PS3-2 NG, CA, PA

High school · Physical Science

STANDARD

Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects).

MINI 4WD

Account for the car's energy as motion of the whole car plus the arrangement of the car on a slope, or a spring roller compressed. Particle motion inside the metal is the same idea at a smaller scale. Say which scale you are in.

HS-PS3-3 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

MINI 4WD

Within a mass limit and a parts limit, refine the path from cell to motor to wheels so more of the run is motion and less is a stalled, hot motor.

HS-PS3-4 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

MINI 4WD

Put a hot metal mass and a cold metal mass in a closed insulated cup and track both temperatures toward one value. A hot motor touched to a cold chassis is the same kind of spreading, harder to close.

HS-PS3-5 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.

MINI 4WD

Model a magnet and a steel axle, not touching, and the energy change as they snap together. The motor's magnets and coils are the designed version of that kind of interaction.

HS-PS4-1 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

MINI 4WD

Use frequency, wavelength, and speed for a wave on a string, then say what would change if the wave moved into a different cord. Radio noise from the motor brushes is a later example of a wave, not the first calculation.

HS-PS4-2 NG, CA, MI, NJ

High school · Physical Science

STANDARD

Evaluate questions about the advantages of using a digital transmission and storage of information.

MINI 4WD

Ask what is gained by storing lap times as digits instead of as a mark on a strip of paper that can smear.

HS-PS4-3 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.

MINI 4WD

Evaluate when a wave picture of light helps, and when a particle picture helps, using a published case. A lamp on the car is only the object in the room.

HS-PS4-4 NG, CA, MI, NJ, PA

High school · Physical Science

STANDARD

Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.

MINI 4WD

Evaluate a published claim about a frequency of radiation and what it does to matter, such as a microwave and water, or ultraviolet and skin. Do not test a dangerous source on a car part.

HS-PS4-5 ^{NG, CA, MI, NJ, PA}

High school · Physical Science

STANDARD

Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

MINI 4WD

Explain one device that uses waves to carry information or energy, such as a radio or a garage-door opener, and say what it is doing. Brush spark noise from the motor is energy leaving as a wave the car did not mean to send.

3.4.9–12.H ^{PA}

High school · Physical Science

STANDARD

Design and evaluate solutions in which individuals and societies can promote stewardship in environmental quality and community well-being.

MINI 4WD

Design one club practice that cuts waste, such as a labeled cell-recycling step, and judge it by the well-being of the people who share the room.

Pennsylvania assigns this standard to grades 9–12, so it is printed in each high school section.

C.1A ^{TX}

High school · Physical Science

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

C.1B ^{TX}

High school · Physical Science

STANDARD

Apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.IC^{TX}

High school · Physical Science

STANDARD

Use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

C.ID^{TX}

High school · Physical Science

STANDARD

Use appropriate tools such as Safety Data Sheets (SDS), scientific or graphing calculators, computers and probes, electronic balances, an adequate supply of consumable chemicals, and sufficient scientific glassware such as beakers, Erlenmeyer flasks, pipettes, graduated cylinders, volumetric flasks, and burettes.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

C.IE^{TX}

High school · Physical Science

STANDARD

Collect quantitative data using the International System of Units (SI) and qualitative data as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

C.IF^{TX}

High school · Physical Science

STANDARD

Organize quantitative and qualitative data using oral or written lab reports, labeled drawings, particle diagrams, charts, tables, graphs, journals, summaries, or technology-based reports.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

C.1G^{TX}

High school · Physical Science

STANDARD

Develop and use models to represent phenomena, systems, processes, or solutions to engineering problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.1H^{TX}

High school · Physical Science

STANDARD

Distinguish between scientific hypotheses, theories, and laws.

MINI 4WD

Say which you are using: a guess about a run, a tested account, or a rule of the track.

C.2A^{TX}

High school · Physical Science

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

C.2B^{TX}

High school · Physical Science

STANDARD

Analyze data by identifying significant statistical features, patterns, sources of error, and limitations.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

C.2C ^{TX}

High school · Physical Science

STANDARD

Use mathematical calculations to assess quantitative relationships in data.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

C.2D ^{TX}

High school · Physical Science

STANDARD

Evaluate experimental and engineering designs.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

C.3A ^{TX}

High school · Physical Science

STANDARD

Develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.3B ^{TX}

High school · Physical Science

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.3C ^{TX}

High school · Physical Science

STANDARD

Engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

C.4A ^{TX}

High school · Physical Science

STANDARD

Analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.4B ^{TX}

High school · Physical Science

STANDARD

Relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content.

MINI 4WD

Read one published case of a cost and a benefit. The cells are one small use, not that case.

C.4C ^{TX}

High school · Physical Science

STANDARD

Research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

C.5A ^{TX}

High school · Physical Science

STANDARD

Explain the development of the Periodic Table over time using evidence such as chemical and physical properties.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.5B ^{TX}

High school · Physical Science

STANDARD

Predict the properties of elements in chemical families, including alkali metals, alkaline earth metals, halogens, noble gases, and transition metals, based on valence electrons patterns using the Periodic Table.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.5C ^{TX}

High school · Physical Science

STANDARD

Analyze and interpret elemental data, including atomic radius, atomic mass, electronegativity, ionization energy, and reactivity to identify periodic trends.

MINI 4WD

Use a published table or example for the atom the standard names. Do not open a cell and call it that.

C.6A ^{TX}

High school · Physical Science

STANDARD

Construct models using Dalton's Postulates, Thomson's discovery of electron properties, Rutherford's nuclear atom, Bohr's nuclear atom, and Heisenberg's Uncertainty Principle to show the development of modern atomic theory over time.

MINI 4WD

Use a published table or example for the atom the standard names. Do not open a cell and call it that.

C.6B ^{TX}

High school · Physical Science

STANDARD

Describe the structure of atoms and ions, including the masses, electrical charges, and locations of protons and neutrons in the nucleus and electrons in the electron cloud.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.6C ^{TX}

High school · Physical Science

STANDARD

Investigate the mathematical relationship between energy, frequency, and wavelength of light using the electromagnetic spectrum and relate it to the quantization of energy in the emission spectrum.

MINI 4WD

Shine a lamp on the car, then block it. Say what the light does and where the shadow falls.

C.6D ^{TX}

High school · Physical Science

STANDARD

Calculate average atomic mass of an element using isotopic composition.

MINI 4WD

Use a published table or example for the atom the standard names. Do not open a cell and call it that.

C.6E ^{TX}

High school · Physical Science

STANDARD

Construct models to express the arrangement of electrons in atoms of representative elements using electron configurations and Lewis dot structures.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.7A ^{TX}

High school · Physical Science

STANDARD

Construct an argument to support how periodic trends such as electronegativity can predict bonding between elements.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.7B ^{TX}

High school · Physical Science

STANDARD

Name and write the chemical formulas for ionic and covalent compounds using International Union of Pure and Applied Chemistry (IUPAC) nomenclature rules.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.7C ^{TX}

High school · Physical Science

STANDARD

Classify and draw electron dot structures for molecules with linear, bent, trigonal planar, trigonal pyramidal, and tetrahedral molecular geometries as explained by Valence Shell Electron Pair Repulsion (VSEPR) theory.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.7D ^{TX}

High school · Physical Science

STANDARD

Analyze the properties of ionic, covalent, and metallic substances in terms of intramolecular and intermolecular forces.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

C.8A ^{TX}

High school · Physical Science

STANDARD

Define mole and apply the concept of molar mass to convert between moles and grams.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.8B ^{TX}

High school · Physical Science

STANDARD

Calculate the number of atoms or molecules in a sample of material using Avogadro's number.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

C.8C ^{TX}

High school · Physical Science

STANDARD

Calculate percent composition of compounds.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

C.8D ^{TX}

High school · Physical Science

STANDARD

Differentiate between empirical and molecular formulas.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.9A ^{TX}

High school · Physical Science

STANDARD

Interpret, write, and balance chemical equations, including synthesis, decomposition, single replacement, double replacement, and combustion reactions using the law of conservation of mass.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.9B ^{TX}

High school · Physical Science

STANDARD

Differentiate among acid-base reactions, precipitation reactions, and oxidation-reduction reactions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.9C ^{TX}

High school · Physical Science

STANDARD

Perform stoichiometric calculations, including determination of mass relationships, gas volume relationships, and percent yield.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.9D ^{TX}

High school · Physical Science

STANDARD

Describe the concept of limiting reactants in a balanced chemical equation.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.10A^{TX}

High school · Physical Science

STANDARD

Describe the postulates of the kinetic molecular theory.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.10B^{TX}

High school · Physical Science

STANDARD

Describe and calculate the relationships among volume, pressure, number of moles, and temperature for an ideal gas.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

C.10C^{TX}

High school · Physical Science

STANDARD

Define and apply Dalton's law of partial pressure.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.11A^{TX}

High school · Physical Science

STANDARD

Describe the unique role of water in solutions in terms of polarity.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.11B^{TX}

High school · Physical Science

STANDARD

Distinguish among types of solutions, including electrolytes and nonelectrolytes and unsaturated, saturated, and supersaturated solutions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.11C^{TX}

High school · Physical Science

STANDARD

Investigate how solid and gas solubilities are influenced by temperature using solubility curves and how rates of dissolution are influenced by temperature, agitation, and surface area.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.11D^{TX}

High school · Physical Science

STANDARD

Investigate the general rules regarding solubility and predict the solubility of the products of a double replacement reaction.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.11E^{TX}

High school · Physical Science

STANDARD

Calculate the concentration of solutions in units of molarity.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.11F^{TX}

High school · Physical Science

STANDARD

Calculate the dilutions of solutions using molarity.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.12A^{TX}

High school · Physical Science

STANDARD

Name and write the chemical formulas for acids and bases using IUPAC nomenclature rules.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.12B^{TX}

High school · Physical Science

STANDARD

Define acids and bases and distinguish between Arrhenius and Bronsted-Lowry definitions.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.12C^{TX}

High school · Physical Science

STANDARD

Differentiate between strong and weak acids and bases.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.I2D^{TX}

High school · Physical Science

STANDARD

Predict products in acid-base reactions that form water.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.I2E^{TX}

High school · Physical Science

STANDARD

Define pH and calculate the pH of a solution using the hydrogen ion concentration.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.I3A^{TX}

High school · Physical Science

STANDARD

Explain everyday examples that illustrate the four laws of thermodynamics.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.I3B^{TX}

High school · Physical Science

STANDARD

Investigate the process of heat transfer using calorimetry.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.I3C^{TX}

High school · Physical Science

STANDARD

Classify processes as exothermic or endothermic and represent energy changes that occur in chemical reactions using thermochemical equations or graphical analysis.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.I3D^{TX}

High school · Physical Science

STANDARD

Perform calculations involving heat, mass, temperature change, and specific heat.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

C.I4A^{TX}

High school · Physical Science

STANDARD

Describe the characteristics of alpha, beta, and gamma radioactive decay processes in terms of balanced nuclear equations.

MINI 4WD

Use a published table or example for the atom the standard names. Do not open a cell and call it that.

C.I4B^{TX}

High school · Physical Science

STANDARD

Compare fission and fusion reactions.

MINI 4WD

Use a published table or example for the atom the standard names. Do not open a cell and call it that.

C.I4C^{TX}

High school · Physical Science

STANDARD

Give examples of applications of nuclear phenomena such as nuclear stability, radiation therapy, diagnostic imaging, solar cells, and nuclear power.

MINI 4WD

Use a published table or example for the atom the standard names. Do not open a cell and call it that.

IPC.IA^{TX}

High school · Physical Science

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

IPC.IB^{TX}

High school · Physical Science

STANDARD

Apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

IPC.IC^{TX}

High school · Physical Science

STANDARD

Use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

IPC.1D ^{TX}

High school · Physical Science

STANDARD

Use appropriate tools such as data-collecting probes, software applications, the internet, standard laboratory glassware, metric rulers, meter sticks, spring scales, multimeters, Gauss meters, wires, batteries, light bulbs, switches, magnets, electronic balances, mass sets, Celsius thermometers, hot plates, an adequate supply of consumable chemicals, lab notebooks or journals, timing devices, models, and diagrams.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

IPC.1E ^{TX}

High school · Physical Science

STANDARD

Collect quantitative data using the International System of Units (SI) and qualitative data as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

IPC.1F ^{TX}

High school · Physical Science

STANDARD

Organize quantitative and qualitative data using labeled drawings and diagrams, graphic organizers, charts, tables, and graphs.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

IPC.1G ^{TX}

High school · Physical Science

STANDARD

Develop and use models to represent phenomena, systems, processes, or solutions to engineering problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

IPC.1H ^{TX}

High school · Physical Science

STANDARD

Distinguish between scientific hypotheses, theories, and laws.

MINI 4WD

Say which you are using: a guess about a run, a tested account, or a rule of the track.

IPC.2A ^{TX}

High school · Physical Science

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

IPC.2B ^{TX}

High school · Physical Science

STANDARD

Analyze data by identifying significant statistical features, patterns, sources of error, and limitations.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

IPC.2C ^{TX}

High school · Physical Science

STANDARD

Use mathematical calculations to assess quantitative relationships in data.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

IPC.2D ^{TX}

High school · Physical Science

STANDARD

Evaluate experimental and engineering designs.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

IPC.3A ^{TX}

High school · Physical Science

STANDARD

Develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

IPC.3B ^{TX}

High school · Physical Science

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

IPC.3C ^{TX}

High school · Physical Science

STANDARD

Engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

IPC.4A ^{TX}

High school · Physical Science

STANDARD

Analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

IPC.4B ^{TX}

High school · Physical Science

STANDARD

Relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content.

MINI 4WD

Read one published case of a cost and a benefit. The cells are one small use, not that case.

IPC.4C ^{TX}

High school · Physical Science

STANDARD

Research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

IPC.5A ^{TX}

High school · Physical Science

STANDARD

Investigate, analyze, and model motion in terms of position, velocity, acceleration, and time using tables, graphs, and mathematical relationships.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

IPC.5B ^{TX}

High school · Physical Science

STANDARD

Analyze data to explain the relationship between mass and acceleration in terms of the net force on an object in one dimension using force diagrams, tables, and graphs.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

IPC.5C ^{TX}

High school · Physical Science

STANDARD

Apply the concepts of momentum and impulse to design, evaluate, and refine a device to minimize the net force on objects during collisions such as those that occur during vehicular accidents, sports activities, or the dropping of personal electronic devices.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

IPC.5D ^{TX}

High school · Physical Science

STANDARD

Describe the nature of the four fundamental forces: gravitation; electromagnetic; the strong and weak nuclear forces, including fission and fusion; and mass-energy equivalency.

MINI 4WD

Use a published table or example for the atom the standard names. Do not open a cell and call it that.

IPC.5E ^{TX}

High school · Physical Science

STANDARD

Construct and communicate an explanation based on evidence for how changes in mass, charge, and distance affect the strength of gravitational and electrical forces between two objects.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

IPC.6A ^{TX}

High school · Physical Science

STANDARD

Design and construct series and parallel circuits that model real-world circuits such as in-home wiring, automobile wiring, and simple electrical devices to evaluate the transfer of electrical energy.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

IPC.6B ^{TX}

High school · Physical Science

STANDARD

Design, evaluate, and refine a device that generates electrical energy through the interaction of electric charges and magnetic fields.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

IPC.6C ^{TX}

High school · Physical Science

STANDARD

Plan and conduct an investigation to provide evidence that energy is conserved within a closed system.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

IPC.6D ^{TX}

High school · Physical Science

STANDARD

Investigate and demonstrate the movement of thermal energy through solids, liquids, and gases by convection, conduction, and radiation such as weather, living, and mechanical systems.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

IPC.6E ^{TX}

High school · Physical Science

STANDARD

Plan and conduct an investigation to evaluate the transfer of energy or information through different materials by different types of waves such as wireless signals, ultraviolet radiation, and microwaves.

MINI 4WD

Compare a motor can after a run with a part left in the shade. Name the heat move you mean. Do not open a cell.

IPC.6F ^{TX}

High school · Physical Science

STANDARD

Construct and communicate an evidence-based explanation for how wave interference, reflection, and refraction are used in technology such as medicine, communication, and scientific research.

MINI 4WD

Look at the car in a flat mirror, or through a lens if you have one. Say where the image shows up.

IPC.6G ^{TX}

High school · Physical Science

STANDARD

Evaluate evidence from multiple sources to critique the advantages and disadvantages of various renewable and nonrenewable energy sources and their impact on society and the environment.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

IPC.7A ^{TX}

High school · Physical Science

STANDARD

Model basic atomic structure and relate an element's atomic structure to its bonding, reactivity, and placement on the Periodic Table.

MINI 4WD

Use a published table or example for the atom the standard names. Do not open a cell and call it that.

IPC.7B ^{TX}

High school · Physical Science

STANDARD

Use patterns within the Periodic Table to predict the relative physical and chemical properties of elements.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

IPC.7C ^{TX}

High school · Physical Science

STANDARD

Explain how physical and chemical properties of substances are related to their usage in everyday life such as in sunscreen, cookware, industrial applications, and fuels.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

IPC.7D ^{TX}

High school · Physical Science

STANDARD

Explain how electrons can transition from a high energy level to a low energy state, emitting photons at different frequencies for different energy transitions.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

IPC.7E ^{TX}

High school · Physical Science

STANDARD

Explain how atomic energy levels and emission spectra present evidence for the wave particle duality.

MINI 4WD

Use a published table or example for the atom the standard names. Do not open a cell and call it that.

IPC.7F ^{TX}

High school · Physical Science

STANDARD

Plan and conduct an investigation to provide evidence that the rate of reaction or dissolving is affected by multiple factors such as particle size, stirring, temperature, and concentration.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

IPC.8A ^{TX}

High school · Physical Science

STANDARD

Investigate how changes in properties are indicative of chemical reactions such as hydrochloric acid with a metal, oxidation of metal, combustion, and neutralizing an acid with a base.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

IPC.8B ^{TX}

High school · Physical Science

STANDARD

Develop and use models to balance chemical equations and support the claim that atoms, and therefore mass, are conserved during a chemical reaction.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

IPC.8C ^{TX}

High school · Physical Science

STANDARD

Research and communicate the uses, advantages, and disadvantages of nuclear reactions in current technologies.

MINI 4WD

Use a published table or example for the atom the standard names. Do not open a cell and call it that.

IPC.8D ^{TX}

High school · Physical Science

STANDARD

Construct and communicate an evidence-based explanation of the environmental impact of the end-products of chemical reactions such as those that may result in degradation of water, soil, air quality, and global climate change.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

P.1A ^{TX}

High school · Physical Science

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

P.1B ^{TX}

High school · Physical Science

STANDARD

Apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations, and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

P.1C ^{TX}

High school · Physical Science

STANDARD

Use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

P.I.D ^{TX}

High school · Physical Science

STANDARD

Use appropriate tools such as balances, ballistic carts or equivalent, batteries, computers, constant velocity cars, convex lenses, copper wire, discharge tubes with power supply (H, He, Ne, Ar), data acquisition probes and software, dynamics and force demonstration equipment, electrostatic generators, electrostatic kits, friction blocks, graph paper, graphing technology, hand-held visual spectrometers, inclined planes, iron filings, lab masses, laser pointers, magnets, magnetic compasses, metric rulers, motion detectors, multimeters (current, voltage, resistance), optics bench, optics kit, photogates, plane mirrors, prisms, protractors, pulleys, resistors, rope or string, scientific calculators, stopwatches, springs, spring scales, switches, tuning forks, wave generators, or other equipment and materials that will produce the same results.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

P.I.E ^{TX}

High school · Physical Science

STANDARD

Collect quantitative data using the International System of Units (SI) and qualitative data as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

P.I.F ^{TX}

High school · Physical Science

STANDARD

Organize quantitative and qualitative data using bar charts, line graphs, scatter plots, data tables, labeled diagrams, and conceptual mathematical relationships.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

P.1G ^{TX}

High school · Physical Science

STANDARD

Develop and use models to represent phenomena, systems, processes, or solutions to engineering problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

P.1H ^{TX}

High school · Physical Science

STANDARD

Distinguish among scientific hypotheses, theories, and laws.

MINI 4WD

Say which you are using: a guess about a run, a tested account, or a rule of the track.

P.2A ^{TX}

High school · Physical Science

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

P.2B ^{TX}

High school · Physical Science

STANDARD

Analyze data by identifying significant statistical features, patterns, sources of error, and limitations.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

P.2C ^{TX}

High school · Physical Science

STANDARD

Use mathematical calculations to assess quantitative relationships in data.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

P.2D ^{TX}

High school · Physical Science

STANDARD

Evaluate experimental and engineering designs.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

P.3A ^{TX}

High school · Physical Science

STANDARD

Develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

P.3B ^{TX}

High school · Physical Science

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

P.3C ^{TX}

High school · Physical Science

STANDARD

Engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

P.4A ^{TX}

High school · Physical Science

STANDARD

Analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

P.4B ^{TX}

High school · Physical Science

STANDARD

Relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content.

MINI 4WD

Read one published case of a cost and a benefit. The cells are one small use, not that case.

P.4C ^{TX}

High school · Physical Science

STANDARD

Research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

P.5A ^{TX}

High school · Physical Science

STANDARD

Analyze different types of motion by generating and interpreting position versus time, velocity versus time, and acceleration versus time using hand graphing and real-time technology such as motion detectors, photogates, or digital applications.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

P.5B ^{TX}

High school · Physical Science

STANDARD

Define scalar and vector quantities related to one- and two-dimensional motion and combine vectors using both graphical vector addition and the Pythagorean theorem.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

P.5C ^{TX}

High school · Physical Science

STANDARD

Describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, velocity, frames of reference, and acceleration.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

P.5D ^{TX}

High school · Physical Science

STANDARD

Describe and analyze acceleration in uniform circular and horizontal projectile motion in two dimensions using equations.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

P.5E^{TX}

High school · Physical Science

STANDARD

Explain and apply the concepts of equilibrium and inertia as represented by Newton's first law of motion using relevant real-world examples such as rockets, satellites, and automobile safety devices.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

P.5F^{TX}

High school · Physical Science

STANDARD

Calculate the effect of forces on objects, including tension, friction, normal, gravity, centripetal, and applied forces, using free body diagrams and the relationship between force and acceleration as represented by Newton's second law of motion.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

P.5G^{TX}

High school · Physical Science

STANDARD

Illustrate and analyze the simultaneous forces between two objects as represented in Newton's third law of motion using free body diagrams and in an experimental design scenario.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

P.5H^{TX}

High school · Physical Science

STANDARD

Describe and calculate, using scientific notation, how the magnitude of force between two objects depends on their masses and the distance between their centers, and predict the effects on objects in linear and orbiting systems using Newton's law of universal gravitation.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

P.6A ^{TX}

High school · Physical Science

STANDARD

Use scientific notation and predict how the magnitude of the electric force between two objects depends on their charges and the distance between their centers using Coulomb's law.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

P.6B ^{TX}

High school · Physical Science

STANDARD

Identify and describe examples of electric and magnetic forces and fields in everyday life such as generators, motors, and transformers.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

P.6C ^{TX}

High school · Physical Science

STANDARD

Investigate and describe conservation of charge during the processes of induction, conduction, and polarization using different materials such as electroscopes, balloons, rods, fur, silk, and Van de Graaf generators.

MINI 4WD

Compare a motor can after a run with a part left in the shade. Name the heat move you mean. Do not open a cell.

P.6D ^{TX}

High school · Physical Science

STANDARD

Analyze, design, and construct series and parallel circuits using schematics and materials such as switches, wires, resistors, lightbulbs, batteries, voltmeters, and ammeters.

MINI 4WD

Build a simple loop with a cell, a switch, and the motor, and say whether the parts are in one path or two.

P.6E ^{TX}

High school · Physical Science

STANDARD

Calculate current through, potential difference across, resistance of, and power used by electric circuit elements connected in both series and parallel circuits using Ohm's law.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

P.7A ^{TX}

High school · Physical Science

STANDARD

Calculate and explain work and power in one dimension and identify when work is and is not being done by or on a system.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

P.7B ^{TX}

High school · Physical Science

STANDARD

Investigate and calculate mechanical, kinetic, and potential energy of a system.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

P.7C ^{TX}

High school · Physical Science

STANDARD

Apply the concept of conservation of energy using the work-energy theorem, energy diagrams, and energy transformation equations, including transformations between kinetic, potential, and thermal energy.

MINI 4WD

Compare a motor can after a run with a part left in the shade. Name the heat move you mean. Do not open a cell.

P.7D ^{TX}

High school · Physical Science

STANDARD

Calculate and describe the impulse and momentum of objects in physical systems such as automobile safety features, athletics, and rockets.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

P.7E ^{TX}

High school · Physical Science

STANDARD

Analyze the conservation of momentum qualitatively in inelastic and elastic collisions in one dimension using models, diagrams, and simulations.

MINI 4WD

Roll the car into a roller and say what each one does after they meet.

P.8A ^{TX}

High school · Physical Science

STANDARD

Examine and describe simple harmonic motion such as masses on springs and pendulums and wave energy propagation in various types of media such as surface waves on a body of water and pulses in ropes.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

P.8B ^{TX}

High school · Physical Science

STANDARD

Compare the characteristics of transverse and longitudinal waves, including electromagnetic and sound waves.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

P.8C ^{TX}

High school · Physical Science

STANDARD

Investigate and analyze characteristics of waves, including velocity, frequency, amplitude, and wavelength, and calculate using the relationships between wave speed, frequency, and wavelength.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

P.8D ^{TX}

High school · Physical Science

STANDARD

Investigate behaviors of waves, including reflection, refraction, diffraction, interference, standing wave, the Doppler effect and polarization and superposition.

MINI 4WD

Look at the car in a flat mirror, or through a lens if you have one. Say where the image shows up.

P.8E ^{TX}

High school · Physical Science

STANDARD

Compare the different applications of the electromagnetic spectrum, including radio telescopes, microwaves, and x-rays.

MINI 4WD

Look at the sky with the tool you have. The car is the object the tool was not made for.

P.8F ^{TX}

High school · Physical Science

STANDARD

Investigate the emission spectra produced by various atoms and explain the relationship to the electromagnetic spectrum.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

P.8G ^{TX}

High school · Physical Science

STANDARD

Describe and predict image formation as a consequence of reflection from a plane mirror and refraction through a thin convex lens.

MINI 4WD

Look at the car in a flat mirror, or through a lens if you have one. Say where the image shows up.

P.9A ^{TX}

High school · Physical Science

STANDARD

Describe the photoelectric effect and emission spectra produced by various atoms and how both are explained by the photon model for light.

MINI 4WD

Shine a lamp on the car, then block it. Say what the light does and where the shadow falls.

P.9B ^{TX}

High school · Physical Science

STANDARD

Investigate Malus's Law and describe examples of applications of wave polarization, including 3-D movie glasses and LCD computer screens.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

P.9C ^{TX}

High school · Physical Science

STANDARD

Compare and explain how superposition of quantum states is related to the wave-particle duality nature of light.

MINI 4WD

Shine a lamp on the car, then block it. Say what the light does and where the shadow falls.

P.9D^{TX}

High school · Physical Science

STANDARD

Give examples of applications of quantum phenomena, including the Heisenberg uncertainty principle, quantum computing, and cybersecurity.

MINI 4WD

Use a published spectrum or account. The color of the body is not that spectrum.

PS.M.1^{OH}

High school · Physical Science

STANDARD

Classification of matter. Heterogeneous vs. homogeneous. Properties of matter. States of matter and its changes.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

PS.M.2^{OH}

High school · Physical Science

STANDARD

Atoms. Models of the atom (components). Ions (cations and anions). Isotopes.

MINI 4WD

Keep nuclear changes in a published account. A motor warming up is not that change.

PS.M.3^{OH}

High school · Physical Science

STANDARD

Periodic trends of the elements. Periodic law. Representative groups.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

PS.M.4 ^{OH}

High school · Physical Science

STANDARD

Bonding and compounds. Bonding (ionic and covalent). Nomenclature.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

PS.M.5 ^{OH}

High school · Physical Science

STANDARD

Reactions of matter. Chemical reactions. Nuclear reactions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

PS.EW.1 ^{OH}

High school · Physical Science

STANDARD

Conservation of energy. Quantifying kinetic energy. Quantifying gravitational potential energy.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

PS.EW.2 ^{OH}

High school · Physical Science

STANDARD

Transfer and transformation of energy (including work).

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

PS.EW.3 ^{OH}

High school · Physical Science

STANDARD

Waves. Refraction, reflection, diffraction, absorption, superposition. Radiant energy and the electromagnetic spectrum. Doppler shift.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

PS.EW.4 ^{OH}

High school · Physical Science

STANDARD

Thermal energy.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

PS.EW.5 ^{OH}

High school · Physical Science

STANDARD

Electricity. Movement of electrons. Current. Electric potential (voltage). Resistors and transfer of energy.

MINI 4WD

Use the cells and the motor as the circuit in front of you. Say what is closed, and what stays open.

PS.FM.1 ^{OH}

High school · Physical Science

STANDARD

Motion. Introduction to one-dimensional vectors. Displacement, velocity (constant, average and instantaneous) and acceleration. Interpreting position vs. time and velocity vs. time graphs.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PS.FM.2 ^{OH}

High school · Physical Science

STANDARD

Forces. Force diagrams. Types of forces (gravity, friction, normal, tension). Field model for forces at a distance.

MINI 4WD

Name the field the standard names. The car on the table is sitting in the room, not in that field.

PS.FM.3 ^{OH}

High school · Physical Science

STANDARD

Dynamics (how forces affect motion). Objects at rest. Objects moving with constant velocity. Accelerating objects.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PS.U.1 ^{OH}

High school · Physical Science

STANDARD

History of the universe.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

PS.U.2 ^{OH}

High school · Physical Science

STANDARD

Galaxies.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

PS.U.3^{OH}

High school · Physical Science

STANDARD

Stars. Formation: stages of evolution. Fusion in stars.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

C.PM.1^{OH}

High school · Physical Science

STANDARD

Atomic structure. Evolution of atomic models/theory. Electrons. Electron configurations.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.PM.2^{OH}

High school · Physical Science

STANDARD

Periodic Table. Properties. Trends.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.PM.3^{OH}

High school · Physical Science

STANDARD

Chemical bonding. Ionic. Polar/covalent.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.PM.4 ^{OH}

High school · Physical Science

STANDARD

Representing compounds. Formula writing. Nomenclature. Models and shapes (Lewis structures, ball and stick, molecular geometries).

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.PM.5 ^{OH}

High school · Physical Science

STANDARD

Quantifying matter.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.PM.6 ^{OH}

High school · Physical Science

STANDARD

Intermolecular forces of attraction. Types and strengths. Implications for properties of substances. Melting and boiling point. Solubility. Vapor pressure.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

C.IM.1 ^{OH}

High school · Physical Science

STANDARD

Chemical reactions. Types of reactions. Kinetics. Energy. Equilibrium. Acids/bases.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.IM.2 ^{OH}

High school · Physical Science

STANDARD

Gas laws. Pressure, volume and temperature. Ideal gas law.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

C.IM.3 ^{OH}

High school · Physical Science

STANDARD

Stoichiometry. Molecular calculations. Solutions. Limiting reagents.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

P.M.1 ^{OH}

High school · Physical Science

STANDARD

Motion Graphs. Position vs. time. Velocity vs. time. Acceleration vs. time.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

P.M.2 ^{OH}

High school · Physical Science

STANDARD

Problem Solving. Using graphs (average velocity, instantaneous velocity, acceleration, displacement, change in velocity). Uniform acceleration including free fall (initial velocity, final velocity, time, displacement, acceleration, average velocity).

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

P.M.3 ^{OH}

High school · Physical Science

STANDARD

Projectile Motion. Independence of horizontal and vertical motion. Problem-solving involving horizontally launched projectiles.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

P.F.1 ^{OH}

High school · Physical Science

STANDARD

Newton's laws applied to complex problems.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

P.F.2 ^{OH}

High school · Physical Science

STANDARD

Gravitational force and fields.

MINI 4WD

Name the field the standard names. The car on the table is sitting in the room, not in that field.

P.F.3 ^{OH}

High school · Physical Science

STANDARD

Elastic forces.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

P.F.4 ^{OH}

High school · Physical Science

STANDARD

Friction force (static and kinetic).

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

P.F.5 ^{OH}

High school · Physical Science

STANDARD

Air resistance and drag.

MINI 4WD

Roll the car once and name what slowed it. The air in the room is not a weather report.

P.F.6 ^{OH}

High school · Physical Science

STANDARD

Forces in two dimensions. Adding vector forces. Motion down inclines. Centripetal forces and circular motion.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

P.F.7 ^{OH}

High school · Physical Science

STANDARD

Momentum, impulse and conservation of momentum.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

P.E.1^{OH}

High school · Physical Science

STANDARD

Gravitational potential energy.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

P.E.2^{OH}

High school · Physical Science

STANDARD

Energy in springs.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

P.E.3^{OH}

High school · Physical Science

STANDARD

Work and power.

MINI 4WD

Name the push and how far the car went. Do not invent a power number the run did not give you.

P.E.4^{OH}

High school · Physical Science

STANDARD

Conservation of energy.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

P.E.5 ^{OH}

High school · Physical Science

STANDARD

Nuclear energy.

MINI 4WD

Keep nuclear changes in a published account. A motor warming up is not that change.

P.W.1 ^{OH}

High school · Physical Science

STANDARD

Wave properties. Conservation of energy. Reflection. Refraction. Interference. Diffraction.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

P.W.2 ^{OH}

High school · Physical Science

STANDARD

Light phenomena. Ray diagrams (propagation of light). Law of reflection (equal angles). Snell's law. Diffraction patterns. Wave–particle duality of light. Visible spectrum of color.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

P.EM.1 ^{OH}

High school · Physical Science

STANDARD

Charging objects (friction, contact and induction).

MINI 4WD

Use the cells and the motor as the circuit in front of you. Say what is closed, and what stays open.

P.EM.2 ^{OH}

High school · Physical Science

STANDARD

Coulomb's law.

MINI 4WD

Use the cells and the motor as the circuit in front of you. Say what is closed, and what stays open.

P.EM.3 ^{OH}

High school · Physical Science

STANDARD

Electric fields and electric potential energy.

MINI 4WD

Name the field the standard names. The car on the table is sitting in the room, not in that field.

P.EM.4 ^{OH}

High school · Physical Science

STANDARD

DC circuits. Ohm's law. Series circuits. Parallel circuits. Mixed circuits. Applying conservation of charge and energy (junction and loop rules).

MINI 4WD

Use the cells and the motor as the circuit in front of you. Say what is closed, and what stays open.

P.EM.5 ^{OH}

High school · Physical Science

STANDARD

Magnetic fields.

MINI 4WD

Name the field the standard names. The car on the table is sitting in the room, not in that field.

P.EM.6 ^{OH}

High school · Physical Science

STANDARD

Electromagnetic interactions.

MINI 4WD

Use the cells and the motor as the circuit in front of you. Say what is closed, and what stays open.

CHEM.1 ^{AL}

High school · Physical Science

STANDARD

Use the periodic table as a model to predict the structure and properties of atoms and elements.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

CHEM.1a ^{AL}

High school · Physical Science

STANDARD

Assess the merits and limitations of historic and modern atomic models pertaining to the presence, position, mass, and charge of subatomic particles.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

CHEM.1b ^{AL}

High school · Physical Science

STANDARD

Develop and use models of an element's subatomic particles to compare and contrast its atoms, ions, and isotopes.

MINI 4WD

Keep nuclear changes in a published account. A motor warming up is not that change.

CHEM.ic ^{AL}

High school · Physical Science

STANDARD

Analyze and interpret data to identify or describe an element based on its number of protons, its relative abundance of isotopes, its organization and placement of electrons, and its light emission spectrum.

MINI 4WD

Keep nuclear changes in a published account. A motor warming up is not that change.

CHEM.id ^{AL}

High school · Physical Science

STANDARD

Ask questions to determine the relationship between an element's physical and chemical properties and its position on the periodic table.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

CHEM.ie ^{AL}

High school · Physical Science

STANDARD

Construct explanations of how periodic trends can be used to predict the properties of elements.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

CHEM.2 ^{AL}

High school · Physical Science

STANDARD

Construct explanations of the formation of intramolecular and intermolecular forces and their effects on atomic and molecular interactions.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

CHEM.2a ^{AL}

High school · Physical Science

STANDARD

Develop and use Lewis dot diagrams to model the formation of covalent and ionic bonds.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

CHEM.2b ^{AL}

High school · Physical Science

STANDARD

Construct an explanation of the change in potential energy that occurs when chemical bonds are formed.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

CHEM.2c ^{AL}

High school · Physical Science

STANDARD

Plan and carry out an investigation to identify specific physical and chemical properties of compounds formed from ionic, covalent, and metallic bonding.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

CHEM.2d ^{AL}

High school · Physical Science

STANDARD

Develop and use models based on valence shell electron pair repulsion (VSEPR) theory to predict the shape of a molecule up to four electron domains around the central atom.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

CHEM.2e^{AL}

High school · Physical Science

STANDARD

Construct an explanation of the polarity of a molecule based on electronegativity data and molecular geometry.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

CHEM.2f^{AL}

High school · Physical Science

STANDARD

Analyze and interpret data from the periodic table to derive chemical formulas and names for ionic and covalent compounds.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

CHEM.2g^{AL}

High school · Physical Science

STANDARD

Analyze and interpret data to compare the strengths of intermolecular forces and to explain how these forces affect physical properties.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

CHEM.3^{AL}

High school · Physical Science

STANDARD

Develop and use multiple types of models to represent chemical reactions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

CHEM.3a^{AL}

High school · Physical Science

STANDARD

Use qualitative and quantitative reasoning to describe and balance chemical equations to satisfy the law of conservation of matter.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

CHEM.3b^{AL}

High school · Physical Science

STANDARD

Use qualitative and quantitative reasoning to classify chemical reactions, predict the products of single replacement and double replacement reactions, and represent chemical reactions using ionic equations.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

CHEM.3c^{AL}

High school · Physical Science

STANDARD

Analyze and interpret temperature and bond energy data to classify a reaction as endothermic or exothermic.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

CHEM.3d^{AL}

High school · Physical Science

STANDARD

Construct an explanation, using particle diagrams and collision theory, for how particle size, concentration, and temperature affect the rate of a chemical reaction.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

CHEM.4a ^{AL}

High school · Physical Science

STANDARD

Quantitatively apply the concepts of the mole and Avogadro's number to conceptualize and calculate percent composition and empirical or molecular formulas of common compounds.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

CHEM.4b ^{AL}

High school · Physical Science

STANDARD

Use mathematical representations of the mole concept to solve reaction stoichiometry problems, involving mole-to-mole conversions, mass-to-mole conversions, and mass-to-mass conversions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

CHEM.4c ^{AL}

High school · Physical Science

STANDARD

Use mathematical models to reveal the relationships among the theoretical, actual, and percent yields of chemical reactions.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

CHEM.4d ^{AL}

High school · Physical Science

STANDARD

Qualitatively and quantitatively determine the limiting reactant when given the masses of all reactants.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

CHEM.4e^{AL}

High school · Physical Science

STANDARD

Use mathematics and computational thinking to perform gas stoichiometry calculations involving mass, volume, and number of moles at standard temperature and pressure (STP).

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

CHEM.5^{AL}

High school · Physical Science

STANDARD

Obtain, evaluate, and communicate information concerning factors that affect solubility and the properties of solutions.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

CHEM.5a^{AL}

High school · Physical Science

STANDARD

Use mathematics and computational thinking to express the concentrations of given solutions in terms of molarity and molality.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

CHEM.5b^{AL}

High school · Physical Science

STANDARD

Develop and use models to illustrate solute-solvent interactions.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

CHEM.5c^{AL}

High school · Physical Science

STANDARD

Use mathematics and computational thinking to prepare solutions from both solids and concentrated solutions when given a desired molarity and volume.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

CHEM.5d^{AL}

High school · Physical Science

STANDARD

Analyze and interpret data to explain the effects of temperature on the solubility of solid, liquid, and gaseous solutes in a solvent and the effects of pressure on the solubility of gaseous solutes.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

CHEM.5e^{AL}

High school · Physical Science

STANDARD

Design and conduct experiments to evaluate the effect of solute concentration on the colligative properties of a solution.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

CHEM.6^{AL}

High school · Physical Science

STANDARD

Make qualitative and quantitative claims, based on ion concentration, about the acidic, basic, or neutral characteristics of a solution.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

CHEM.6b ^{AL}

High school · Physical Science

STANDARD

Use the periodic table and computational thinking to derive chemical formulas and names of acids and bases.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

CHEM.6c ^{AL}

High school · Physical Science

STANDARD

Use multiple models to predict the relative properties of strong, weak, concentrated, and dilute acids and bases.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

CHEM.6d ^{AL}

High school · Physical Science

STANDARD

Use mathematics to calculate the pH, pOH, [OH⁻], and [H₃O⁺] of common solutions.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

CHEM.6e ^{AL}

High school · Physical Science

STANDARD

Plan and carry out a strong acid-strong base titration to determine the concentration of an unknown acidic or basic solution.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

CHEM.7^{AL}

High school · Physical Science

STANDARD

Plan and carry out investigations to determine how the atomic and molecular motion in chemical and physical processes is related to the kinetic molecular theory.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

CHEM.7a^{AL}

High school · Physical Science

STANDARD

Qualitatively and quantitatively relate changes in the temperature and pressure of a gas to particle motion and number of collisions.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

CHEM.7b^{AL}

High school · Physical Science

STANDARD

Express the relationship among pressure, volume, temperature, and the number of moles of a gas quantitatively, conceptually, and graphically.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

PS.1^{AL}

High school · Physical Science

STANDARD

Evaluate sources of information concerning the law of conservation of energy to illustrate energy transformations in practical applications and natural systems.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

PS.1a ^{AL}

High school · Physical Science

STANDARD

Plan and carry out investigations to explore how mechanical energy is transformed within a system, including kinetic energy, gravitational potential energy, elastic potential energy, and work.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

PS.1b ^{AL}

High school · Physical Science

STANDARD

Collect, analyze, and use data to explain how thermal energy is transferred by conduction, convection, and radiation.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

PS.1c ^{AL}

High school · Physical Science

STANDARD

Construct explanations to justify the selection of materials for specific applications based on the materials' specific heat values.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

PS.1d ^{AL}

High school · Physical Science

STANDARD

Investigate collisions and other real-world situations to evaluate the effects of impulse on changes in momentum.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

PS.2 ^{AL}

High school · Physical Science

STANDARD

Obtain, evaluate, and communicate information to compare and contrast the properties of mechanical and electromagnetic waves as they relate to real-world applications.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

PS.2a ^{AL}

High school · Physical Science

STANDARD

Analyze and interpret data to identify and describe the relationships among wavelength, frequency, amplitude, and energy in waves.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

PS.2b ^{AL}

High school · Physical Science

STANDARD

Develop models to illustrate reflection, refraction, interference, and diffraction.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

PS.2c ^{AL}

High school · Physical Science

STANDARD

Analyze the ways in which different media and their characteristics affect the speed of sound and light waves.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

PS.2d ^{AL}

High school · Physical Science

STANDARD

Use models to illustrate the Doppler effect and explain the changes in sound perception associated with it.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

PS.2e ^{AL}

High school · Physical Science

STANDARD

Obtain and communicate information from published materials to explain how transmitting and receiving devices use the principles of wave behavior and wave interactions to transmit and capture information and energy.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

PS.3 ^{AL}

High school · Physical Science

STANDARD

Construct an explanation of the ways in which modern science uses both magnetic and electric concepts to create usable products.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

PS.3a ^{AL}

High school · Physical Science

STANDARD

Construct an argument using evidence to support the claim that field forces exist between objects and act on the objects even when the objects are not in contact.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

PS.3b ^{AL}

High school · Physical Science

STANDARD

Plan and carry out investigations to identify the factors that affect the strength of the electric and magnetic forces between objects.

MINI 4WD

Use the cells and the motor as the circuit in front of you. Say what is closed, and what stays open.

PS.3c ^{AL}

High school · Physical Science

STANDARD

Use mathematics and computational thinking to represent and determine the quantitative relationships between voltage, current, and resistance in series and parallel circuits in terms of Ohm's law.

MINI 4WD

Use the cells and the motor as the circuit in front of you. Say what is closed, and what stays open.

PS.3d ^{AL}

High school · Physical Science

STANDARD

Develop and use models to determine the relationships among voltage, current, and resistance at specific loads in series and parallel circuits.

MINI 4WD

Use the cells and the motor as the circuit in front of you. Say what is closed, and what stays open.

PS.3e ^{AL}

High school · Physical Science

STANDARD

Plan and carry out investigations to determine the relationships between magnetism and electrical charge in common devices.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

PS.3f ^{AL}

High school · Physical Science

STANDARD

Analyze and interpret data concerning the advantages and disadvantages of the energy sources used to produce electricity.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

PS.4 ^{AL}

High school · Physical Science

STANDARD

Evaluate the effects of using ions or isotopes of elements as a solution to a complex real-world problem, including cost, safety, trade-offs, and environmental impacts.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

PS.4a ^{AL}

High school · Physical Science

STANDARD

Obtain, evaluate, and communicate information from the periodic table concerning the structure of an atom and the arrangement of the atom's protons, neutrons, and electrons.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

PS.4b ^{AL}

High school · Physical Science

STANDARD

Predict the properties of an element based on the element's number of protons and valence electrons.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

PS.4c^{AL}

High school · Physical Science

STANDARD

Analyze and interpret data to predict properties of ionic and covalent compounds.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

PS.4d^{AL}

High school · Physical Science

STANDARD

Use mathematics and computational thinking to determine the charge of an ion and the mass number of an isotope based on the number of subatomic particles.

MINI 4WD

Keep nuclear changes in a published account. A motor warming up is not that change.

PS.4e^{AL}

High school · Physical Science

STANDARD

Analyze and interpret data to explain how radioactive decay changes a radioactive isotope over time and explain how the age of an object can be estimated by the ratio of radioactive isotopes contained within the object's atoms.

MINI 4WD

Keep nuclear changes in a published account. A motor warming up is not that change.

PS.4f^{AL}

High school · Physical Science

STANDARD

Use mathematics and computational thinking to identify types of radioactive decay based on balanced chemical equations, penetrating power, identity of emitted particles, and charge.

MINI 4WD

Keep nuclear changes in a published account. A motor warming up is not that change.

PS.4g^{AL}

High school · Physical Science

STANDARD

Use models to explain how nuclear fission and fusion reactions can be used as energy sources.

MINI 4WD

Keep nuclear changes in a published account. A motor warming up is not that change.

PS.4h^{AL}

High school · Physical Science

STANDARD

Generate and defend a data-based claim regarding the use of radioactive materials as an energy source.

MINI 4WD

Keep nuclear changes in a published account. A motor warming up is not that change.

PS.5^{AL}

High school · Physical Science

STANDARD

Analyze and interpret data to justify the selection of a specific material for a practical application, considering a range of constraints.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

PS.5a^{AL}

High school · Physical Science

STANDARD

Carry out investigations and use results to compare and contrast the physical and chemical properties of matter.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

PS.5b ^{AL}

High school · Physical Science

STANDARD

Analyze and interpret data to predict changes in the phase of a material based on changes in particle motion, temperature, pressure, or thermal energy.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PS.5c ^{AL}

High school · Physical Science

STANDARD

Use mathematical and computational thinking to determine the quantitative relationships among temperature, pressure, and volume of confined gases.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

PS.5d ^{AL}

High school · Physical Science

STANDARD

Utilize multiple types of models to support and verify the claim that matter is conserved during a simple chemical reaction.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

PS.6 ^{AL}

High school · Physical Science

STANDARD

Obtain, evaluate, and communicate information to explain how the properties of various types of solutions make them useful in real-world applications.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

PS.6a ^{AL}

High school · Physical Science

STANDARD

Plan and carry out investigations to determine how various factors, including temperature, surface area, and stirring, affect the rate at which a solute dissolves in a solvent.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

PS.6b ^{AL}

High school · Physical Science

STANDARD

Develop and use particle diagrams to illustrate diluted and concentrated solutions and describe how adjusting amounts of solute and solvent impacts the concentration of a solution.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

PS.6c ^{AL}

High school · Physical Science

STANDARD

Analyze and interpret data from experiments to determine whether solutions are acidic, basic, or neutral to predict properties of the solutions.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

PS.6d ^{AL}

High school · Physical Science

STANDARD

Plan and carry out investigations concerning neutralization reactions and describe the properties of the reactants and products.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

PHY.1 ^{AL}

High school · Physical Science

STANDARD

Obtain, evaluate, and communicate ideas about kinematics, including scalar quantities (distance and speed) and vector quantities (position, displacement, velocity, and acceleration).

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.1a ^{AL}

High school · Physical Science

STANDARD

Analyze data to create and interpret graphs of position, velocity, and acceleration versus time for one-dimensional motion.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.1b ^{AL}

High school · Physical Science

STANDARD

Analyze free fall motion using one-dimensional kinematics to determine the acceleration due to gravity (g).

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.1c ^{AL}

High school · Physical Science

STANDARD

Analyze and interpret data to explain changes in the vector quantities of position, velocity, and acceleration in two-dimensional projectile motion, including projectiles launched horizontally and at an angle.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.1d ^{AL}

High school · Physical Science

STANDARD

Use mathematics and computational thinking to solve problems, using kinematics equations in both one- and two-dimensional motion.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.2 ^{AL}

High school · Physical Science

STANDARD

Construct explanations of dynamics from evidence, using Newton's laws of motion.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

PHY.2a ^{AL}

High school · Physical Science

STANDARD

Evaluate the effects of balanced and unbalanced forces on an object's motion.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.2b ^{AL}

High school · Physical Science

STANDARD

Use mathematical, graphical, and narrative methods to explain the relationships among net force, mass, and acceleration of a single object.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.2c ^{AL}

High school · Physical Science

STANDARD

Create free and fixed body diagrams to model all the forces acting on a single object.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.2d ^{AL}

High school · Physical Science

STANDARD

Create an explanation of the nature of forces and the interactions among them, including tension, friction, gravitation, and normal forces, using free-body diagrams.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.2e ^{AL}

High school · Physical Science

STANDARD

Analyze data to identify the pair of equal and opposite forces between two interacting bodies and relate their magnitudes and directions using Newton's third law.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.3 ^{AL}

High school · Physical Science

STANDARD

Design and carry out experiments to verify that energy and momentum are conserved in closed systems.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

PHY.3a ^{AL}

High school · Physical Science

STANDARD

Use mathematical and computational thinking to explain the relationships among work, power, and time.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

PHY.3b ^{AL}

High school · Physical Science

STANDARD

Create mathematical and graphical representations to depict the transformation of energy from one form to another, including kinetic energy, gravitational potential energy, elastic potential energy, and work due to friction.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.3c ^{AL}

High school · Physical Science

STANDARD

Use models to illustrate the relationship between the work performed on an object and the object's total mechanical energy.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

PHY.3d ^{AL}

High school · Physical Science

STANDARD

Qualitatively and quantitatively evaluate the relationship among the force acting on an object, the time of interaction, and the change in linear momentum (impulse) of the object.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.3e ^{AL}

High school · Physical Science

STANDARD

Obtain, evaluate, and interpret data related to collisions (both elastic and inelastic) and their effects on both linear momentum and energy conservation.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

PHY.4 ^{AL}

High school · Physical Science

STANDARD

Use mathematics and computational thinking to analyze the effects of pressure changes and buoyant forces in fluid systems.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.4a ^{AL}

High school · Physical Science

STANDARD

Plan and carry out experiments to determine the density of objects.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

PHY.4b ^{AL}

High school · Physical Science

STANDARD

Use and solve algebraic formulas to determine the relationships between pressure, force, area, and density.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.4c^{AL}

High school · Physical Science

STANDARD

Design solutions to determine the magnitude and direction of the buoyant force acting on an object and the effects of the buoyant forces on the object's motion.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

PHY.4d^{AL}

High school · Physical Science

STANDARD

Use the buoyant force acting on an object and free body diagrams to determine the acceleration of submerged objects.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.5^{AL}

High school · Physical Science

STANDARD

Develop and use models to analyze the circular motion of objects.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.5a^{AL}

High school · Physical Science

STANDARD

Use mathematics and free-body diagrams to relate the tangential velocity, the radius of orbit, the centripetal acceleration, and force to each other for an object moving in a circle.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

PHY.5b ^{AL}

High school · Physical Science

STANDARD

Develop and use a model to describe the mathematical relationship between mass, distance, and force as expressed by Newton's law of universal gravitation.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.6 ^{AL}

High school · Physical Science

STANDARD

Obtain, evaluate, and communicate information concerning static and current electricity.

MINI 4WD

Use the cells and the motor as the circuit in front of you. Say what is closed, and what stays open.

PHY.6a ^{AL}

High school · Physical Science

STANDARD

Develop and use a model to describe the mathematical relationship among charge, distance, and force as expressed by Coulomb's law.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

PHY.6b ^{AL}

High school · Physical Science

STANDARD

Obtain, evaluate, and communicate information regarding the relationship among voltage, current, and power for direct current circuits.

MINI 4WD

Use the cells and the motor as the circuit in front of you. Say what is closed, and what stays open.

PHY.6c ^{AL}

High school · Physical Science

STANDARD

Create models of series, parallel, and mixed direct current circuits.

MINI 4WD

Use the cells and the motor as the circuit in front of you. Say what is closed, and what stays open.

PHY.6d ^{AL}

High school · Physical Science

STANDARD

Use mathematics and computational thinking to determine the voltage, current, and resistance for an entire circuit and at each resistor or load.

MINI 4WD

Use the cells and the motor as the circuit in front of you. Say what is closed, and what stays open.

PHY.7 ^{AL}

High school · Physical Science

STANDARD

Obtain, evaluate, and communicate information regarding the propagation, properties, and applications of waves.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

PHY.7a ^{AL}

High school · Physical Science

STANDARD

Use mathematics and computational thinking to describe the relationships among the velocity, frequency, and wavelength of a propagating wave.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

PHY.7b ^{AL}

High school · Physical Science

STANDARD

Use results of investigations to explain the production and characteristics of sound waves including interferences, the Doppler effect, and standing waves.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

PHY.7c ^{AL}

High school · Physical Science

STANDARD

Obtain, evaluate, and communicate information to explain the properties and behavior of electromagnetic waves.

MINI 4WD

Use a lamp or a tap on the body and say what you saw or heard. Do not invent a wavelength.

SC.912.N.1.1 ^{FL}

High school · Physical Science

STANDARD

Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. pose questions about the natural world, 2. conduct systematic observations, 3. examine books and other sources of information to see what is already known, 4. review what is known in light of empirical evidence, 5. plan investigations, 6. use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), 7. pose answers, explanations, or descriptions of events, 8. generate explanations that explicate or describe natural phenomena (inferences), 9. use appropriate evidence and reasoning to justify these explanations to others, 10. communicate results of scientific investigations, and 11. evaluate the merits of the explanations produced by others.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.2^{FL}

High school · Physical Science

STANDARD

Describe and explain what characterizes science and its methods.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.3^{FL}

High school · Physical Science

STANDARD

Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.

MINI 4WD

State one claim about a run, and the evidence from that run.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.4^{FL}

High school · Physical Science

STANDARD

Identify sources of information and assess their reliability according to the strict standards of scientific investigation.

MINI 4WD

Name the source of a claim about the car, and say why you trust that source.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.5^{FL}

High school · Physical Science

STANDARD

Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.6^{FL}

High school · Physical Science

STANDARD

Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.7^{FL}

High school · Physical Science

STANDARD

Recognize the role of creativity in constructing scientific questions, methods and explanations.

MINI 4WD

Ask a new question about one run, then say what that question lets you see.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.1^{FL}

High school · Physical Science

STANDARD

Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).

MINI 4WD

Name one question about the lane that a run can answer, and one question a run cannot.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.2^{FL}

High school · Physical Science

STANDARD

Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.

MINI 4WD

Name one question about the lane that a run can answer, and one question a run cannot.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.3^{FL}

High school · Physical Science

STANDARD

Identify examples of pseudoscience (such as astrology, phrenology) in society.

MINI 4WD

Name one cost and one benefit of a change you would make to the car, using the kinds of cost the standard names.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.4^{FL}

High school · Physical Science

STANDARD

Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.

MINI 4WD

State one claim about a run, and the evidence from that run.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.5^{FL}

High school · Physical Science

STANDARD

Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.1^{FL}

High school · Physical Science

STANDARD

Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.2^{FL}

High school · Physical Science

STANDARD

Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.3^{FL}

High school · Physical Science

STANDARD

Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.4^{FL}

High school · Physical Science

STANDARD

Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.5^{FL}

High school · Physical Science

STANDARD

Describe the function of models in science, and identify the wide range of models used in science.

MINI 4WD

Point to the car and say which part of the standard the model is standing in for, and one way the model is not the whole thing.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.4.1^{FL}

High school · Physical Science

STANDARD

Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.4.2 ^{FL}

High school · Physical Science

STANDARD

Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.

MINI 4WD

Name one cost and one benefit of a change you would make to the car, using the kinds of cost the standard names.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.P.8.1 ^{FL}

High school · Physical Science

STANDARD

Differentiate among the four states of matter.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.8.2 ^{FL}

High school · Physical Science

STANDARD

Differentiate between physical and chemical properties and physical and chemical changes of matter.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.8.3 ^{FL}

High school · Physical Science

STANDARD

Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.8.4^{FL}

High school · Physical Science

STANDARD

Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.8.5^{FL}

High school · Physical Science

STANDARD

Relate properties of atoms and their position in the periodic table to the arrangement of their electrons.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.8.6^{FL}

High school · Physical Science

STANDARD

Distinguish between bonding forces holding compounds together and other attractive forces, including hydrogen bonding and van der Waals forces.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.8.7^{FL}

High school · Physical Science

STANDARD

Interpret formula representations of molecules and compounds in terms of composition and structure.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.8.8^{FL}

High school · Physical Science

STANDARD

Characterize types of chemical reactions, for example: redox, acid-base, synthesis, and single and double replacement reactions.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.8.9^{FL}

High school · Physical Science

STANDARD

Apply the mole concept and the law of conservation of mass to calculate quantities of chemicals participating in reactions.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.8.10^{FL}

High school · Physical Science

STANDARD

Describe oxidation-reduction reactions in living and non-living systems.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.8.11^{FL}

High school · Physical Science

STANDARD

Identify selected functional groups and relate how they contribute to properties of carbon compounds.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.8.12^{FL}

High school · Physical Science

STANDARD

Describe the properties of the carbon atom that make the diversity of carbon compounds possible.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.8.13^{FL}

High school · Physical Science

STANDARD

Relate acidity and basicity to hydronium and hydroxyl ion concentration and pH.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.10.1^{FL}

High school · Physical Science

STANDARD

Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.912.P.10.2^{FL}

High school · Physical Science

STANDARD

Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.912.P.10.3^{FL}

High school · Physical Science

STANDARD

Compare and contrast work and power qualitatively and quantitatively.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.912.P.10.4^{FL}

High school · Physical Science

STANDARD

Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.10.5^{FL}

High school · Physical Science

STANDARD

Relate temperature to the average molecular kinetic energy.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.912.P.10.6^{FL}

High school · Physical Science

STANDARD

Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.912.P.10.7^{FL}

High school · Physical Science

STANDARD

Distinguish between endothermic and exothermic chemical processes.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.10.8^{FL}

High school · Physical Science

STANDARD

Explain entropy's role in determining the efficiency of processes that convert energy to work.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.912.P.10.9^{FL}

High school · Physical Science

STANDARD

Describe the quantization of energy at the atomic level.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.912.P.10.10^{FL}

High school · Physical Science

STANDARD

Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear).

MINI 4WD

Use a published account for the nuclear change the standard names. Do not try that change with the car.

SC.912.P.10.11^{FL}

High school · Physical Science

STANDARD

Explain and compare nuclear reactions (radioactive decay, fission and fusion), the energy changes associated with them and their associated safety issues.

MINI 4WD

Use a published account for the nuclear change the standard names. Do not try that change with the car.

SC.912.P.10.12^{FL}

High school · Physical Science

STANDARD

Differentiate between chemical and nuclear reactions.

MINI 4WD

Use a published account for the nuclear change the standard names. Do not try that change with the car.

SC.912.P.10.13^{FL}

High school · Physical Science

STANDARD

Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy.

MINI 4WD

Name two forms of energy from the standard, and which one shows up when the car rolls and then stops.

SC.912.P.10.14^{FL}

High school · Physical Science

STANDARD

Differentiate among conductors, semiconductors, and insulators.

MINI 4WD

Name the cell, the motor, and the path between them.

SC.912.P.10.15^{FL}

High school · Physical Science

STANDARD

Investigate and explain the relationships among current, voltage, resistance, and power.

MINI 4WD

Name the cell, the motor, and the path between them.

SC.912.P.10.16^{FL}

High school · Physical Science

STANDARD

Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies.

MINI 4WD

Point to the motor and name the electric or magnetic idea the standard is using.

SC.912.P.10.17^{FL}

High school · Physical Science

STANDARD

Explore the theory of electromagnetism by explaining electromagnetic waves in terms of oscillating electric and magnetic fields.

MINI 4WD

Point to the motor and name the electric or magnetic idea the standard is using.

SC.912.P.10.18^{FL}

High school · Physical Science

STANDARD

Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications.

MINI 4WD

Point to the motor and name the electric or magnetic idea the standard is using.

SC.912.P.10.19^{FL}

High school · Physical Science

STANDARD

Explain that all objects emit and absorb electromagnetic radiation and distinguish between objects that are blackbody radiators and those that are not.

MINI 4WD

Point to the motor and name the electric or magnetic idea the standard is using.

SC.912.P.10.20^{FL}

High school · Physical Science

STANDARD

Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another.

MINI 4WD

Use a lamp or the motor's sound for the wave the standard names, and say what changed.

SC.912.P.10.21^{FL}

High school · Physical Science

STANDARD

Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver.

MINI 4WD

Point to the motor and name the electric or magnetic idea the standard is using.

SC.912.P.10.22^{FL}

High school · Physical Science

STANDARD

Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors.

MINI 4WD

Use a lamp or the motor's sound for the wave the standard names, and say what changed.

SC.912.P.12.1 ^{FL}

High school · Physical Science

STANDARD

Distinguish between scalar and vector quantities and assess which should be used to describe an event.

MINI 4WD

Use a published account for the motion idea the standard names. On the lane, say what you can time with the car.

SC.912.P.12.2 ^{FL}

High school · Physical Science

STANDARD

Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time.

MINI 4WD

Use a published account for the motion idea the standard names. On the lane, say what you can time with the car.

SC.912.P.12.3 ^{FL}

High school · Physical Science

STANDARD

Interpret and apply Newton's three laws of motion.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.912.P.12.4 ^{FL}

High school · Physical Science

STANDARD

Describe how the gravitational force between two objects depends on their masses and the distance between them.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.912.P.12.5^{FL}

High school · Physical Science

STANDARD

Apply the law of conservation of linear momentum to interactions, such as collisions between objects.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.912.P.12.6^{FL}

High school · Physical Science

STANDARD

Qualitatively apply the concept of angular momentum.

MINI 4WD

Push the car, then let it go, and say how the motion changed.

SC.912.P.12.7^{FL}

High school · Physical Science

STANDARD

Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving.

MINI 4WD

Use a published account for the motion idea the standard names. On the lane, say what you can time with the car.

SC.912.P.12.8^{FL}

High school · Physical Science

STANDARD

Recognize that Newton's Laws are a limiting case of Einstein's Special Theory of Relativity at speeds that are much smaller than the speed of light.

MINI 4WD

Use a published account for the motion idea the standard names. On the lane, say what you can time with the car.

SC.912.P.12.9^{FL}

High school · Physical Science

STANDARD

Recognize that time, length, and energy depend on the frame of reference.

MINI 4WD

Use a published account for the motion idea the standard names. On the lane, say what you can time with the car.

SC.912.P.12.10^{FL}

High school · Physical Science

STANDARD

Interpret the behavior of ideal gases in terms of kinetic molecular theory.

MINI 4WD

Use a published account for the change of state the standard names, and point to one part of the car that did not make that change.

SC.912.P.12.11^{FL}

High school · Physical Science

STANDARD

Describe phase transitions in terms of kinetic molecular theory.

MINI 4WD

Use a published account for the change of state the standard names, and point to one part of the car that did not make that change.

SC.912.P.12.12^{FL}

High school · Physical Science

STANDARD

Explain how various factors, such as concentration, temperature, and presence of a catalyst affect the rate of a chemical reaction.

MINI 4WD

Sort or change one material the standard names, and say what you can see before and after. Leave living examples in a published account.

SC.912.P.12.13 ^{FL}

High school · Physical Science

STANDARD

Explain the concept of dynamic equilibrium in terms of reversible processes occurring at the same rates.

MINI 4WD

Use a published account for the change of state the standard names, and point to one part of the car that did not make that change.

Grades 9–12 Life Science

354 standards

HS-LS1-1 ^{NG, CA, MI, NJ, PA}

High school · Life Science

STANDARD

Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

MINI 4WD

Explain, from a published account, how DNA shape leads to a protein that does a job in a cell. The car's chassis shape leads to a job too, and that shape was chosen by a designer, not coded by DNA.

HS-LS1-2 ^{NG, CA, MI, NJ, PA}

High school · Life Science

STANDARD

Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

MINI 4WD

Draw a person as cells, tissues, and organs that let the hand catch the car. Draw the car as parts that let it roll. Hierarchy is the shared drawing habit. Only one of the drawings is an organism.

HS-LS1-3 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

MINI 4WD

Investigate a feedback case in a living body, such as sweating when hot. A builder who sees the car climb the wall and then eases the setup is a person using feedback. The car itself has no homeostasis.

HS-LS1-4 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

MINI 4WD

Use a published model of mitosis and differentiation. The car is not maintained by cell division. This standard stays with the organism.

HS-LS1-5 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

MINI 4WD

Model light stored as chemical energy in a plant. A solar panel charging a cell stores energy by a different device. Show the plant model for the standard, and the panel only if you label it as not photosynthesis.

HS-LS1-6 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

MINI 4WD

Explain how sugar's carbon, hydrogen, and oxygen can become larger molecules in a living thing. Plastic in the body is also carbon-based and was manufactured. Keep the biochemical path and the factory path separate.

HS-LS1-7 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

MINI 4WD

Model cellular respiration as bonds broken and new bonds made, with a net transfer of energy the builder can use. The cell in the car is an electrochemical store, not respiration.

HS-LS2-1 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

MINI 4WD

Use a published carrying-capacity figure for a real population. A pit that can hold only so many working motors is a parts limit, not a carrying capacity. Use the population numbers for the standard.

HS-LS2-2 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

MINI 4WD

Revise an explanation of biodiversity with counts from two real ecosystems. The variety of cars at a club is a catalog variety, not that biodiversity.

HS-LS2-3 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

MINI 4WD

Explain matter and energy in aerobic and anaerobic conditions from a published case, such as a sealed compost or a muscle short of oxygen. A closed car box is not that system.

HS-LS2-4 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

MINI 4WD

Support a claim about matter and energy among organisms with a published calculation. A lap-energy sketch of cell to motor is a machine budget, to be labeled as such.

HS-LS2-5 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

MINI 4WD

Model carbon moving among air, water, rock, and life, with photosynthesis and respiration in the loop. If the club's electricity comes from burning fuel, that is a human addition to the air side. Say so only from a source you can cite.

HS-LS2-6 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

MINI 4WD

Evaluate a claim that a living system stays steady until conditions change, using ecological evidence. A ruleset that keeps race results steady until the track changes is a social system, not this evidence.

HS-LS2-7 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

MINI 4WD

Design a small, real reduction of harm from the club: used cells to a proper stream, or less new plastic. Evaluate it against a larger published biodiversity action so the scale stays honest.

HS-LS2-8 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

MINI 4WD

Evaluate evidence that a herd or a flock changes survival odds. Builders sharing a pit change people's odds of finishing a race day. That is group behavior of people. Use animal studies for the species claim.

HS-LS3-1 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

MINI 4WD

Ask how DNA and chromosomes carry a trait from parent to offspring, using a published trait. Kit cars match because of a mold. Ask that separately.

HS-LS3-2 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

MINI 4WD

Defend a claim that a new heritable variation can come from meiosis, a copy error, or a mutation from the environment, from a published case. A bent axle is damage, not one of those three.

HS-LS3-3 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

MINI 4WD

Use statistics on a published trait in a population. Times of many cars can be plotted too. Label the car plot as race data, not as expressed genes.

HS-LS4-1 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

MINI 4WD

Communicate the several lines of evidence for common ancestry. Shared screws in two kits are evidence of a shared product line. Do not offer them as ancestry.

HS-LS4-2 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

MINI 4WD

Explain evolution from the four factors in the standard, with living examples. A faster setup becoming popular at a club is builders copying a result, which is not those four factors.

HS-LS4-3 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

MINI 4WD

Apply probability to a published case where a heritable advantage becomes a larger share of a population. A setup that wins more heats becomes a larger share of the pits only because people choose it.

HS-LS4-4 NG, CA, MI, NJ, PA

High school · Life Science

STANDARD

Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

MINI 4WD

Explain natural selection leading to adaptation in a population. A car revised after losses is engineering iteration. Name it as iteration when you set it beside the biological explanation.

HS-LS4-5 ^{NG, CA, MI, NJ, PA}

High school · Life Science

STANDARD

Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

MINI 4WD

Evaluate evidence that a changed environment can grow a population, start a new species, or end one. A changed track can grow one setup's wins and end another's. Species are not setups.

HS-LS4-6 ^{NG, CA, MI, NJ}

High school · Life Science

STANDARD

Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

MINI 4WD

Revise a published simulation aimed at reducing human harm to biodiversity. A club rule about waste can be one tiny input. It is not a substitute for the simulation.

3.4.9–12.H ^{PA}

High school · Life Science

STANDARD

Design and evaluate solutions in which individuals and societies can promote stewardship in environmental quality and community well-being.

MINI 4WD

Design one club practice that cuts waste, such as a labeled cell-recycling step, and judge it by the well-being of the people who share the room.

Pennsylvania assigns this standard to grades 9–12, so it is printed in each high school section.

B.1A ^{TX}

High school · Life Science

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

B.1B ^{TX}

High school · Life Science

STANDARD

Apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

B.1C ^{TX}

High school · Life Science

STANDARD

Use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

B.1D ^{TX}

High school · Life Science

STANDARD

Use appropriate tools such as microscopes, slides, Petri dishes, laboratory glassware, metric rulers, digital balances, pipets, filter paper, micropipettes, gel electrophoresis and polymerase chain reaction (PCR) apparatuses, microcentrifuges, water baths, incubators, thermometers, hot plates, data collection probes, test tube holders, lab notebooks or journals, hand lenses, and models, diagrams, or samples of biological specimens or structures.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

B.1E ^{TX}

High school · Life Science

STANDARD

Collect quantitative data using the International System of Units (SI) and qualitative data as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

B.1F ^{TX}

High school · Life Science

STANDARD

Organize quantitative and qualitative data using scatter plots, line graphs, bar graphs, charts, data tables, digital tools, diagrams, scientific drawings, and student-prepared models.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

B.1G ^{TX}

High school · Life Science

STANDARD

Develop and use models to represent phenomena, systems, processes, or solutions to engineering problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

B.1H ^{TX}

High school · Life Science

STANDARD

Distinguish among scientific hypotheses, theories, and laws.

MINI 4WD

Say which you are using: a guess about a run, a tested account, or a rule of the track.

B.2A ^{TX}

High school · Life Science

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

B.2B ^{TX}

High school · Life Science

STANDARD

Analyze data by identifying significant statistical features, patterns, sources of error, and limitations.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

B.2C ^{TX}

High school · Life Science

STANDARD

Use mathematical calculations to assess quantitative relationships in data.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

B.2D ^{TX}

High school · Life Science

STANDARD

Evaluate experimental and engineering designs.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

B.3A ^{TX}

High school · Life Science

STANDARD

Develop explanations and propose solutions supported by data and models and consistent with scientific ideas, principles, and theories.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

B.3B ^{TX}

High school · Life Science

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

B.3C ^{TX}

High school · Life Science

STANDARD

Engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

B.4A ^{TX}

High school · Life Science

STANDARD

Analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

B.4B ^{TX}

High school · Life Science

STANDARD

Relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content.

MINI 4WD

Read one published case of a cost and a benefit. The cells are one small use, not that case.

B.4C ^{TX}

High school · Life Science

STANDARD

Research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

B.5A ^{TX}

High school · Life Science

STANDARD

Relate the functions of different types of biomolecules, including carbohydrates, lipids, proteins, and nucleic acids, to the structure and function of a cell.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.5B ^{TX}

High school · Life Science

STANDARD

Compare and contrast prokaryotic and eukaryotic cells, including their complexity, and compare and contrast scientific explanations for cellular complexity.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.5C ^{TX}

High school · Life Science

STANDARD

Investigate homeostasis through the cellular transport of molecules.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

B.5D ^{TX}

High school · Life Science

STANDARD

Compare the structures of viruses to cells and explain how viruses spread and cause disease.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.6A ^{TX}

High school · Life Science

STANDARD

Explain the importance of the cell cycle to the growth of organisms, including an overview of the stages of the cell cycle and deoxyribonucleic acid (DNA) replication models.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

B.6B ^{TX}

High school · Life Science

STANDARD

Explain the process of cell specialization through cell differentiation, including the role of environmental factors.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.6C ^{TX}

High school · Life Science

STANDARD

Relate disruptions of the cell cycle to how they lead to the development of diseases such as cancer.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.7A ^{TX}

High school · Life Science

STANDARD

Identify components of DNA, explain how the nucleotide sequence specifies some traits of an organism, and examine scientific explanations for the origin of DNA.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.7B ^{TX}

High school · Life Science

STANDARD

Describe the significance of gene expression and explain the process of protein synthesis using models of DNA and ribonucleic acid (RNA).

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

B.7C ^{TX}

High school · Life Science

STANDARD

Identify and illustrate changes in DNA and evaluate the significance of these changes.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.7D ^{TX}

High school · Life Science

STANDARD

Discuss the importance of molecular technologies such as polymerase chain reaction (PCR), gel electrophoresis, and genetic engineering that are applicable in current research and engineering practices.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

B.8A ^{TX}

High school · Life Science

STANDARD

Analyze the significance of chromosome reduction, independent assortment, and crossing-over during meiosis in increasing diversity in populations of organisms that reproduce sexually.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.8B ^{TX}

High school · Life Science

STANDARD

Predict possible outcomes of various genetic combinations using monohybrid and dihybrid crosses, including non-Mendelian traits of incomplete dominance, codominance, sex-linked traits, and multiple alleles.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.9A ^{TX}

High school · Life Science

STANDARD

Analyze and evaluate how evidence of common ancestry among groups is provided by the fossil record, biogeography, and homologies, including anatomical, molecular, and developmental.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.9B ^{TX}

High school · Life Science

STANDARD

Examine scientific explanations for varying rates of change such as gradualism, abrupt appearance, and stasis in the fossil record.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.10A ^{TX}

High school · Life Science

STANDARD

Analyze and evaluate how natural selection produces change in populations and not in individuals.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.10B ^{TX}

High school · Life Science

STANDARD

Analyze and evaluate how the elements of natural selection, including inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources, result in differential reproductive success.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.10C ^{TX}

High school · Life Science

STANDARD

Analyze and evaluate how natural selection may lead to speciation.

MINI 4WD

Use a published living case. Cars from one mold are copies, not a population that changes.

B.10D ^{TX}

High school · Life Science

STANDARD

Analyze evolutionary mechanisms other than natural selection, including genetic drift, gene flow, mutation, and genetic recombination, and their effect on the gene pool of a population.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.II.A ^{TX}

High school · Life Science

STANDARD

Explain how matter is conserved and energy is transferred during photosynthesis and cellular respiration using models, including the chemical equations for these processes.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

B.II.B ^{TX}

High school · Life Science

STANDARD

Investigate and explain the role of enzymes in facilitating cellular processes.

MINI 4WD

Use the living process the standard names. The motor keeping a steady run is a machine, not a cell.

B.I2.A ^{TX}

High school · Life Science

STANDARD

Analyze the interactions that occur among systems that perform the functions of regulation, nutrient absorption, reproduction, and defense from injury or illness in animals.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.I2.B ^{TX}

High school · Life Science

STANDARD

Explain how the interactions that occur among systems that perform functions of transport, reproduction, and response in plants are facilitated by their structures.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.13A ^{TX}

High school · Life Science

STANDARD

Investigate and evaluate how ecological relationships, including predation, parasitism, commensalism, mutualism, and competition, influence ecosystem stability.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.13B ^{TX}

High school · Life Science

STANDARD

Analyze how ecosystem stability is affected by disruptions to the cycling of matter and flow of energy through trophic levels using models.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.13C ^{TX}

High school · Life Science

STANDARD

Explain the significance of the carbon and nitrogen cycles to ecosystem stability and analyze the consequences of disrupting these cycles.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.13D ^{TX}

High school · Life Science

STANDARD

Explain how environmental change, including change due to human activity, affects biodiversity and analyze how changes in biodiversity impact ecosystem stability.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.1A ^{TX}

High school · Life Science

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

AQ.1B ^{TX}

High school · Life Science

STANDARD

Apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

AQ.1C ^{TX}

High school · Life Science

STANDARD

Use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

AQ.iD^{TX}

High school · Life Science

STANDARD

Use appropriate tools such as Global Positioning System (GPS), Geographic Information System (GIS), weather balloons, buoys, water testing kits, meter sticks, metric rulers, pipettes, graduated cylinders, standard laboratory glassware, balances, timing devices, pH meters or probes, various data collecting probes, thermometers, calculators, computers, internet access, turbidity testing devices, hand magnifiers, work and disposable gloves, compasses, first aid kits, field guides, water quality test kits or probes, 30-meter tape measures, tarps, ripple tanks, trowels, screens, buckets, sediment samples equipment, cameras, flow meters, cast nets, kick nets, seines, computer models, spectrophotometers, stereomicroscopes, compound microscopes, clinometers, and field journals, various prepared slides, hand lenses, hot plates, Petri dishes, sampling nets, waders, leveling grade rods (Jason sticks), protractors, inclination and height distance calculators, samples of biological specimens or structures, core sampling equipment, fish tanks and associated supplies, and hydrometers.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

AQ.iE^{TX}

High school · Life Science

STANDARD

Collect quantitative data using the International System of Units (SI) and qualitative data as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

AQ.iF^{TX}

High school · Life Science

STANDARD

Organize quantitative and qualitative data using probeware, spreadsheets, lab notebooks or journals, models, diagrams, graphs paper, computers, or cellphone applications.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

AQ.1G^{TX}

High school · Life Science

STANDARD

Develop and use models to represent phenomena, systems, processes, or solutions to engineering problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

AQ.1H^{TX}

High school · Life Science

STANDARD

Distinguish between scientific hypotheses, theories, and laws.

MINI 4WD

Say which you are using: a guess about a run, a tested account, or a rule of the track.

AQ.2A^{TX}

High school · Life Science

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

AQ.2B^{TX}

High school · Life Science

STANDARD

Analyze data by identifying significant statistical features, patterns, sources of error, and limitations.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

AQ.2C^{TX}

High school · Life Science

STANDARD

Use mathematical calculations to assess quantitative relationships in data.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

AQ.2D^{TX}

High school · Life Science

STANDARD

Evaluate experimental and engineering designs.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

AQ.3A^{TX}

High school · Life Science

STANDARD

Develop explanations and propose solutions supported by data and models consistent with scientific ideas, principles, and theories.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

AQ.3B^{TX}

High school · Life Science

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

AQ.3C^{TX}

High school · Life Science

STANDARD

Engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

AQ.4A^{TX}

High school · Life Science

STANDARD

Analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

AQ.4B^{TX}

High school · Life Science

STANDARD

Relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content.

MINI 4WD

Read one published case of a cost and a benefit. The cells are one small use, not that case.

AQ.4C^{TX}

High school · Life Science

STANDARD

Research and explore resources such as museums, planetariums, observatories, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

AQ.5A ^{TX}

High school · Life Science

STANDARD

Describe how the shape and polarity of the water molecule make it a "universal solvent" in aquatic systems.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

AQ.5B ^{TX}

High school · Life Science

STANDARD

Identify how aquatic ecosystems are affected by water's properties of adhesion, cohesion, surface tension, heat capacity, and thermal conductivity.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.5C ^{TX}

High school · Life Science

STANDARD

Explain how the density of water is critical for organisms in cold environments.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.6A ^{TX}

High school · Life Science

STANDARD

Identify key features and characteristics of atmospheric, geological, hydrological, and biological systems as they relate to aquatic environments.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

AQ.6B ^{TX}

High school · Life Science

STANDARD

Describe the interrelatedness of atmospheric, geological, hydrological, and biological systems in aquatic ecosystems, including positive and negative feedback loops.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.6C ^{TX}

High school · Life Science

STANDARD

Evaluate environmental data using technology such as maps, visualizations, satellite data, Global Positioning System (GPS), Geographic Information System (GIS), weather balloons, and buoys to model the interactions that affect aquatic ecosystems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.7A ^{TX}

High school · Life Science

STANDARD

Identify how energy flows and matter cycles through both freshwater and marine aquatic systems, including food webs, chains, and pyramids.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

AQ.7B ^{TX}

High school · Life Science

STANDARD

Identify biological, chemical, geological, and physical components of an aquatic life zone as they relate to the organisms in it.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

AQ.7C^{TX}

High school · Life Science

STANDARD

Identify variables that affect the solubility of carbon dioxide and oxygen in water.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

AQ.7D^{TX}

High school · Life Science

STANDARD

Evaluate factors affecting aquatic population cycles such as lunar cycles, temperature variations, hours of daylight, and predator-prey relationships.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.7E^{TX}

High school · Life Science

STANDARD

Identify the interdependence of organisms in an aquatic environment such as in a pond, a river, a lake, an ocean, or an aquifer and the biosphere.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.8A^{TX}

High school · Life Science

STANDARD

Evaluate data over a period of time from an established aquatic environment documenting seasonal changes and the behavior of organisms.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.8B ^{TX}

High school · Life Science

STANDARD

Collect and analyze pH, salinity, temperature, mineral content, nitrogen compounds, dissolved oxygen, and turbidity data periodically, starting with baseline measurements.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

AQ.8C ^{TX}

High school · Life Science

STANDARD

Use data from short-term or long-term studies to analyze interrelationships between producers, consumers, and decomposers in aquatic ecosystems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.9A ^{TX}

High school · Life Science

STANDARD

Identify the role of carbon, nitrogen, water, and nutrient cycles in an aquatic environment, including upwellings and turnovers.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

AQ.9B ^{TX}

High school · Life Science

STANDARD

Examine the interrelationships between aquatic systems and climate and weather, including El Niño and La Niña, currents, and hurricanes.

MINI 4WD

Use a published account for the climate or the daylight pattern. One hot afternoon at the track is weather, not that account.

AQ.9C^{TX}

High school · Life Science

STANDARD

Explain how tidal cycles influence intertidal ecology.

MINI 4WD

Use a published account of the water zone the standard names. A pit bottle is not that zone.

AQ.10A^{TX}

High school · Life Science

STANDARD

Identify sources of water in a watershed, including rainfall, groundwater, and surface water.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

AQ.10B^{TX}

High school · Life Science

STANDARD

Identify factors that contribute to how water flows through a watershed.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

AQ.10C^{TX}

High school · Life Science

STANDARD

Analyze water quantity and quality in a local watershed or aquifer.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

AQ.10D^{TX}

High school · Life Science

STANDARD

Describe human uses of fresh water and how human freshwater use competes with that of other organisms.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.11A^{TX}

High school · Life Science

STANDARD

Examine basic principles of fluid dynamics, including hydrostatic pressure, density as a result of salinity, and buoyancy.

MINI 4WD

Set a washer and a plastic clip in a cup of water. Say which one sinks.

AQ.11B^{TX}

High school · Life Science

STANDARD

Identify interrelationships between ocean currents, climates, and geologic features such as continental margins, active and passive margins, abyssal plains, island atolls, peninsulas, barrier islands, and hydrothermal vents.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

AQ.11C^{TX}

High school · Life Science

STANDARD

Explain how fluid dynamics causes upwelling and lake turnover.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

AQ.11D ^{TX}

High school · Life Science

STANDARD

Describe how erosion and deposition in river systems lead to formation of geologic features.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

AQ.12A ^{TX}

High school · Life Science

STANDARD

Differentiate among freshwater, brackish, and marine ecosystems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.12B ^{TX}

High school · Life Science

STANDARD

Identify the major properties and components of different marine and freshwater life zones.

MINI 4WD

Use a published account of the water zone the standard names. A pit bottle is not that zone.

AQ.13A ^{TX}

High school · Life Science

STANDARD

Compare different traits in aquatic organisms using tools such as dichotomous keys.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.I3B^{TX}

High school · Life Science

STANDARD

Describe how adaptations allow an organism to exist within an aquatic environment.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.I3C^{TX}

High school · Life Science

STANDARD

Compare adaptations of freshwater and marine organisms.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.I4A^{TX}

High school · Life Science

STANDARD

Analyze the cumulative impact of human population growth on an aquatic ecosystem.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.I4B^{TX}

High school · Life Science

STANDARD

Predict effects of chemical, organic, physical, and thermal changes due to humans on the living and nonliving components of an aquatic ecosystem.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

AQ.I4C ^{TX}

High school · Life Science

STANDARD

Investigate the role of humans in unbalanced systems involving phenomena such as invasive species, fish farming, cultural eutrophication, or red tides.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AQ.I4D ^{TX}

High school · Life Science

STANDARD

Analyze and discuss how human activities such as fishing, transportation, dams, and recreation influence aquatic environments.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

AQ.I4E ^{TX}

High school · Life Science

STANDARD

Describe the impact such as costs and benefits of various laws and policies such as The Endangered Species Act, right of capture laws, or Clean Water Act on aquatic systems.

MINI 4WD

Read one of those laws in a published account and name one cost and one benefit. The club's waste is a local note beside it.

AQ.I4F ^{TX}

High school · Life Science

STANDARD

Analyze the purpose and effectiveness of human efforts to restore aquatic ecosystems affected by human activities.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.H.1 ^{OH}

High school · Life Science

STANDARD

Cellular genetics.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

B.H.2 ^{OH}

High school · Life Science

STANDARD

Structure and function of DNA in cells.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

B.H.3 ^{OH}

High school · Life Science

STANDARD

Genetic mechanisms and inheritance.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

B.H.4 ^{OH}

High school · Life Science

STANDARD

Mutations.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

B.H.5 ^{OH}

High school · Life Science

STANDARD

Modern genetics.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

B.E.1 ^{OH}

High school · Life Science

STANDARD

Mechanisms. Natural selection. Mutation. Genetic drift. Gene flow (immigration, emigration). Sexual selection.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

B.E.2 ^{OH}

High school · Life Science

STANDARD

Speciation. Biological classification expanded to molecular evidence. Variation of organisms within species due to population genetics and gene frequency.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

B.DI.1 ^{OH}

High school · Life Science

STANDARD

Biodiversity. Genetic diversity. Species diversity.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

B.DI.2 ^{OH}

High school · Life Science

STANDARD

Ecosystems. Equilibrium and disequilibrium. Carrying capacity.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.DI.3 ^{OH}

High school · Life Science

STANDARD

Loss of Diversity. Climate change. Anthropocene effects. Extinction. Invasive species.

MINI 4WD

Use a published account for the climate pattern the standard names. One hot afternoon at the track is weather, not that account.

B.C.1 ^{OH}

High school · Life Science

STANDARD

Cell structure and function. Structure, function and interrelatedness of cell organelles. Eukaryotic cells and prokaryotic cells.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

B.C.2 ^{OH}

High school · Life Science

STANDARD

Cellular processes. Characteristics of life regulated by cellular processes. Photosynthesis, chemosynthesis, cellular respiration, biosynthesis of macromolecules.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

AP.LO.1 ^{OH}

High school · Life Science

STANDARD

Hierarchy of Organization.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.LO.2 ^{OH}

High school · Life Science

STANDARD

Types of Tissues.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.LO.3 ^{OH}

High school · Life Science

STANDARD

Homeostasis.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.LO.4 ^{OH}

High school · Life Science

STANDARD

Anatomical Terminology.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.SM.1 ^{OH}

High school · Life Science

STANDARD

Integumentary System.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.SM.2 ^{OH}

High school · Life Science

STANDARD

Skeletal System.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.SM.3 ^{OH}

High school · Life Science

STANDARD

Muscular System.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.IC.1 ^{OH}

High school · Life Science

STANDARD

Nervous System.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.IC.2 ^{OH}

High school · Life Science

STANDARD

Special Senses. Sense of Sight. Senses of Hearing and Balance. Senses of Taste and Smell.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.IC.3 ^{OH}

High school · Life Science

STANDARD

Endocrine System.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.T.1 ^{OH}

High school · Life Science

STANDARD

Blood.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.T.2 ^{OH}

High school · Life Science

STANDARD

Cardiovascular System.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.T.3^{OH}

High school · Life Science

STANDARD

Lymphatic and Immune Systems.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.AE.1^{OH}

High school · Life Science

STANDARD

Digestive System.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.AE.2^{OH}

High school · Life Science

STANDARD

Respiratory System.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.AE.3^{OH}

High school · Life Science

STANDARD

Urinary System.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

AP.R.1 ^{OH}

High school · Life Science

STANDARD

Reproductive System.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

BIO.1 ^{AL}

High school · Life Science

STANDARD

Engage in evidence-based argument to relate a cell's function to the structure, function, and diversity of its components.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

BIO.2 ^{AL}

High school · Life Science

STANDARD

Obtain and evaluate information to explain the role of DNA and RNA in transcription and translation leading to protein synthesis and cellular function.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

BIO.2a ^{AL}

High school · Life Science

STANDARD

Use a model to describe the structure and sequence of DNA, including nucleotide structure, base pairing, and the structure of the helix.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

BIO.2b^{AL}

High school · Life Science

STANDARD

Obtain and evaluate information to explore additional functions and regulatory roles of RNA, DNA, and protein, including their roles in gene expression and cellular differentiation.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

BIO.2c^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information regarding how DNA and genetic technology apply to daily life.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

BIO.3^{AL}

High school · Life Science

STANDARD

Develop and use models to explain how events during the cell cycle lead to the formation of new cells and repair of multicellular organisms, including cell growth, DNA replication, separation of chromosomes, and separation of cell contents.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

BIO.3a^{AL}

High school · Life Science

STANDARD

Construct an explanation of the process of DNA replication during cellular division (S-phase).

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

BIO.3b^{AL}

High school · Life Science

STANDARD

Using observations of cell growth, construct an explanation of how the cell cycle leads to differentiation in tissue development.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

BIO.4^{AL}

High school · Life Science

STANDARD

Engage in argument from evidence to explain the regulation of cellular processes that maintain homeostasis, including active and passive transport.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

BIO.4a^{AL}

High school · Life Science

STANDARD

Use models to illustrate how the structural characteristics of lipids and proteins in the cell membrane regulate cellular processes.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

BIO.4b^{AL}

High school · Life Science

STANDARD

Construct an explanation of how the unique properties of water are vital to maintaining homeostasis in organisms.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

BIO.5^{AL}

High school · Life Science

STANDARD

Plan and carry out investigations and utilize results to explain the role and cycling of products and reactants involved in the cellular conversion of energy.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

BIO.5a^{AL}

High school · Life Science

STANDARD

Construct an explanation of how the structural characteristics of carbohydrates and lipids store energy.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

BIO.5b^{AL}

High school · Life Science

STANDARD

Use models of the reactants and products of photosynthesis to illustrate the conversion of light energy into stored chemical energy within cells.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

BIO.5c^{AL}

High school · Life Science

STANDARD

Use models of the reactants and products of cellular respiration (both aerobic and anaerobic) to illustrate how chemical energy is stored in the bonds of carbohydrates and lipids and converted to ATP and heat when the bonds are broken.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

BIO.6 ^{AL}

High school · Life Science

STANDARD

Develop and use models to illustrate interactions between ecological hierarchy levels, including biosphere, biome, ecosystem, community, population, and organism.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

BIO.7 ^{AL}

High school · Life Science

STANDARD

Develop and use models to illustrate the flow of matter and energy between abiotic and biotic factors in ecosystems, including loss of heat, 10% rule, and the conservation of matter.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

BIO.8 ^{AL}

High school · Life Science

STANDARD

Construct an evidence-based explanation of how density-dependent and density-independent factors affect population growth.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

BIO.9 ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate data to explain how the biodiversity of Alabama contributes to ecosystem services in the state.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

BIO.9a ^{AL}

High school · Life Science

STANDARD

Obtain and evaluate data to describe human impact on various Alabama ecosystems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

BIO.10 ^{AL}

High school · Life Science

STANDARD

Engage in argument from evidence to support the claim that characteristics of an ecosystem contribute to its resilience and stability, including ecological succession and recovery from disturbance.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

BIO.11 ^{AL}

High school · Life Science

STANDARD

Use probability and statistical models to explain the variation of expressed traits within a population.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

BIO.11a ^{AL}

High school · Life Science

STANDARD

Use mathematics and computational thinking to predict patterns of inheritance, including dominance, recessiveness, codominance, and incomplete dominance.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

BIO.11b ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information about how the interplay of heritable risk factors, somatic mutations, and environment influences human disease.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

BIO.12 ^{AL}

High school · Life Science

STANDARD

Develop and use an evidence-based model to illustrate the formation of reproductive cells through the process of meiosis.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

BIO.12a ^{AL}

High school · Life Science

STANDARD

Construct an explanation of how new genetic combinations and variations occur during crossover.

MINI 4WD

Use a published account for the inheritance the standard names. Two cars from one mold are not that inheritance.

BIO.12b ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information about how errors during meiosis and environmental factors affect the expression of traits.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

BIO.13a ^{AL}

High school · Life Science

STANDARD

Evaluate evidence supporting claims that viruses should be placed in a separate category from living things.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

BIO.14 ^{AL}

High school · Life Science

STANDARD

Analyze and interpret data pertaining to adaptations resulting from natural and artificial selection to explain the evolution of populations.

MINI 4WD

Use a published account for the change across generations. A setup you change between heats is not that change.

BIO.15 ^{AL}

High school · Life Science

STANDARD

Engage in argument from evidence to explain how populations respond to changes in the environment that can lead to speciation or extinction.

MINI 4WD

Use a published account for the change across generations. A setup you change between heats is not that change.

HAP.1 ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information to explain how differences in cellular structure (mitochondria, cytoskeletal structure, endoplasmic reticulum, cell membrane) lead to differences in the function and organization of the four tissue types (epithelial, connective, muscular, and nervous).

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.2 ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information to describe how the structures of the integumentary system and its accessory organs contribute to its function.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.2a ^{AL}

High school · Life Science

STANDARD

Construct an explanation of the relationships between the integumentary system and other organ systems, including the body's mechanisms for maintaining homeostasis.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.3 ^{AL}

High school · Life Science

STANDARD

Develop and use a model to illustrate how the structures of the skeletal system contribute to its function.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.3a ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information describing the growth and development of the skeletal system.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.3b ^{AL}

High school · Life Science

STANDARD

Construct an explanation of the relationships between the skeletal system and other organ systems, including the body's mechanisms for maintaining homeostasis.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.4 ^{AL}

High school · Life Science

STANDARD

Develop and build a three-dimensional model to illustrate the structures of the muscular system, including muscle locations, origins, and insertions, and explain their roles in movement and support.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.4a ^{AL}

High school · Life Science

STANDARD

Model the cellular physiology of skeletal muscle, including how the cell functions in muscle contraction and relaxation.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.4b ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information to explain muscle fatigue and tone in terms of muscle cell physiology.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.5^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information explaining the relationship between the structures and functions of the central nervous system and the peripheral nervous system.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.5a^{AL}

High school · Life Science

STANDARD

Use a model to illustrate the role of action potentials in neural transmission. Clarification: Discussions of sodium-potassium pumps and ion channels are not required.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.5b^{AL}

High school · Life Science

STANDARD

Construct an explanation of the role of reflex arcs, the central nervous system, and special senses in the response to stimuli to maintain homeostasis and guide behavior.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.5c^{AL}

High school · Life Science

STANDARD

Construct an explanation of the role of neurotransmitters in the functions and behavior of the nervous system.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.5d ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and summarize scientific findings regarding the biological origin of emotions and memories in distinct regions of the brain.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.6 ^{AL}

High school · Life Science

STANDARD

Construct an explanation of how the interdependence of the nervous and endocrine systems maintains homeostasis.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.6a ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information explaining how hormones secreted by endocrine glands help the body maintain homeostasis through negative and positive feedback loops.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.6b ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information describing the role of endocrine axes involving the thyroid and gonads in controlling growth, development, metabolism, and reproduction.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.7 ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information describing the structure of lymph nodes and primary cells of the immune system (neutrophils, lymphocytes, monocytes, macrophages, eosinophils, and basophils) and explaining their role in inflammation and the body's defense.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.7a ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information explaining how vaccines work to stimulate immunity in the human body.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.7b ^{AL}

High school · Life Science

STANDARD

Construct an explanation of how the lymphatic system interacts with the immune and circulatory systems.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.8 ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information explaining how the structures of the cardiovascular system are related to its functions.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.8a ^{AL}

High school · Life Science

STANDARD

Create a model to show how a pressure gradient moves blood through the circulatory system.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.8b ^{AL}

High school · Life Science

STANDARD

Carry out an investigation exploring the link between blood pressure and heart rate and include the role of baroreceptors and chemoreceptors in the explanation of results.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.8c ^{AL}

High school · Life Science

STANDARD

Construct an explanation of the cardiovascular system's relationships with other organ systems, including the body's mechanisms for maintaining homeostasis.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.9 ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information to explain the relationship between the structures and functions of the respiratory system.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.9a ^{AL}

High school · Life Science

STANDARD

Construct an explanation of how the circulatory system works with respiration to transport respiratory gases.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.9b ^{AL}

High school · Life Science

STANDARD

Use a model to illustrate how pressure gradients move air into and out of the lungs.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.9c ^{AL}

High school · Life Science

STANDARD

Construct an explanation of the respiratory system's relationships with other organ systems, including the body's mechanisms for maintaining homeostasis.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.10 ^{AL}

High school · Life Science

STANDARD

Obtain, evaluate, and communicate information explaining the relationship between the structures and functions of the digestive system, including absorption and chemical and mechanical digestion.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.10a ^{AL}

High school · Life Science

STANDARD

Construct an explanation of the roles of accessory organs (salivary glands, pancreas, and liver) in digestion.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.10b ^{AL}

High school · Life Science

STANDARD

Construct an explanation of the relationships between the digestive system and other organ systems, including the body's mechanisms for maintaining homeostasis.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.11 ^{AL}

High school · Life Science

STANDARD

Use a model to illustrate the microanatomy of excretory structures and describe their functions.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.11a ^{AL}

High school · Life Science

STANDARD

Construct an explanation of how the excretory system maintains homeostasis, including blood pressure and pH.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.I2 ^{AL}

High school · Life Science

STANDARD

Use models to compare and contrast the internal and external structures of the female and male reproductive systems and their production of gametes.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

HAP.I2a ^{AL}

High school · Life Science

STANDARD

Construct an explanation of how the endocrine system influences the growth, development, and functions of the reproductive systems in males and females, including the mechanisms of hormonal birth control.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.N.1.1 ^{FL}

High school · Life Science

STANDARD

Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. pose questions about the natural world, 2. conduct systematic observations, 3. examine books and other sources of information to see what is already known, 4. review what is known in light of empirical evidence, 5. plan investigations, 6. use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), 7. pose answers, explanations, or descriptions of events, 8. generate explanations that explicate or describe natural phenomena (inferences), 9. use appropriate evidence and reasoning to justify these explanations to others, 10. communicate results of scientific investigations, and 11. evaluate the merits of the explanations produced by others.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.2^{FL}

High school · Life Science

STANDARD

Describe and explain what characterizes science and its methods.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.3^{FL}

High school · Life Science

STANDARD

Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.

MINI 4WD

State one claim about a run, and the evidence from that run.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.4^{FL}

High school · Life Science

STANDARD

Identify sources of information and assess their reliability according to the strict standards of scientific investigation.

MINI 4WD

Name the source of a claim about the car, and say why you trust that source.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.5^{FL}

High school · Life Science

STANDARD

Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.6 ^{FL}

High school · Life Science

STANDARD

Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.7 ^{FL}

High school · Life Science

STANDARD

Recognize the role of creativity in constructing scientific questions, methods and explanations.

MINI 4WD

Ask a new question about one run, then say what that question lets you see.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.1 ^{FL}

High school · Life Science

STANDARD

Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).

MINI 4WD

Name one question about the lane that a run can answer, and one question a run cannot.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.2 ^{FL}

High school · Life Science

STANDARD

Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.

MINI 4WD

Name one question about the lane that a run can answer, and one question a run cannot.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.3 ^{FL}

High school · Life Science

STANDARD

Identify examples of pseudoscience (such as astrology, phrenology) in society.

MINI 4WD

Name one cost and one benefit of a change you would make to the car, using the kinds of cost the standard names.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.4 ^{FL}

High school · Life Science

STANDARD

Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.

MINI 4WD

State one claim about a run, and the evidence from that run.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.5^{FL}

High school · Life Science

STANDARD

Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.1^{FL}

High school · Life Science

STANDARD

Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.2^{FL}

High school · Life Science

STANDARD

Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.3^{FL}

High school · Life Science

STANDARD

Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.4^{FL}

High school · Life Science

STANDARD

Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.5^{FL}

High school · Life Science

STANDARD

Describe the function of models in science, and identify the wide range of models used in science.

MINI 4WD

Point to the car and say which part of the standard the model is standing in for, and one way the model is not the whole thing.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.4.1^{FL}

High school · Life Science

STANDARD

Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.4.2^{FL}

High school · Life Science

STANDARD

Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.

MINI 4WD

Name one cost and one benefit of a change you would make to the car, using the kinds of cost the standard names.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.L.14.1^{FL}

High school · Life Science

STANDARD

Describe the scientific theory of cells (cell theory) and relate the history of its discovery to the process of science.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.14.2^{FL}

High school · Life Science

STANDARD

Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.14.3^{FL}

High school · Life Science

STANDARD

Compare and contrast the general structures of plant and animal cells. Compare and contrast the general structures of prokaryotic and eukaryotic cells.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.14.4^{FL}

High school · Life Science

STANDARD

Compare and contrast structure and function of various types of microscopes.

MINI 4WD

Look at a small mark on the car with a magnifier, and say what it shows that your eye alone does not. A cell stays in a published account.

SC.912.L.14.5^{FL}

High school · Life Science

STANDARD

Explain the evidence supporting the scientific theory of the origin of eukaryotic cells (endosymbiosis).

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.14.6^{FL}

High school · Life Science

STANDARD

Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.14.7^{FL}

High school · Life Science

STANDARD

Relate the major structure of fungi to their functions.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.14.8^{FL}

High school · Life Science

STANDARD

Explain alternation of generations in plants.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.14.9^{FL}

High school · Life Science

STANDARD

Relate the structure of each of the major plant organs and tissues to physiological processes.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.10^{FL}

High school · Life Science

STANDARD

Discuss the relationship between the evolution of land plants and their anatomy.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.11^{FL}

High school · Life Science

STANDARD

Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.12^{FL}

High school · Life Science

STANDARD

Describe the anatomy and histology of bone tissue.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.13^{FL}

High school · Life Science

STANDARD

Distinguish between bones of the axial skeleton and the appendicular skeleton.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.14^{FL}

High school · Life Science

STANDARD

Identify the major bones of the axial and appendicular skeleton.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.15^{FL}

High school · Life Science

STANDARD

Identify major markings (such as foramina, fossae, tubercles, etc.) on a skeleton. Explain why these markings are important.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.16^{FL}

High school · Life Science

STANDARD

Describe the anatomy and histology, including ultrastructure, of muscle tissue.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.17^{FL}

High school · Life Science

STANDARD

List the steps involved in the sliding filament of muscle contraction.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.18^{FL}

High school · Life Science

STANDARD

Describe signal transmission across a myoneural junction.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.19^{FL}

High school · Life Science

STANDARD

Explain the physiology of skeletal muscle.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.20^{FL}

High school · Life Science

STANDARD

Identify the major muscles of the human on a model or diagram.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.21^{FL}

High school · Life Science

STANDARD

Describe the anatomy, histology, and physiology of the central and peripheral nervous systems and name the major divisions of the nervous system.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.22^{FL}

High school · Life Science

STANDARD

Describe the physiology of nerve conduction, including the generator potential, action potential, and the synapse.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.23^{FL}

High school · Life Science

STANDARD

Identify the parts of a reflex arc.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.24^{FL}

High school · Life Science

STANDARD

Identify the general parts of a synapse and describe the physiology of signal transmission across a synapse.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.25^{FL}

High school · Life Science

STANDARD

Identify the major parts of a cross section through the spinal cord.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.26^{FL}

High school · Life Science

STANDARD

Identify the major parts of the brain on diagrams or models.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.27^{FL}

High school · Life Science

STANDARD

Identify the functions of the major parts of the brain, including the meninges, medulla, pons, midbrain, hypothalamus, thalamus, cerebellum and cerebrum.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.28^{FL}

High school · Life Science

STANDARD

Identify the major functions of the spinal cord.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.29^{FL}

High school · Life Science

STANDARD

Define the terms endocrine and exocrine.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.30^{FL}

High school · Life Science

STANDARD

Compare endocrine and neural controls of physiology.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.31^{FL}

High school · Life Science

STANDARD

Describe the physiology of hormones including the different types and the mechanisms of their action.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.32^{FL}

High school · Life Science

STANDARD

Describe the anatomy and physiology of the endocrine system.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.33^{FL}

High school · Life Science

STANDARD

Describe the basic anatomy and physiology of the reproductive system.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.34^{FL}

High school · Life Science

STANDARD

Describe the composition and physiology of blood, including that of the plasma and the formed elements.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.35^{FL}

High school · Life Science

STANDARD

Describe the steps in hemostasis, including the mechanism of coagulation. Include the basis for blood typing and transfusion reactions.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.36^{FL}

High school · Life Science

STANDARD

Describe the factors affecting blood flow through the cardiovascular system.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.37^{FL}

High school · Life Science

STANDARD

Explain the components of an electrocardiogram.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.38^{FL}

High school · Life Science

STANDARD

Describe normal heart sounds and what they mean.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.39^{FL}

High school · Life Science

STANDARD

Describe hypertension and some of the factors that produce it.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.40^{FL}

High school · Life Science

STANDARD

Describe the histology of the major arteries and veins of systemic, pulmonary, hepatic portal, and coronary circulation.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.41^{FL}

High school · Life Science

STANDARD

Describe fetal circulation and changes that occur to the circulatory system at birth.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.42^{FL}

High school · Life Science

STANDARD

Describe the anatomy and the physiology of the lymph system.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.43^{FL}

High school · Life Science

STANDARD

Describe the histology of the respiratory system.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.44^{FL}

High school · Life Science

STANDARD

Describe the physiology of the respiratory system including the mechanisms of ventilation, gas exchange, gas transport and the mechanisms that control the rate of ventilation.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.45^{FL}

High school · Life Science

STANDARD

Describe the histology of the alimentary canal and its associated accessory organs.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.46^{FL}

High school · Life Science

STANDARD

Describe the physiology of the digestive system, including mechanical digestion, chemical digestion, absorption and the neural and hormonal mechanisms of control.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.47^{FL}

High school · Life Science

STANDARD

Describe the physiology of urine formation by the kidney.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.48^{FL}

High school · Life Science

STANDARD

Describe the anatomy, histology, and physiology of the ureters, the urinary bladder and the urethra.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.49^{FL}

High school · Life Science

STANDARD

Identify the major functions associated with the sympathetic and parasympathetic nervous systems.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.50^{FL}

High school · Life Science

STANDARD

Describe the structure of vertebrate sensory organs. Relate structure to function in vertebrate sensory systems.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.51^{FL}

High school · Life Science

STANDARD

Describe the function of the vertebrate integumentary system.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.52^{FL}

High school · Life Science

STANDARD

Explain the basic functions of the human immune system, including specific and nonspecific immune response, vaccines, and antibiotics.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.14.53^{FL}

High school · Life Science

STANDARD

Discuss basic classification and characteristics of plants. Identify bryophytes, pteridophytes, gymnosperms, and angiosperms.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.15.1^{FL}

High school · Life Science

STANDARD

Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.15.2^{FL}

High school · Life Science

STANDARD

Discuss the use of molecular clocks to estimate how long ago various groups of organisms diverged evolutionarily from one another.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.15.3^{FL}

High school · Life Science

STANDARD

Describe how biological diversity is increased by the origin of new species and how it is decreased by the natural process of extinction.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.15.4^{FL}

High school · Life Science

STANDARD

Describe how and why organisms are hierarchically classified and based on evolutionary relationships.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.15.5^{FL}

High school · Life Science

STANDARD

Explain the reasons for changes in how organisms are classified.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.15.6^{FL}

High school · Life Science

STANDARD

Discuss distinguishing characteristics of the domains and kingdoms of living organisms.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.15.7^{FL}

High school · Life Science

STANDARD

Discuss distinguishing characteristics of vertebrate and representative invertebrate phyla, and chordate classes using typical examples.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.15.8^{FL}

High school · Life Science

STANDARD

Describe the scientific explanations of the origin of life on Earth.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.15.9^{FL}

High school · Life Science

STANDARD

Explain the role of reproductive isolation in the process of speciation.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.15.10^{FL}

High school · Life Science

STANDARD

Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.15.11^{FL}

High school · Life Science

STANDARD

Discuss specific fossil hominids and what they show about human evolution.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.15.12^{FL}

High school · Life Science

STANDARD

List the conditions for Hardy-Weinberg equilibrium in a population and why these conditions are not likely to appear in nature. Use the Hardy-Weinberg equation to predict genotypes in a population from observed phenotypes.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.15.13^{FL}

High school · Life Science

STANDARD

Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.15.14^{FL}

High school · Life Science

STANDARD

Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.15.15^{FL}

High school · Life Science

STANDARD

Describe how mutation and genetic recombination increase genetic variation.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.1^{FL}

High school · Life Science

STANDARD

Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.2^{FL}

High school · Life Science

STANDARD

Discuss observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and multiple alleles.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.3^{FL}

High school · Life Science

STANDARD

Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.4^{FL}

High school · Life Science

STANDARD

Explain how mutations in the DNA sequence may or may not result in phenotypic change. Explain how mutations in gametes may result in phenotypic changes in offspring.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.5^{FL}

High school · Life Science

STANDARD

Explain the basic processes of transcription and translation, and how they result in the expression of genes.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.6^{FL}

High school · Life Science

STANDARD

Discuss the mechanisms for regulation of gene expression in prokaryotes and eukaryotes at transcription and translation level.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.7^{FL}

High school · Life Science

STANDARD

Describe how viruses and bacteria transfer genetic material between cells and the role of this process in biotechnology.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.8 ^{FL}

High school · Life Science

STANDARD

Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.9 ^{FL}

High school · Life Science

STANDARD

Explain how and why the genetic code is universal and is common to almost all organisms.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.10 ^{FL}

High school · Life Science

STANDARD

Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.11 ^{FL}

High school · Life Science

STANDARD

Discuss the technologies associated with forensic medicine and DNA identification, including restriction fragment length polymorphism (RFLP) analysis.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.12^{FL}

High school · Life Science

STANDARD

Describe how basic DNA technology (restriction digestion by endonucleases, gel electrophoresis, polymerase chain reaction, ligation, and transformation) is used to construct recombinant DNA molecules (DNA cloning).

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.13^{FL}

High school · Life Science

STANDARD

Describe the basic anatomy and physiology of the human reproductive system. Describe the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy.

MINI 4WD

Use a published anatomy account for the body part the standard names. The car is a machine in the room, not that body.

SC.912.L.16.14^{FL}

High school · Life Science

STANDARD

Describe the cell cycle, including the process of mitosis. Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.15^{FL}

High school · Life Science

STANDARD

Compare and contrast binary fission and mitotic cell division.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.16^{FL}

High school · Life Science

STANDARD

Describe the process of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of haploid gametes or spores.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.16.17^{FL}

High school · Life Science

STANDARD

Compare and contrast mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.17.1^{FL}

High school · Life Science

STANDARD

Discuss the characteristics of populations, such as number of individuals, age structure, density, and pattern of distribution.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.17.2^{FL}

High school · Life Science

STANDARD

Explain the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.17.3^{FL}

High school · Life Science

STANDARD

Discuss how various oceanic and freshwater processes, such as currents, tides, and waves, affect the abundance of aquatic organisms.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.17.4^{FL}

High school · Life Science

STANDARD

Describe changes in ecosystems resulting from seasonal variations, climate change and succession.

MINI 4WD

Use a published account for the environmental effect the standard names. Club waste on the floor is not that system.

SC.912.L.17.5^{FL}

High school · Life Science

STANDARD

Analyze how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carrying capacity.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.17.6^{FL}

High school · Life Science

STANDARD

Compare and contrast the relationships among organisms, including predation, parasitism, competition, commensalism, and mutualism.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.17.7^{FL}

High school · Life Science

STANDARD

Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.17.8^{FL}

High school · Life Science

STANDARD

Recognize the consequences of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive, non-native species.

MINI 4WD

Use a published account for the environmental effect the standard names. Club waste on the floor is not that system.

SC.912.L.17.9^{FL}

High school · Life Science

STANDARD

Use a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels.

MINI 4WD

List what the builder needs during one build, and what the standard says a living thing needs. The car does not eat or drink.

SC.912.L.17.10^{FL}

High school · Life Science

STANDARD

Diagram and explain the biogeochemical cycles of an ecosystem, including water, carbon, and nitrogen cycle.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.17.11 ^{FL}

High school · Life Science

STANDARD

Evaluate the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests.

MINI 4WD

Use a published account for the environmental effect the standard names. Club waste on the floor is not that system.

SC.912.L.17.12 ^{FL}

High school · Life Science

STANDARD

Discuss the political, social, and environmental consequences of sustainable use of land.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.17.13 ^{FL}

High school · Life Science

STANDARD

Discuss the need for adequate monitoring of environmental parameters when making policy decisions.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.17.14 ^{FL}

High school · Life Science

STANDARD

Assess the need for adequate waste management strategies.

MINI 4WD

Use a published account for the environmental effect the standard names. Club waste on the floor is not that system.

SC.912.L.17.15^{FL}

High school · Life Science

STANDARD

Discuss the effects of technology on environmental quality.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.17.16^{FL}

High school · Life Science

STANDARD

Discuss the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone depletion, and surface and groundwater pollution.

MINI 4WD

Use a published account for the environmental effect the standard names. Club waste on the floor is not that system.

SC.912.L.17.17^{FL}

High school · Life Science

STANDARD

Assess the effectiveness of innovative methods of protecting the environment.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.17.18^{FL}

High school · Life Science

STANDARD

Describe how human population size and resource use relate to environmental quality.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.17.19^{FL}

High school · Life Science

STANDARD

Describe how different natural resources are produced and how their rates of use and renewal limit availability.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.17.20^{FL}

High school · Life Science

STANDARD

Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.18.1^{FL}

High school · Life Science

STANDARD

Describe the basic molecular structures and primary functions of the four major categories of biological macromolecules.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.18.2^{FL}

High school · Life Science

STANDARD

Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.18.3 ^{FL}

High school · Life Science

STANDARD

Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.18.4 ^{FL}

High school · Life Science

STANDARD

Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.18.5 ^{FL}

High school · Life Science

STANDARD

Discuss the use of chemiosmotic gradients for ATP production in chloroplasts and mitochondria.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.18.6 ^{FL}

High school · Life Science

STANDARD

Discuss the role of anaerobic respiration in living things and in human society.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.18.7 ^{FL}

High school · Life Science

STANDARD

Identify the reactants, products, and basic functions of photosynthesis.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.18.8 ^{FL}

High school · Life Science

STANDARD

Identify the reactants, products, and basic functions of aerobic and anaerobic cellular respiration.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.18.9 ^{FL}

High school · Life Science

STANDARD

Explain the interrelated nature of photosynthesis and cellular respiration.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.18.10 ^{FL}

High school · Life Science

STANDARD

Connect the role of adenosine triphosphate (ATP) to energy transfers within a cell.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.18.11 ^{FL}

High school · Life Science

STANDARD

Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

SC.912.L.18.12 ^{FL}

High school · Life Science

STANDARD

Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent.

MINI 4WD

Use a published account for the living thing or the process the standard names. The car is a machine in the room, not that organism.

Grades 9–12 Engineering Design

42 standards

HS-ETS1-1 ^{NG, CA, MI, NJ, PA}

High school · Engineering Design

STANDARD

Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

MINI 4WD

Take a real challenge at the scale of the standard, such as safer used-cell handling for a whole region, and write qualitative and quantitative tests plus constraints. The club's jar of spent cells is the local specimen, not the whole challenge.

HS-ETS1-2 NG, CA, MI, NJ, PA

High school · Engineering Design

STANDARD

Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

MINI 4WD

Break “this car stays in the lane and finishes” into smaller problems: roller, mass, gear mesh, cell seat, body clearance. Solve them as separate engineering problems.

HS-ETS1-3 NG, CA, MI, NJ, PA

High school · Engineering Design

STANDARD

Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

MINI 4WD

Judge a proposed car or a proposed pit rule against cost, safety, whether it lasts, how it looks, and what it does to the people and the ground. Say which criterion you ranked first and what you gave up.

HS-ETS1-4 NG, CA, MI, NJ, PA

High school · Engineering Design

STANDARD

Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

MINI 4WD

Use a spreadsheet or a simple simulation of lap time against mass and gear ratio, with the limits written down, to see how one change moves the others. Measured times from the real car check the model.

3.4.9–12.H^{PA}

High school · Engineering Design

STANDARD

Design and evaluate solutions in which individuals and societies can promote stewardship in environmental quality and community well-being.

MINI 4WD

Design one club practice that cuts waste, such as a labeled cell-recycling step, and judge it by the well-being of the people who share the room.

Pennsylvania assigns this standard to grades 9–12, so it is printed in each high school section.

STS.1A^{TX}

High school · Engineering Design

STANDARD

Ask questions and define problems related to specialized topics of study based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

STS.1B^{TX}

High school · Engineering Design

STANDARD

Apply science practices related to specialized topics of study to plan and conduct investigations or use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

STS.1C^{TX}

High school · Engineering Design

STANDARD

Use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

STS.1D ^{TX}

High school · Engineering Design

STANDARD

Use tools appropriate to the specialized topic of study.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

STS.1E ^{TX}

High school · Engineering Design

STANDARD

Collect quantitative data using the International System of Units (SI) or qualitative data as evidence as appropriate to the specialized topic of study.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

STS.1F ^{TX}

High school · Engineering Design

STANDARD

Organize quantitative or qualitative data using representations appropriate to the specialized topic of study such as scatter plots, line graphs, bar graphs, charts, data tables, diagrams, scientific drawings, and student-prepared models.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

STS.1G ^{TX}

High school · Engineering Design

STANDARD

Develop and use models to represent phenomena, systems, processes, or solutions to problems as appropriate to the specialized topic of study.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

STS.1H ^{TX}

High school · Engineering Design

STANDARD

Distinguish among scientific hypotheses, theories, and laws as appropriate to the specialized topic of study.

MINI 4WD

Say which you are using: a guess about a run, a tested account, or a rule of the track.

STS.2A ^{TX}

High school · Engineering Design

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials as appropriate to the specialized topic of study.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

STS.2B ^{TX}

High school · Engineering Design

STANDARD

Analyze data appropriate to the specialized topic of study by identifying significant statistical features, patterns, sources of error, and limitations.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

STS.2C ^{TX}

High school · Engineering Design

STANDARD

Use mathematical calculations to assess quantitative relationships in data as appropriate to the specialized topic of study.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

STS.2D ^{TX}

High school · Engineering Design

STANDARD

Evaluate experimental or engineering designs as appropriate to the specialized topic of study.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

STS.3A ^{TX}

High school · Engineering Design

STANDARD

Develop explanations or propose solutions supported by data and models consistent with scientific ideas, principles, and theories as appropriate to the specialized topic of study.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

STS.3B ^{TX}

High school · Engineering Design

STANDARD

Communicate explanations or solutions individually and collaboratively in a variety of settings and formats as appropriate to the specialized topic of study.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

STS.3C ^{TX}

High school · Engineering Design

STANDARD

Engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence as appropriate to the specialized topic of study.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

STS.4A ^{TX}

High school · Engineering Design

STANDARD

Analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental or observational testing as appropriate to the specialized topic of study, so as to encourage critical thinking by the student.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

STS.4B ^{TX}

High school · Engineering Design

STANDARD

Relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as appropriate to the specialized topic of study.

MINI 4WD

Read one published case of a cost and a benefit. The cells are one small use, not that case.

STS.4C ^{TX}

High school · Engineering Design

STANDARD

Research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers as appropriate to the specialized topic of study.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

SC.912.N.1.1^{FL}

High school · Engineering Design

STANDARD

Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. pose questions about the natural world, 2. conduct systematic observations, 3. examine books and other sources of information to see what is already known, 4. review what is known in light of empirical evidence, 5. plan investigations, 6. use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), 7. pose answers, explanations, or descriptions of events, 8. generate explanations that explicate or describe natural phenomena (inferences), 9. use appropriate evidence and reasoning to justify these explanations to others, 10. communicate results of scientific investigations, and 11. evaluate the merits of the explanations produced by others.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.2^{FL}

High school · Engineering Design

STANDARD

Describe and explain what characterizes science and its methods.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.3^{FL}

High school · Engineering Design

STANDARD

Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.

MINI 4WD

State one claim about a run, and the evidence from that run.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.4^{FL}

High school · Engineering Design

STANDARD

Identify sources of information and assess their reliability according to the strict standards of scientific investigation.

MINI 4WD

Name the source of a claim about the car, and say why you trust that source.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.5^{FL}

High school · Engineering Design

STANDARD

Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.6^{FL}

High school · Engineering Design

STANDARD

Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.7^{FL}

High school · Engineering Design

STANDARD

Recognize the role of creativity in constructing scientific questions, methods and explanations.

MINI 4WD

Ask a new question about one run, then say what that question lets you see.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.1 ^{FL}

High school · Engineering Design

STANDARD

Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).

MINI 4WD

Name one question about the lane that a run can answer, and one question a run cannot.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.2 ^{FL}

High school · Engineering Design

STANDARD

Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.

MINI 4WD

Name one question about the lane that a run can answer, and one question a run cannot.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.3 ^{FL}

High school · Engineering Design

STANDARD

Identify examples of pseudoscience (such as astrology, phrenology) in society.

MINI 4WD

Name one cost and one benefit of a change you would make to the car, using the kinds of cost the standard names.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.4^{FL}

High school · Engineering Design

STANDARD

Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.

MINI 4WD

State one claim about a run, and the evidence from that run.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.5^{FL}

High school · Engineering Design

STANDARD

Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.1^{FL}

High school · Engineering Design

STANDARD

Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.2^{FL}

High school · Engineering Design

STANDARD

Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.3^{FL}

High school · Engineering Design

STANDARD

Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.4^{FL}

High school · Engineering Design

STANDARD

Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.5^{FL}

High school · Engineering Design

STANDARD

Describe the function of models in science, and identify the wide range of models used in science.

MINI 4WD

Point to the car and say which part of the standard the model is standing in for, and one way the model is not the whole thing.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.4.1 ^{FL}

High school · Engineering Design

STANDARD

Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.4.2 ^{FL}

High school · Engineering Design

STANDARD

Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.

MINI 4WD

Name one cost and one benefit of a change you would make to the car, using the kinds of cost the standard names.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

Grades 9–12 Earth and Space Science

361 standards

HS-ESS1-1 ^{NG, CA, MI, NJ}

High school · Earth and Space Science

STANDARD

Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation.

MINI 4WD

Model the sun's lifetime and fusion in the core, with radiation as what eventually reaches a panel or a leaf. The charged cell is downstream of that radiation only when the charger was fed by sunlight.

HS-ESS1-2 NG, CA, MI, NJ

High school · Earth and Space Science

STANDARD

Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.

MINI 4WD

Explain the Big Bang from spectra, galaxy motion, and composition, as published. Nothing on the car is that evidence.

HS-ESS1-3 NG, CA, MI, NJ, PA

High school · Earth and Space Science

STANDARD

Communicate scientific ideas about the way stars, over their life cycle, produce elements.

MINI 4WD

Communicate how stars make elements over their lives. The iron and copper in the car are atoms from that history. The car is the sample in your hand, not the star.

HS-ESS1-4 NG, CA, MI, NJ, PA

High school · Earth and Space Science

STANDARD

Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

MINI 4WD

Predict an orbit from a published mathematical model of the solar system. The car circling a banked turn is not an orbit. Gravity and a normal force from the track are why it does not fly off. Say that difference.

HS-ESS1-5 NG, CA, MI, NJ, PA

High school · Earth and Space Science

STANDARD

Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.

MINI 4WD

Evaluate plate-motion evidence and the ages of crustal rocks from published maps. The car has no crustal age.

HS-ESS1-6 NG, CA, MI, NJ, PA

High school · Earth and Space Science

STANDARD

Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.

MINI 4WD

Build the account of early Earth from ancient materials, meteorites, and other planetary surfaces. Plastic and metal in the car are later human materials.

HS-ESS2-1 NG, CA, MI, NJ, PA

High school · Earth and Space Science

STANDARD

Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and oceanfloor features.

MINI 4WD

Model a slow Earth process and a fast one, at their real scales, from the framework's examples. A single heat's scrape on a painted lane is a fast mark at car scale, useful only as the small end of a scale talk.

HS-ESS2-2 NG, CA

High school · Earth and Space Science

STANDARD

Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth's systems.

MINI 4WD

Use geoscience data to claim that one surface change sets off another. A car that cuts a groove, which then steers the next car, is a feedback on a toy surface. Label it as the toy, then do the Earth claim from the data.

HS-ESS2-3 NG, CA, MI, NJ, PA

High school · Earth and Space Science

STANDARD

Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.

MINI 4WD

Model Earth's interior and convection from evidence. The motor can warming the chassis is heat moving in a machine, not mantle convection.

HS-ESS2-4 NG, CA, MI, NJ, PA

High school · Earth and Space Science

STANDARD

Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

MINI 4WD

Model how more energy in than out changes climate. A car body warming in the sun until it warms the air in a closed box is a desk picture of energy in and temperature up, not a climate model.

HS-ESS2-5 NG, CA, MI, NJ, PA

High school · Earth and Space Science

STANDARD

Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

MINI 4WD

Investigate water on a slope of sand and on a slope of clay, the same pour, and record how the surface changes. That is the investigation. The lane is a reason you might care about the surface.

HS-ESS2-6 NG, CA, MI, NJ, PA

High school · Earth and Space Science

STANDARD

Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

MINI 4WD

Use a quantitative carbon-cycle model from a published source. Burning fuel to charge a room full of cells is a human carbon flow only if you cite the electricity source. Otherwise leave the number out.

HS-ESS2-7 NG, CA, MI, NJ, PA

High school · Earth and Space Science

STANDARD

Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.

MINI 4WD

Argue from evidence that Earth's systems and life changed together. The club and the cars are a recent human layer, not that deep history.

HS-ESS3-1 NG, CA, MI, PA

High school · Earth and Space Science

STANDARD

Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

MINI 4WD

Explain, from evidence, how resources, hazards, or climate have changed what people do. Name one way that reaches a race day: a hot region, a floodplain site, or where the plastic and metals come from.

HS-ESS3-1 NJ

High school · Earth and Space Science

STANDARD

Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

MINI 4WD

Explain, from a published account, how climate change has changed what people do. A hot region on the club's race calendar can be one local note. It is not that account.

HS-ESS3-2 NG, CA, MI, NJ, PA

High school · Earth and Space Science

STANDARD

Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

MINI 4WD

Evaluate two published ways of supplying energy or a mineral, on cost and benefit. The cells are one small use of that supply chain.

HS-ESS3-3 NG, CA, MI, NJ, PA

High school · Earth and Space Science

STANDARD

Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

MINI 4WD

A published simulation of resource use, population, and biodiversity is the tool. The club's consumption can be one discussion input. It is not the simulation.

HS-ESS3-4 ^{NG, CA, MI}

High school · Earth and Space Science

STANDARD

Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

MINI 4WD

Refine one technology that cuts harm, at a scale you can actually touch: a labeled cell-recycling step, or a tray that catches oil. Evaluate it against the standard's larger natural systems so you do not overclaim.

HS-ESS3-4 ^{NJ}

High school · Earth and Space Science

STANDARD

Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.

MINI 4WD

Refine one technology you can touch, such as a labeled cell-recycling step, and say how it relates to climate change and to the smaller system in the room. Do not claim the club step is the climate solution.

HS-ESS3-5 ^{NG, CA, MI, NJ, PA}

High school · Earth and Space Science

STANDARD

Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

MINI 4WD

Analyze published climate-model output and geoscience data for a rate and a future impact. One hot afternoon at the track is weather, not that forecast.

HS-ESS3-6 ^{NG, CA, MI, PA}

High school · Earth and Space Science

STANDARD

Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

MINI 4WD

Use a published computational picture of Earth systems changed by human activity. Add the hobby's waste only as a qualitative note unless you have a real quantity.

HS-ESS3-6 ^{NJ}

High school · Earth and Space Science

STANDARD

Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).

MINI 4WD

Use a published computational picture of Earth systems changed by human activity, and name climate change as the case this standard gives. The hobby's waste is a qualitative note unless you have a real quantity.

3.4.9–12.H ^{PA}

High school · Earth and Space Science

STANDARD

Design and evaluate solutions in which individuals and societies can promote stewardship in environmental quality and community well-being.

MINI 4WD

Design one club practice that cuts waste, such as a labeled cell-recycling step, and judge it by the well-being of the people who share the room.

Pennsylvania assigns this standard to grades 9–12, so it is printed in each high school section.

AST.1A ^{TX}

High school · Earth and Space Science

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

AST.iB^{TX}

High school · Earth and Space Science

STANDARD

Apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

AST.iC^{TX}

High school · Earth and Space Science

STANDARD

Use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

AST.iD^{TX}

High school · Earth and Space Science

STANDARD

Use appropriate tools such as gnomons; sundials; Planisphere; star charts; globe of the Earth; diffraction gratings; spectroscopes; color filters; lenses of multiple focal lengths; concave, plane, and convex mirrors; binoculars; telescopes; celestial sphere; online astronomical databases; and online access to observatories.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

AST.iE^{TX}

High school · Earth and Space Science

STANDARD

Collect quantitative data using the International System of Units (SI) and qualitative data as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

AST.iF^{TX}

High school · Earth and Space Science

STANDARD

Organize quantitative and qualitative data using graphs, charts, spreadsheets, and computer software.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

AST.iG^{TX}

High school · Earth and Space Science

STANDARD

Develop and use models to represent phenomena, systems, processes, or solutions to engineering problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

AST.iH^{TX}

High school · Earth and Space Science

STANDARD

Distinguish between scientific hypotheses, theories, and laws.

MINI 4WD

Say which you are using: a guess about a run, a tested account, or a rule of the track.

AST.2A^{TX}

High school · Earth and Space Science

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

AST.2B ^{TX}

High school · Earth and Space Science

STANDARD

Analyze data by identifying significant statistical features, patterns, sources of error, and limitations.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

AST.2C ^{TX}

High school · Earth and Space Science

STANDARD

Use mathematical calculations to assess quantitative relationships in data.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

AST.2D ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate experimental and engineering designs.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

AST.3A ^{TX}

High school · Earth and Space Science

STANDARD

Develop explanations and propose solutions supported by data and models consistent with scientific ideas, principles, and theories.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

AST.3B ^{TX}

High school · Earth and Space Science

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

AST.3C ^{TX}

High school · Earth and Space Science

STANDARD

Engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

AST.4A ^{TX}

High school · Earth and Space Science

STANDARD

Analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

AST.4B ^{TX}

High school · Earth and Space Science

STANDARD

Relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content.

MINI 4WD

Read one published case of a cost and a benefit. The cells are one small use, not that case.

AST.4C^{TX}

High school · Earth and Space Science

STANDARD

Research and explore resources such as museums, planetariums, observatories, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

AST.5A^{TX}

High school · Earth and Space Science

STANDARD

Evaluate and communicate how ancient civilizations developed models of the universe using astronomical structures, instruments, and tools such as the astrolabe, gnomons, and charts and how those models influenced society, time keeping, and navigation.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.5B^{TX}

High school · Earth and Space Science

STANDARD

Research and evaluate the contributions of scientists, including Ptolemy, Copernicus, Tycho Brahe, Kepler, Galileo, and Newton, as astronomy progressed from a geocentric model to a heliocentric model.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.5C^{TX}

High school · Earth and Space Science

STANDARD

Describe and explain the historical origins of the perceived patterns of constellations and the role of constellations in ancient and modern navigation.

MINI 4WD

Name a pattern in three runs, such as the car leaving the lane at the same corner.

AST.6A ^{TX}

High school · Earth and Space Science

STANDARD

Observe, record, and analyze the apparent movement of the Sun, Moon, and stars and predict sunrise and sunset.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.6B ^{TX}

High school · Earth and Space Science

STANDARD

Observe the movement of planets throughout the year and measure how their positions change relative to the constellations.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.6C ^{TX}

High school · Earth and Space Science

STANDARD

Identify constellations such as Ursa Major, Ursa Minor, Orion, Cassiopeia, and constellations along the ecliptic and describe their importance.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.6D ^{TX}

High school · Earth and Space Science

STANDARD

Understand the difference between astronomy and astrology, the reasons for their historical conflation, and their eventual separation.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.7A ^{TX}

High school · Earth and Space Science

STANDARD

Demonstrate the use of units of measurement in astronomy, including astronomical units and light years, minutes, and seconds.

MINI 4WD

Shine a lamp on the car, then block it. Say what the light does and where the shadow falls.

AST.7B ^{TX}

High school · Earth and Space Science

STANDARD

Model the scale, size, and distances of the Sun, Earth, and Moon system and identify the limitations of physical models.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.7C ^{TX}

High school · Earth and Space Science

STANDARD

Model the scale, sizes, and distances of the Sun and the planets in our solar system and identify the limitations of physical models.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.8A ^{TX}

High school · Earth and Space Science

STANDARD

Model how the orbit and relative position of the Moon cause lunar phases and predict the timing of moonrise and moonset during each phase.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.8B ^{TX}

High school · Earth and Space Science

STANDARD

Model how the orbit and relative position of the Moon cause lunar and solar eclipses.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.8C ^{TX}

High school · Earth and Space Science

STANDARD

Examine and investigate the dynamics of tides using the Sun, Earth, and Moon model.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.9A ^{TX}

High school · Earth and Space Science

STANDARD

Examine the relationship of a planet's axial tilt to its potential seasons.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

AST.9B ^{TX}

High school · Earth and Space Science

STANDARD

Predict how changing latitudinal position affects the length of day and night throughout a planet's orbital year.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.9C^{TX}

High school · Earth and Space Science

STANDARD

Investigate the relationship between a planet's axial tilt, angle of incidence of sunlight, and concentration of solar energy.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.9D^{TX}

High school · Earth and Space Science

STANDARD

Explain the significance of Earth's solstices and equinoxes.

MINI 4WD

Use a published account for the climate or the daylight pattern. One hot afternoon at the track is weather, not that account.

AST.10A^{TX}

High school · Earth and Space Science

STANDARD

Investigate the use of black body radiation curves and emission, absorption, and continuous spectra in the identification and classification of celestial objects.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.10B^{TX}

High school · Earth and Space Science

STANDARD

Calculate the relative light-gathering power of different-sized telescopes to compare telescopes for different applications.

MINI 4WD

Shine a lamp on the car, then block it. Say what the light does and where the shadow falls.

AST.10C^{TX}

High school · Earth and Space Science

STANDARD

Analyze the importance and limitations of optical, infrared, and radio telescopes, gravitational wave detectors, and other ground-based technology.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

AST.10D^{TX}

High school · Earth and Space Science

STANDARD

Analyze the importance and limitations of space telescopes in the collection of astronomical data across the electromagnetic spectrum.

MINI 4WD

Look at the sky with the tool you have. The car is the object the tool was not made for.

AST.11A^{TX}

High school · Earth and Space Science

STANDARD

Relate Newton's law of universal gravitation and Kepler's laws of planetary motion to the formation and motion of the planets and their satellites.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.11B^{TX}

High school · Earth and Space Science

STANDARD

Explore and communicate the origins and significance of planets, planetary rings, satellites, asteroids, comets, Oort cloud, and Kuiper belt objects.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.11C ^{TX}

High school · Earth and Space Science

STANDARD

Compare the planets in terms of orbit, size, composition, rotation, atmosphere, natural satellites, magnetic fields, and geological activity.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.11D ^{TX}

High school · Earth and Space Science

STANDARD

Compare the factors essential to life on Earth such as temperature, water, gases, and gravitational and magnetic fields to conditions on other planets and their satellites.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.12A ^{TX}

High school · Earth and Space Science

STANDARD

Identify the approximate mass, size, motion, temperature, structure, and composition of the Sun.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

AST.12B ^{TX}

High school · Earth and Space Science

STANDARD

Distinguish between nuclear fusion and nuclear fission and identify the source of energy within the Sun as nuclear fusion of hydrogen to helium.

MINI 4WD

Use a published table or example for the atom the standard names. Do not open a cell and call it that.

AST.I2C^{TX}

High school · Earth and Space Science

STANDARD

Describe the eleven-year solar cycle and the significance of sunspots.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.I2D^{TX}

High school · Earth and Space Science

STANDARD

Analyze the origins and effects of space weather, including the solar wind, coronal mass ejections, prominences, flares, and sunspots.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

AST.I3A^{TX}

High school · Earth and Space Science

STANDARD

Identify the characteristics of main sequence stars, including surface temperature, age, relative size, and composition.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.I3B^{TX}

High school · Earth and Space Science

STANDARD

Describe and communicate star formation from nebulae to protostars to the development of main sequence stars.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.I3C^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the relationship between mass and fusion on stellar evolution.

MINI 4WD

Use a published table or example for the atom the standard names. Do not open a cell and call it that.

AST.I3D^{TX}

High school · Earth and Space Science

STANDARD

Compare how the mass of a main sequence star will determine its end state as a white dwarf, neutron star, or black hole.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.I3E^{TX}

High school · Earth and Space Science

STANDARD

Describe the use of spectroscopy in obtaining physical data on celestial objects such as temperature, chemical composition, and relative motion.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

AST.I3F^{TX}

High school · Earth and Space Science

STANDARD

Use the Hertzsprung-Russell diagram to classify stars and plot and examine the life cycle of stars from birth to death.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.I3G^{TX}

High school · Earth and Space Science

STANDARD

Illustrate how astronomers use geometric parallax to determine stellar distances and intrinsic luminosities.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.I3H^{TX}

High school · Earth and Space Science

STANDARD

Describe how stellar distances are determined by comparing apparent brightness and intrinsic luminosity when using spectroscopic parallax and the Leavitt relation for variable stars.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.I4A^{TX}

High school · Earth and Space Science

STANDARD

Illustrate the structure and components of our Milky Way galaxy and model the size, location, and movement of our solar system within it.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.I4B^{TX}

High school · Earth and Space Science

STANDARD

Compare spiral, elliptical, irregular, dwarf, and active galaxies.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.I4C^{TX}

High school · Earth and Space Science

STANDARD

Develop and use models to explain how galactic evolution occurs through mergers and collisions.

MINI 4WD

Draw the car and the lane, and name one thing the drawing leaves out.

AST.I4D^{TX}

High school · Earth and Space Science

STANDARD

Describe the Local Group and its relation to larger-scale structures in the universe.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.I4E^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the indirect evidence for the existence of dark matter.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.I5A^{TX}

High school · Earth and Space Science

STANDARD

Describe and evaluate the historical development of evidence supporting the Big Bang Theory.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.I5B^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the limits of observational astronomy methods used to formulate the distance ladder.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

AST.I5C^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the indirect evidence for the existence of dark energy.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

AST.I5D^{TX}

High school · Earth and Space Science

STANDARD

Describe the current scientific understanding of the evolution of the universe, including estimates for the age of the universe.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.I5E^{TX}

High school · Earth and Space Science

STANDARD

Describe current scientific hypotheses about the fate of the universe, including open and closed universes.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.I6A ^{TX}

High school · Earth and Space Science

STANDARD

Describe and communicate the historical development of human space flight and its challenges.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.I6B ^{TX}

High school · Earth and Space Science

STANDARD

Describe and communicate the uses and challenges of robotic space flight.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.I6C ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the evidence of the existence of habitable zones and potentially habitable planetary bodies in extrasolar planetary systems.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.I6D ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the impact on astronomy from light pollution, radio interference, and space debris.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

AST.I6E ^{TX}

High school · Earth and Space Science

STANDARD

Examine and describe current developments and discoveries in astronomy.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

AST.I6F ^{TX}

High school · Earth and Space Science

STANDARD

Explore and explain careers that involve astronomy, space exploration, and the technologies developed through them.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

ESS.IA ^{TX}

High school · Earth and Space Science

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

ESS.IB ^{TX}

High school · Earth and Space Science

STANDARD

Apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

ESS.iC ^{TX}

High school · Earth and Space Science

STANDARD

Use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

ESS.iD ^{TX}

High school · Earth and Space Science

STANDARD

Use appropriate tools such as a drawing compass, magnetic compass, bar magnets, topographical and geological maps, satellite imagery and other remote sensing data, Geographic Information Systems (GIS), Global Positioning System (GPS), hand lenses, and fossil and rock sample kits.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

ESS.iE ^{TX}

High school · Earth and Space Science

STANDARD

Collect quantitative data using the International System of Units (SI) and qualitative data as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

ESS.iF ^{TX}

High school · Earth and Space Science

STANDARD

Organize quantitative and qualitative data using scatter plots, line graphs, bar graphs, charts, data tables, digital tools, diagrams, scientific drawings, and student-prepared models.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

ESS.1G^{TX}

High school · Earth and Space Science

STANDARD

Develop and use models to represent phenomena, systems, processes, or solutions to engineering problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

ESS.1H^{TX}

High school · Earth and Space Science

STANDARD

Distinguish between scientific hypotheses, theories, and laws.

MINI 4WD

Say which you are using: a guess about a run, a tested account, or a rule of the track.

ESS.2A^{TX}

High school · Earth and Space Science

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

ESS.2B^{TX}

High school · Earth and Space Science

STANDARD

Analyze data by identifying significant statistical features, patterns, sources of error, and limitations.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

ESS.2C ^{TX}

High school · Earth and Space Science

STANDARD

Use mathematical calculations to assess quantitative relationships in data.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

ESS.2D ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate experimental and engineering designs.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

ESS.3A ^{TX}

High school · Earth and Space Science

STANDARD

Develop explanations and propose solutions supported by data and models consistent with scientific ideas, principles, and theories.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

ESS.3B ^{TX}

High school · Earth and Space Science

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

ESS.3C ^{TX}

High school · Earth and Space Science

STANDARD

Engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

ESS.4A ^{TX}

High school · Earth and Space Science

STANDARD

Analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

ESS.4B ^{TX}

High school · Earth and Space Science

STANDARD

Relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content.

MINI 4WD

Read one published case of a cost and a benefit. The cells are one small use, not that case.

ESS.4C ^{TX}

High school · Earth and Space Science

STANDARD

Research and explore resources such as museums, planetariums, observatories, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

ESS.5A ^{TX}

High school · Earth and Space Science

STANDARD

Analyze how gravitational condensation of solar nebular gas and dust can lead to the accretion of planetesimals and protoplanets.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

ESS.5B ^{TX}

High school · Earth and Space Science

STANDARD

Identify comets, asteroids, meteoroids, and planets in the solar system and describe how they affect the Earth and Earth's systems.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

ESS.5C ^{TX}

High school · Earth and Space Science

STANDARD

Explore the historical and current hypotheses for the origin of the Moon, including the collision of Earth with a Mars-sized planetesimal.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

ESS.6A ^{TX}

High school · Earth and Space Science

STANDARD

Describe how impact accretion, gravitational compression, radioactive decay, and cooling differentiated proto-Earth into layers.

MINI 4WD

Compare a motor can after a run with a part left in the shade. Name the heat move you mean. Do not open a cell.

ESS.6B ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the roles of volcanic outgassing and water-bearing comets in developing Earth's atmosphere and hydrosphere.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

ESS.6C ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the evidence for changes to the chemical composition of Earth's atmosphere prior to the introduction of oxygen.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

ESS.6D ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate scientific hypotheses for the origin of life through abiotic chemical processes.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

ESS.6E ^{TX}

High school · Earth and Space Science

STANDARD

Describe how the production of oxygen by photosynthesis affected the development of the atmosphere, hydrosphere, geosphere, and biosphere.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ESS.7A ^{TX}

High school · Earth and Space Science

STANDARD

Describe the development of multiple radiometric dating methods and analyze their precision, reliability, and limitations in calculating the ages of igneous rocks from Earth, the Moon, and meteorites.

MINI 4WD

Use a published figure for the sky the standard names. The car on the table is not in that figure.

ESS.7B ^{TX}

High school · Earth and Space Science

STANDARD

Apply relative dating methods, principles of stratigraphy, and index fossils to determine the chronological order of rock layers.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ESS.7C ^{TX}

High school · Earth and Space Science

STANDARD

Construct a model of the geological time scale using relative and absolute dating methods to represent Earth's approximate 4.6-billion-year history.

MINI 4WD

Use a published account of the land or the harm the standard names. The club's waste is a local note beside it.

ESS.7D ^{TX}

High school · Earth and Space Science

STANDARD

Explain how sedimentation, fossilization, and speciation affect the degree of completeness of the fossil record.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ESS.7E^{TX}

High school · Earth and Space Science

STANDARD

Describe how evidence of biozones and faunal succession in rock layers reveal information about the environment at the time those rocks were deposited and the dynamic nature of the Earth.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

ESS.7F^{TX}

High school · Earth and Space Science

STANDARD

Analyze data from rock and fossil succession to evaluate the evidence for and significance of mass extinctions, major climatic changes, and tectonic events.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ESS.8A^{TX}

High school · Earth and Space Science

STANDARD

Evaluate heat transfer through Earth's systems by convection and conduction and include its role in plate tectonics and volcanism.

MINI 4WD

Compare a motor can after a run with a part left in the shade. Name the heat move you mean. Do not open a cell.

ESS.8B^{TX}

High school · Earth and Space Science

STANDARD

Develop a model of the physical, mechanical, and chemical composition of Earth's layers using evidence from Earth's magnetic field, the composition of meteorites, and seismic waves.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

ESS.8C ^{TX}

High school · Earth and Space Science

STANDARD

Investigate how new conceptual interpretations of data and innovative geophysical technologies led to the current theory of plate tectonics.

MINI 4WD

Use a published account of the land or the harm the standard names. The club's waste is a local note beside it.

ESS.8D ^{TX}

High school · Earth and Space Science

STANDARD

Describe how heat and rock composition affect density within Earth's interior and how density influences the development and motion of Earth's tectonic plates.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

ESS.8E ^{TX}

High school · Earth and Space Science

STANDARD

Explain how plate tectonics accounts for geologic processes, including sea floor spreading and subduction, and features, including ocean ridges, rift valleys, earthquakes, volcanoes, mountain ranges, hot spots, and hydrothermal vents.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

ESS.8F ^{TX}

High school · Earth and Space Science

STANDARD

Calculate the motion history of tectonic plates using equations relating rate, time, and distance to predict future motions, locations, and resulting geologic features.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

ESS.8G ^{TX}

High school · Earth and Space Science

STANDARD

Distinguish the location, type, and relative motion of convergent, divergent, and transform plate boundaries using evidence from the distribution of earthquakes and volcanoes.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

ESS.8H ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the role of plate tectonics with respect to long-term global changes in Earth's subsystems such as continental buildup, glaciation, sea level fluctuations, mass extinctions, and climate change.

MINI 4WD

Use a published account for the climate or the daylight pattern. One hot afternoon at the track is weather, not that account.

ESS.9A ^{TX}

High school · Earth and Space Science

STANDARD

Interpret Earth surface features using a variety of methods such as satellite imagery, aerial photography, and topographic and geologic maps using appropriate technologies.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

ESS.9B ^{TX}

High school · Earth and Space Science

STANDARD

Investigate and model how surface water and ground water change the lithosphere through chemical and physical weathering and how they serve as valuable natural resources.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

ESS.9C ^{TX}

High school · Earth and Space Science

STANDARD

Model the processes of mass wasting, erosion, and deposition by water, wind, ice, glaciation, gravity, and volcanism in constantly reshaping Earth's surface.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

ESS.9D ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate how weather and human activity affect the location, quality, and supply of available freshwater resources.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

ESS.10A ^{TX}

High school · Earth and Space Science

STANDARD

Describe how the composition and structure of the oceans leads to thermohaline circulation and its periodicity.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

ESS.10B ^{TX}

High school · Earth and Space Science

STANDARD

Model and explain how changes to the composition, structure, and circulation of deep oceans affect thermohaline circulation using data on energy flow, ocean basin structure, and changes in polar ice caps and glaciers.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

ESS.10C^{TX}

High school · Earth and Space Science

STANDARD

Analyze how global surface ocean circulation is the result of wind, tides, the Coriolis effect, water density differences, and the shape of the ocean basins.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

ESS.11A^{TX}

High school · Earth and Space Science

STANDARD

Analyze how energy transfer through Milankovitch cycles, albedo, and differences in atmospheric and surface absorption are mechanisms of climate.

MINI 4WD

Use a published account for the climate or the daylight pattern. One hot afternoon at the track is weather, not that account.

ESS.11B^{TX}

High school · Earth and Space Science

STANDARD

Describe how Earth's atmosphere is chemically and thermally stratified and how solar radiation interacts with the layers to cause the ozone layer, the jet stream, Hadley and Ferrel cells, and other atmospheric phenomena.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ESS.11C^{TX}

High school · Earth and Space Science

STANDARD

Model how greenhouse gases trap thermal energy near Earth's surface.

MINI 4WD

Use a published account for the climate or the daylight pattern. One hot afternoon at the track is weather, not that account.

ESS.II.D ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate how the combination of multiple feedback loops alter global climate.

MINI 4WD

Use a published account for the climate or the daylight pattern. One hot afternoon at the track is weather, not that account.

ESS.II.E ^{TX}

High school · Earth and Space Science

STANDARD

Investigate and analyze evidence for climate changes over Earth's history using paleoclimate data, historical records, and measured greenhouse gas levels.

MINI 4WD

Use a published account for the climate or the daylight pattern. One hot afternoon at the track is weather, not that account.

ESS.II.F ^{TX}

High school · Earth and Space Science

STANDARD

Explain how the transfer of thermal energy among the hydrosphere, lithosphere, and atmosphere influences weather.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

ESS.II.G ^{TX}

High school · Earth and Space Science

STANDARD

Describe how changing surface-ocean conditions, including El Niño-Southern Oscillation, affect global weather and climate patterns.

MINI 4WD

Use a published account for the climate or the daylight pattern. One hot afternoon at the track is weather, not that account.

ESS.I2A ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the impact on humans of natural changes in Earth's systems such as earthquakes, tsunamis, and volcanic eruptions.

MINI 4WD

Use a published account of one fast change of the land. A car hitting a clay bank is a mark from today.

ESS.I2B ^{TX}

High school · Earth and Space Science

STANDARD

Analyze the impact on humans of naturally occurring extreme weather events such as flooding, hurricanes, tornadoes, and thunderstorms.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

ESS.I2C ^{TX}

High school · Earth and Space Science

STANDARD

Analyze the natural and anthropogenic factors that affect the severity and frequency of extreme weather events and the hazards associated with these events.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

ESS.I2D ^{TX}

High school · Earth and Space Science

STANDARD

Analyze recent global ocean temperature data to predict the consequences of changing ocean temperature on evaporation, sea level, algal growth, coral bleaching, and biodiversity.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ESS.I2E^{TX}

High school · Earth and Space Science

STANDARD

Predict how human use of Texas's naturally occurring resources such as fossil fuels, minerals, soil, solar energy, and wind energy directly and indirectly changes the cycling of matter and energy through Earth's systems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ESS.I2F^{TX}

High school · Earth and Space Science

STANDARD

Explain the cycling of carbon through different forms among Earth's systems and how biological processes have caused major changes to the carbon cycle in those systems over Earth's history.

MINI 4WD

Trace carbon through a published cycle. A plastic body is one small store of that carbon, not the cycle.

ESS.I3A^{TX}

High school · Earth and Space Science

STANDARD

Analyze the policies related to resources from discovery to disposal, including economics, health, technological advances, resource type, concentration and location, waste disposal and recycling, mitigation efforts, and environmental impacts.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

ESS.I3B^{TX}

High school · Earth and Space Science

STANDARD

Explore global and Texas-based careers that involve the exploration, extraction, production, use, disposal, regulation, and protection of Earth's resources.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

ENV.1A ^{TX}

High school · Earth and Space Science

STANDARD

Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

ENV.1B ^{TX}

High school · Earth and Space Science

STANDARD

Apply scientific practices to plan and conduct descriptive, comparative, and experimental investigations and use engineering practices to design solutions to problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

ENV.1C ^{TX}

High school · Earth and Space Science

STANDARD

Use appropriate safety equipment and practices during laboratory, classroom, and field investigations as outlined in Texas Education Agency-approved safety standards.

MINI 4WD

Name the eye protection and the hot rule before a lamp or a hot plate is turned on. The motor stays closed.

ENV.1D^{TX}

High school · Earth and Space Science

STANDARD

Use appropriate tools such as meter sticks, metric rulers, pipettes, graduated cylinders, standard laboratory glassware, balances, timing devices, pH meters or probes, various data collecting probes, thermometers, calculators, computers, internet access, turbidity testing devices, hand magnifiers, work and disposable gloves, compasses, first aid kits, binoculars, field guides, water quality test kits or probes, soil test kits or probes, 30 meter tape measures, tarps, shovels, trowels, screens, buckets, rock and mineral samples equipment, air quality testing devices, cameras, flow meters, Global Positioning System (GPS) units, Geographic Information System (GIS) software, computer models, densimeters, spectrophotometers, stereomicroscopes, compound microscopes, clinometers, field journals, various prepared slides, hand lenses, hot plates, Petri dishes, sampling nets, waders, leveling grade rods (Jason sticks), protractors, inclination and height distance calculators, samples of biological specimens or structures, core sampling equipment, and kick nets.

MINI 4WD

Pick two tools from that list you would use at the track, and say what each one measures or holds.

ENV.1E^{TX}

High school · Earth and Space Science

STANDARD

Collect quantitative data using the International System of Units (SI) and qualitative data as evidence.

MINI 4WD

Record one measurement from a run and one thing you only saw. Both count as evidence.

ENV.1F^{TX}

High school · Earth and Space Science

STANDARD

Organize quantitative and qualitative data using probeware, spreadsheets, lab notebooks or journals, models, diagrams, graphs paper, computers, or cellphone applications.

MINI 4WD

Put the times or marks from one race day into a table or a simple graph.

ENV.1G^{TX}

High school · Earth and Space Science

STANDARD

Develop and use models to represent phenomena, systems, processes, or solutions to engineering problems.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

ENV.1H^{TX}

High school · Earth and Space Science

STANDARD

Distinguish between scientific hypotheses, theories, and laws.

MINI 4WD

Say which you are using: a guess about a run, a tested account, or a rule of the track.

ENV.2A^{TX}

High school · Earth and Space Science

STANDARD

Identify advantages and limitations of models such as their size, scale, properties, and materials.

MINI 4WD

Say one thing a sketch of the car gets right and one thing it cannot show.

ENV.2B^{TX}

High school · Earth and Space Science

STANDARD

Analyze data by identifying significant statistical features, patterns, sources of error, and limitations.

MINI 4WD

From three runs of the same car, name the pattern and the one run that broke it.

ENV.2C ^{TX}

High school · Earth and Space Science

STANDARD

Use mathematical calculations to assess quantitative relationships in data.

MINI 4WD

Use the numbers the standard asks for. A single run is one measurement, not the whole calculation.

ENV.2D ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate experimental and engineering designs.

MINI 4WD

Run one part fitted and then removed. Say whether it did the job.

ENV.3A ^{TX}

High school · Earth and Space Science

STANDARD

Develop explanations and propose solutions supported by data and models consistent with scientific ideas, principles, and theories.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

ENV.3B ^{TX}

High school · Earth and Space Science

STANDARD

Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

ENV.3C ^{TX}

High school · Earth and Space Science

STANDARD

Engage respectfully in scientific argumentation using applied scientific explanations and empirical evidence.

MINI 4WD

Hear another builder's account of a run and name the evidence in it.

ENV.4A ^{TX}

High school · Earth and Space Science

STANDARD

Analyze, evaluate, and critique scientific explanations and solutions by using empirical evidence, logical reasoning, and experimental and observational testing, so as to encourage critical thinking by the student.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

ENV.4B ^{TX}

High school · Earth and Space Science

STANDARD

Relate the impact of past and current research on scientific thought and society, including research methodology, cost-benefit analysis, and contributions of diverse scientists as related to the content.

MINI 4WD

Read one published case of a cost and a benefit. The cells are one small use, not that case.

ENV.4C ^{TX}

High school · Earth and Space Science

STANDARD

Research and explore resources such as museums, planetariums, observatories, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field in order to investigate STEM careers.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

ENV.5A ^{TX}

High school · Earth and Space Science

STANDARD

Identify native plants and animals within a local ecosystem and compare their roles to those of plants and animals in other biomes, including aquatic, grassland, forest, desert, and tundra.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.5B ^{TX}

High school · Earth and Space Science

STANDARD

Explain the cycling of water, phosphorus, carbon, silicon, and nitrogen through ecosystems, including sinks, and the human interactions that alter these cycles using tools such as models.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.5C ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the effects of fluctuations in abiotic factors on local ecosystems and local biomes.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.5D ^{TX}

High school · Earth and Space Science

STANDARD

Measure the concentration of dissolved substances such as dissolved oxygen, chlorides, and nitrates and describe their impacts on an ecosystem.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.5E^{TX}

High school · Earth and Space Science

STANDARD

Use models to predict how the introduction of an invasive species may alter the food chain and affect existing populations in an ecosystem.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.5F^{TX}

High school · Earth and Space Science

STANDARD

Use models to predict how species extinction may alter the food chain and affect existing populations in an ecosystem.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.5G^{TX}

High school · Earth and Space Science

STANDARD

Predict changes that may occur in an ecosystem if genetic diversity is increased or decreased.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.6A^{TX}

High school · Earth and Space Science

STANDARD

Compare and contrast land use and management methods and how they affect land attributes such as fertility, productivity, economic value, and ecological stability.

MINI 4WD

Use a published account of the land or the harm the standard names. The club's waste is a local note beside it.

ENV.6B ^{TX}

High school · Earth and Space Science

STANDARD

Relate how water sources, management, and conservation affect water uses and quality.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

ENV.6C ^{TX}

High school · Earth and Space Science

STANDARD

Document the use and conservation of both renewable and non-renewable resources as they pertain to sustainability.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

ENV.6D ^{TX}

High school · Earth and Space Science

STANDARD

Identify how changes in limiting resources such as water, food, and energy affect local ecosystems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.6E ^{TX}

High school · Earth and Space Science

STANDARD

Analyze and evaluate the economic significance and interdependence of resources within the local environmental system.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

ENV.6F ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the impact of waste management methods such as reduction, reuse, recycling, upcycling, and composting on resource availability in the local environment.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

ENV.7A ^{TX}

High school · Earth and Space Science

STANDARD

Describe the interactions between the components of the geosphere, hydrosphere, cryosphere, atmosphere, and biosphere.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

ENV.7B ^{TX}

High school · Earth and Space Science

STANDARD

Relate biogeochemical cycles to the flow of energy in ecosystems, including energy sinks such as oil, natural gas, and coal deposits.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.7C ^{TX}

High school · Earth and Space Science

STANDARD

Explain the flow of heat energy in an ecosystem, including conduction, convection, and radiation.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.7D ^{TX}

High school · Earth and Space Science

STANDARD

Identify and describe how energy is used, transformed, and conserved as it flows through ecosystems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.8A ^{TX}

High school · Earth and Space Science

STANDARD

Compare exponential and logistical population growth using graphical representations.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.8B ^{TX}

High school · Earth and Space Science

STANDARD

Identify factors that may alter carrying capacity such as disease; natural disaster; available food, water, and livable space; habitat fragmentation; and periodic changes in weather.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

ENV.8C ^{TX}

High school · Earth and Space Science

STANDARD

Calculate changes in population size in ecosystems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.8D ^{TX}

High school · Earth and Space Science

STANDARD

Analyze and make predictions about the impact on populations of geographic locales due to diseases, birth and death rates, urbanization, and natural events such as migration and seasonal changes.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.9A ^{TX}

High school · Earth and Space Science

STANDARD

Analyze and describe how natural events such as tectonic movement, volcanic events, fires, tornadoes, hurricanes, flooding, and tsunamis affect natural populations.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.9B ^{TX}

High school · Earth and Space Science

STANDARD

Explain how regional changes in the environment may have global effects.

MINI 4WD

Use a published account of the land or the harm the standard names. The club's waste is a local note beside it.

ENV.9C ^{TX}

High school · Earth and Space Science

STANDARD

Examine how natural processes such as succession and feedback loops can restore habitats and ecosystems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.9D^{TX}

High school · Earth and Space Science

STANDARD

Describe how temperature inversions have short-term and long-term effects, including El Niño and La Niña oscillations, ice cap and glacial melting, and changes in ocean surface temperatures.

MINI 4WD

Record the weather the standard names from a published account or from race days. A puddle on the track is the small case.

ENV.9E^{TX}

High school · Earth and Space Science

STANDARD

Analyze the impact of natural global climate change on ice caps, glaciers, ocean currents, and surface temperatures.

MINI 4WD

Use a published account for the climate or the daylight pattern. One hot afternoon at the track is weather, not that account.

ENV.10A^{TX}

High school · Earth and Space Science

STANDARD

Identify sources of emissions in air, soil, and water, including point and nonpoint sources.

MINI 4WD

Use a published picture of the rock, soil, or interior the standard names. A dent in the track clay is a mark from today.

ENV.10B^{TX}

High school · Earth and Space Science

STANDARD

Distinguish how an emission becomes a pollutant based on its concentration, toxicity, reactivity, and location within the environment.

MINI 4WD

Use a published table or a teacher's setup for this. The car is not the substance, and a cell stays closed.

ENV.10C ^{TX}

High school · Earth and Space Science

STANDARD

Investigate the effects of pollutants such as chlorofluorocarbons, greenhouse gases, pesticide runoff, nuclear waste, aerosols, metallic ions, and heavy metals, as well as thermal, light, and noise pollution.

MINI 4WD

Use a published table or example for the atom the standard names. Do not open a cell and call it that.

ENV.10D ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate indicators of air, soil, and water quality against regulatory standards to determine the health of an ecosystem.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.10E ^{TX}

High school · Earth and Space Science

STANDARD

Distinguish between the causes and effects of global warming and ozone depletion, including the causes, the chemicals involved, the atmospheric layer, the environmental effects, the human health effects, and the relevant wavelengths on the electromagnetic spectrum (IR and UV).

MINI 4WD

Use a published spectrum or account. The color of the body is not that spectrum.

ENV.11A ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the negative effects of human activities on the environment, including overhunting, overfishing, ecotourism, all-terrain vehicles, and personal watercraft.

MINI 4WD

Use a published account of the land or the harm the standard names. The club's waste is a local note beside it.

ENV.II.B ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the positive effects of human activities on the environment, including habitat restoration projects, species preservation efforts, nature conservancy groups, game and wildlife management, and ecotourism.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.II.C ^{TX}

High school · Earth and Space Science

STANDARD

Research the advantages and disadvantages of "going green" such as organic gardening and farming, natural methods of pest control, hydroponics, xeriscaping, energy-efficient homes and appliances, and hybrid cars.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

ENV.I2.A ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate cost-benefit trade-offs of commercial activities such as municipal development, food production, deforestation, over-harvesting, mining, and use of renewable and non-renewable energy sources.

MINI 4WD

Use the car for the motion or the energy you can point at: a push, a roll, or the motor. Say which one you mean.

ENV.I2B ^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the economic impacts of individual actions on the environment such as overbuilding, habitat destruction, poaching, and improper waste disposal.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

ENV.I2C ^{TX}

High school · Earth and Space Science

STANDARD

Analyze how ethical beliefs influence environmental scientific and engineering practices such as methods for food production, water distribution, energy production, and the extraction of minerals.

MINI 4WD

Use the water the standard names. A bottle at the pit is a small sample. The cells are not a store of that water.

ENV.I2D ^{TX}

High school · Earth and Space Science

STANDARD

Discuss the impact of research and technology on social ethics and legal practices in situations such as the design of new buildings, recycling, or emission standards.

MINI 4WD

Name one club habit you can hold, such as a used cell set aside, and keep it beside the larger case the standard names.

ENV.I2E ^{TX}

High school · Earth and Space Science

STANDARD

Argue from evidence whether or not a healthy economy and a healthy environment are mutually exclusive.

MINI 4WD

Use a published account of the land or the harm the standard names. The club's waste is a local note beside it.

ENV.13A^{TX}

High school · Earth and Space Science

STANDARD

Describe past and present state and national legislation, including Texas automobile emissions regulations, the National Park Service Act, the Clean Air Act, the Clean Water Act, the Soil and Water Resources Conservation Act, and the Endangered Species Act.

MINI 4WD

Read one of those laws in a published account, including the Texas emissions rule if you use it. A car's exhaust is not that statute.

ENV.13B^{TX}

High school · Earth and Space Science

STANDARD

Evaluate the goals and effectiveness of past and present international agreements such as the environmental Antarctic Treaty System, the Montreal Protocol, the Kyoto Protocol, and the Paris Climate Accord.

MINI 4WD

Use a published account for the climate or the daylight pattern. One hot afternoon at the track is weather, not that account.

ENV.ES.1^{OH}

High school · Earth and Space Science

STANDARD

Biosphere. Evolution and adaptation in populations. Biodiversity. Ecosystems (equilibrium, species interactions, stability). Population dynamics.

MINI 4WD

Use a published account for the change across generations. A setup you change between heats is not that change.

ENV.ES.2^{OH}

High school · Earth and Space Science

STANDARD

Atmosphere. Atmospheric properties and currents.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

ENV.ES.3 ^{OH}

High school · Earth and Space Science

STANDARD

Lithosphere. Geologic events and processes.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

ENV.ES.4 ^{OH}

High school · Earth and Space Science

STANDARD

Hydrosphere. Oceanic currents and patterns (as they relate to climate). Surface and ground water flow patterns and movement. Cryosphere.

MINI 4WD

Use a published account of the water the standard names. A wet tire on the lane is a local note beside it.

ENV.ES.5 ^{OH}

High school · Earth and Space Science

STANDARD

Movement of matter and energy through the hydrosphere, lithosphere, atmosphere and biosphere. Energy transformation on global, regional and local scales. Biogeochemical cycles. Ecosystems. Weather. Climate.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

ENV.ER.1 ^{OH}

High school · Earth and Space Science

STANDARD

Energy resources. Renewable and nonrenewable energy sources and efficiency. Alternate energy sources and efficiency. Resource availability. Mining and resource extraction.

MINI 4WD

Name one material the car uses and whether the club keeps it or throws it out. That pile is not the whole resource system.

ENV.ER.2 ^{OH}

High school · Earth and Space Science

STANDARD

Air and air pollution. Primary and secondary contaminants. Greenhouse gases. Clean Air Act.

MINI 4WD

Read one of those laws in a published account and name one cost and one benefit. The club's waste is a local note beside it.

ENV.ER.3 ^{OH}

High school · Earth and Space Science

STANDARD

Water and water pollution. Potable water and water quality. Hypoxia, eutrophication. Clean Water Act. Point source and non-point source contamination.

MINI 4WD

Read one of those laws in a published account and name one cost and one benefit. The club's waste is a local note beside it.

ENV.ER.4 ^{OH}

High school · Earth and Space Science

STANDARD

Soil and land. Desertification. Mass movement and erosion. Sediment contamination. Land use and land management (including food production, agriculture and zoning). Solid and hazardous waste.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

ENV.ER.5 ^{OH}

High school · Earth and Space Science

STANDARD

Wildlife and wilderness. Wildlife and wilderness management. Endangered species. Invasive Species. Introduced Species ISSUES.

MINI 4WD

Read one of those laws in a published account and name one cost and one benefit. The club's waste is a local note beside it.

ENV.GP.1 ^{OH}

High school · Earth and Space Science

STANDARD

Human Population.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.GP.2 ^{OH}

High school · Earth and Space Science

STANDARD

Potable water quality, use and availability.

MINI 4WD

Use a published account of the water the standard names. A wet tire on the lane is a local note beside it.

ENV.GP.3 ^{OH}

High school · Earth and Space Science

STANDARD

Climate change.

MINI 4WD

Use a published account for the climate pattern the standard names. One hot afternoon at the track is weather, not that account.

ENV.GP.4 ^{OH}

High school · Earth and Space Science

STANDARD

Sustainability.

MINI 4WD

Name one material the car uses and whether the club keeps it or throws it out. That pile is not the whole resource system.

ENV.GP.5 ^{OH}

High school · Earth and Space Science

STANDARD

Species depletion and extinction.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.GP.6 ^{OH}

High school · Earth and Space Science

STANDARD

Air quality.

MINI 4WD

Use a published account of the air the standard names. One afternoon at the track is not that account.

ENV.GP.7 ^{OH}

High school · Earth and Space Science

STANDARD

Food production and availability.

MINI 4WD

Use a published account for the thing the standard names. The car on the table is a local comparison, not that thing.

ENV.GP.8 ^{OH}

High school · Earth and Space Science

STANDARD

Deforestation and loss of biodiversity.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.GP.9 ^{OH}

High school · Earth and Space Science

STANDARD

Waste management (solid and hazardous).

MINI 4WD

Name one material the car uses and whether the club keeps it or throws it out. That pile is not the whole resource system.

PG.M.1 ^{OH}

High school · Earth and Space Science

STANDARD

Atoms and elements.

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

PG.M.2 ^{OH}

High school · Earth and Space Science

STANDARD

Chemical bonding (ionic, covalent, metallic).

MINI 4WD

Keep the chemistry in a teacher's setup or a published account. Snapping two plastic parts together does not make a new substance.

PG.M.3 ^{OH}

High school · Earth and Space Science

STANDARD

Crystallinity (crystal structure).

MINI 4WD

Use a published account for the thing the standard names. The car on the table is a local comparison, not that thing.

PG.M.4 ^{OH}

High school · Earth and Space Science

STANDARD

Criteria of a mineral (crystalline solid, occurs in nature, inorganic, defined chemical composition).

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

PG.M.5 ^{OH}

High school · Earth and Space Science

STANDARD

Properties of minerals (hardness, luster, cleavage, streak, crystal shape, fluorescence, flammability, density/specific gravity, malleability).

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

PG.IMS.1 ^{OH}

High school · Earth and Space Science

STANDARD

Igneous. Mafic and felsic rocks and minerals. Intrusive (igneous structures: dikes, sills, batholiths, pegmatites). Earth's interior (inner core, outer core, lower mantle, upper mantle, Mohorovicic discontinuity, crust). Magnetic reversals and Earth's magnetic field. Thermal energy within the Earth. Extrusive (volcanic activity, volcanoes: cinder cones, composite, shield). Bowen's Reaction Series (continuous and discontinuous branches).

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

PG.IMS.2 ^{OH}

High school · Earth and Space Science

STANDARD

Metamorphic. Pressure, stress, temperature and compressional forces. Foliated (regional), non-foliated (contact). Parent rock and degrees of metamorphism. Metamorphic zones (where metamorphic rocks are found).

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

PG.IMS.3 ^{OH}

High school · Earth and Space Science

STANDARD

Sedimentary. Division of sedimentary rocks and minerals (chemical, clastic/physical, organic). Depositional environments.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

PG.IMS.4 ^{OH}

High school · Earth and Space Science

STANDARD

Ocean. Tides (daily, neap and spring). Currents (deep and shallow, rip and longshore). Thermal energy and water density. Waves. Ocean features (ridges, trenches, island systems, abyssal zone, shelves, slopes, reefs, island arcs). Passive and active continental margins. Transgressing and regressing sea levels. Streams (channels, streambeds, floodplains, cross-bedding, alluvial fans, deltas).

MINI 4WD

Use a published account of the water the standard names. A wet tire on the lane is a local note beside it.

PG.EH.1 ^{OH}

High school · Earth and Space Science

STANDARD

The geologic rock record. Relative and absolute age. Principles to determine relative age. Original horizontality. Superposition. Cross-cutting relationships. Absolute age. Radiometric dating (isotopes, radioactive decay). Correct uses of radiometric dating. Combining relative and absolute age data. The geologic time scale. Comprehending geologic time. Climate changes evident through the rock record. Fossil record.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

PG.PT.1 ^{OH}

High school · Earth and Space Science

STANDARD

Internal Earth. Seismic waves. S and P waves. Velocities, reflection, refraction of waves.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

PG.PT.2 ^{OH}

High school · Earth and Space Science

STANDARD

Structure of Earth (Note: specific layers were part of grade 8). Asthenosphere. Lithosphere. Mohorovicic boundary (Moho). Composition of each of the layers of Earth. Gravity, magnetism and isostasy. Thermal energy (geothermal gradient and heat flow).

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

PG.PT.3 ^{OH}

High school · Earth and Space Science

STANDARD

Historical review (Note: this would include a review of continental drift and sea-floor spreading found in grade 8). Paleomagnetism and magnetic anomalies. Paleoclimatology.

MINI 4WD

Name the field the standard names. The car on the table is sitting in the room, not in that field.

PG.PT.4 ^{OH}

High school · Earth and Space Science

STANDARD

Plate motion (Note: introduced in grade 8). Causes and evidence of plate motion. Measuring plate motion. Characteristics of oceanic and continental plates. Relationship of plate movement and geologic events. Mantle plumes.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

PG.ER.1 ^{OH}

High school · Earth and Space Science

STANDARD

Energy resources. Renewable and nonrenewable energy sources and efficiency. Alternate energy sources and efficiency. Resource availability. Mining and resource extraction.

MINI 4WD

Name one material the car uses and whether the club keeps it or throws it out. That pile is not the whole resource system.

PG.ER.2 ^{OH}

High school · Earth and Space Science

STANDARD

Air. Primary and secondary contaminants. Greenhouse gases.

MINI 4WD

Use a published account for the climate pattern the standard names. One hot afternoon at the track is weather, not that account.

PG.ER.3 ^{OH}

High school · Earth and Space Science

STANDARD

Water. Potable water and water quality. Hypoxia, eutrophication.

MINI 4WD

Use a published account of the water the standard names. A wet tire on the lane is a local note beside it.

PG.ER.4 ^{OH}

High school · Earth and Space Science

STANDARD

Soil and sediment. Desertification. Mass wasting and erosion. Sediment and contamination.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

PG.GG.1 ^{OH}

High school · Earth and Space Science

STANDARD

Glaciers and glaciation. Evidence of past glaciers (including features formed through erosion or deposition). Glacial deposition and erosion (including features formed through erosion or deposition). Data from ice cores. Historical changes (glacial ages, amounts, locations, particulate matter, correlation to fossil evidence). Evidence of climate changes throughout Earth's history. Glacial distribution and causes of glaciation. Types of glaciers – continental (ice sheets, ice caps), alpine/valley (piedmont, valley, cirque, ice caps). Glacial structure, formation and movement.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

ESS.1^{AL}

High school · Earth and Space Science

STANDARD

Obtain, evaluate, and communicate information about the connections among mass, gravity, and fusion in the life cycle of stars.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

ESS.1a^{AL}

High school · Earth and Space Science

STANDARD

Utilize models to explain the process of stellar evolution from star birth to star death.

MINI 4WD

Use a published account for the change across generations. A setup you change between heats is not that change.

ESS.1b^{AL}

High school · Earth and Space Science

STANDARD

Interpret the Hertzsprung-Russell diagram to analyze the properties of stars, including density, magnitude, temperature, rates of fusion, and spectral class.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

ESS.1c^{AL}

High school · Earth and Space Science

STANDARD

Obtain, evaluate, and communicate information about how nuclear fusion in stars and supernovas leads to the formation of all other elements.

MINI 4WD

Keep nuclear changes in a published account. A motor warming up is not that change.

ESS.1d ^{AL}

High school · Earth and Space Science

STANDARD

Analyze and interpret data to quantify the energy produced in stars, using Einstein's theory of general relativity by applying $E=mc^2$ to show that the small amount of mass produced during hydrogen fusion produces a large amount of energy.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

ESS.2 ^{AL}

High school · Earth and Space Science

STANDARD

Obtain, evaluate, and communicate information about the structure and motion of components of the universe and solar system.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

ESS.2a ^{AL}

High school · Earth and Space Science

STANDARD

Use mathematics and computational thinking to predict the motion of natural and man-made objects in the solar system, using Kepler's laws, Newton's laws of motion, and Newton's gravitational laws.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

ESS.2b ^{AL}

High school · Earth and Space Science

STANDARD

Use mathematics and computational thinking to explain the relationships between the properties of light and distances in the solar system and universe, including the Doppler effect, red shift, light years, and astronomical units.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

ESS.2c ^{AL}

High school · Earth and Space Science

STANDARD

Analyze spectroscopic data to determine the properties and motion of objects in space.

MINI 4WD

Roll the car once and name the push and what changed. Change one thing before the next roll.

ESS.2d ^{AL}

High school · Earth and Space Science

STANDARD

Investigate and communicate major properties of bodies in the solar system and the zones they inhabit.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

ESS.2e ^{AL}

High school · Earth and Space Science

STANDARD

Use mathematics to explain how solar intensity and the tilt of the Earth's axis impact the distribution of sunlight on the Earth's surface, including zenith angle, solar angle, and surface area.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

ESS.3 ^{AL}

High school · Earth and Space Science

STANDARD

Research, evaluate, and communicate information about how the findings of early astronomers, including Aristotle, Ptolemy, Copernicus, Galileo, Brahe, Kepler, Newton, and Einstein, challenged the thinking of their time, allowed for academic advancements, and built a foundation for space exploration.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

ESS.3a^{AL}

High school · Earth and Space Science

STANDARD

Obtain and evaluate scientific information that explains how the application of new knowledge and technological advances has improved human understanding of the universe.

MINI 4WD

Use a published astronomy account for this. The car on the table is not in that sky.

ESS.3b^{AL}

High school · Earth and Space Science

STANDARD

Construct an evidence-based explanation of the connections among various cosmic phenomena, citing leading scientific theories.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

ESS.3c^{AL}

High school · Earth and Space Science

STANDARD

Obtain and communicate information about Alabama's contributions to space exploration.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

ESS.4^{AL}

High school · Earth and Space Science

STANDARD

Obtain, evaluate, and communicate information about the geologic conditions and processes that form different Earth materials.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

ESS.4a ^{AL}

High school · Earth and Space Science

STANDARD

Plan and carry out investigations to explore the processes that form plutonic (intrusive) and volcanic (extrusive) igneous rocks of differing compositions and textures.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

ESS.4b ^{AL}

High school · Earth and Space Science

STANDARD

Analyze and interpret data to explain the effects of mechanical and chemical weathering and erosion on Earth's materials by wind, water, ice, and gravity.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

ESS.4c ^{AL}

High school · Earth and Space Science

STANDARD

Construct an explanation using evidence from experiments, models, or data of the processes that create and transform igneous, sedimentary, and metamorphic rocks.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

ESS.4d ^{AL}

High school · Earth and Space Science

STANDARD

Plan and conduct an investigation on water's effect on surface and subsurface processes.

MINI 4WD

Use a published account of the water the standard names. A wet tire on the lane is a local note beside it.

ESS.4e^{AL}

High school · Earth and Space Science

STANDARD

Obtain and communicate information about significant geologic characteristics in Alabama and the southeastern United States.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

ESS.5^{AL}

High school · Earth and Space Science

STANDARD

Obtain, evaluate, and communicate information about major events in Earth's history.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

ESS.5b^{AL}

High school · Earth and Space Science

STANDARD

Construct an explanation based on evidence of how catastrophic and long-term events have impacted life on Earth, including mass extinctions.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

ESS.5c^{AL}

High school · Earth and Space Science

STANDARD

Construct explanations from evidence of how the flow of energy through Earth's systems has changed over time.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

ESS.5d ^{AL}

High school · Earth and Space Science

STANDARD

Obtain, evaluate, and communicate information about important tectonic and geologic events that have occurred in Alabama over geologic time.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

ESS.6 ^{AL}

High school · Earth and Space Science

STANDARD

Obtain, evaluate, and communicate information about the theory of plate tectonics.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

ESS.6a ^{AL}

High school · Earth and Space Science

STANDARD

Construct an evidence-based explanation of continental drift, basing conclusions on comparisons of coastlines, fossils, ages of rocks, climate, and magnetic patterns.

MINI 4WD

Use a published account for the climate pattern the standard names. One hot afternoon at the track is weather, not that account.

ESS.6b ^{AL}

High school · Earth and Space Science

STANDARD

Construct an explanation, based on evidence, of tectonic plate movement, types of plate boundaries, and how boundary type relates to specific tectonic features, including mountain ranges, earthquakes, volcanism, volcanic islands, hotspots, mid-ocean ridges, and faults.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

ESS.6c ^{AL}

High school · Earth and Space Science

STANDARD

Develop and interpret a model of Earth’s internal structure and composition, including inner core, outer core, asthenosphere, lithosphere, mantle, and crust.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

ESS.6d ^{AL}

High school · Earth and Space Science

STANDARD

Analyze data to interpret seismic activity and assess the risk of volcanic eruptions and earthquakes in Alabama and other areas in the United States.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

ESS.7 ^{AL}

High school · Earth and Space Science

STANDARD

Obtain, evaluate, and communicate information about the role of energy transfer in wind, precipitation, cloud formation, and front formation.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

ESS.7a ^{AL}

High school · Earth and Space Science

STANDARD

Obtain and communicate information to explain how water cycles through the atmosphere, including condensation, evaporation, clouds, types of precipitation, relative humidity, and dew point.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

ESS.7b ^{AL}

High school · Earth and Space Science

STANDARD

Plan and carry out an investigation to determine the differential heating of land and water and explain how these differences create changes in local and global weather.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

ESS.7d ^{AL}

High school · Earth and Space Science

STANDARD

Use data to construct an explanation of the role of pressure differences in the development of wind systems.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

ESS.7e ^{AL}

High school · Earth and Space Science

STANDARD

Analyze and interpret data to create a surface map, including high-pressure and low-pressure systems, isobars, wind barbs, cloud types, precipitation, and fronts.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

ESS.8 ^{AL}

High school · Earth and Space Science

STANDARD

Obtain and communicate information to explain different climate regions and their impact on patterns of severe weather.

MINI 4WD

Use a published account for the climate pattern the standard names. One hot afternoon at the track is weather, not that account.

ESS.8a ^{AL}

High school · Earth and Space Science

STANDARD

Analyze temperature and precipitation patterns related to factors that influence climate, including proximity to water, topography, elevation, latitude, and orographic effect.

MINI 4WD

Use a published account for the climate pattern the standard names. One hot afternoon at the track is weather, not that account.

ESS.8b ^{AL}

High school · Earth and Space Science

STANDARD

Analyze and interpret data to develop predictions about the formation of meteorological events.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

ESS.8c ^{AL}

High school · Earth and Space Science

STANDARD

Communicate scientific information to explain the personal, local, and statewide implications of severe weather events in Alabama.

MINI 4WD

Compare the day at the track with a published weather note. The car is the object in the room, not the air.

ENV.1 ^{AL}

High school · Earth and Space Science

STANDARD

Use mathematical representations to illustrate how the first two laws of thermodynamics demonstrate energy transfers throughout ecosystems, including food chains, food webs, and trophic levels, at various levels of biological organization.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.2 ^{AL}

High school · Earth and Space Science

STANDARD

Obtain, evaluate, and communicate information to model the cycling of matter through the biosphere, atmosphere, hydrosphere, and geosphere, including the flow of carbon, water, nitrogen, phosphorus, and sulfur.

MINI 4WD

Use a published account of the water the standard names. A wet tire on the lane is a local note beside it.

ENV.3 ^{AL}

High school · Earth and Space Science

STANDARD

Construct an explanation of how biotic and abiotic factors affect biodiversity and populations in ecosystems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.3a ^{AL}

High school · Earth and Space Science

STANDARD

Support a claim that biodiversity is a natural resource which fosters ecosystem resilience, including the role of keystone, invasive, native, endemic, and indicator species.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.3b ^{AL}

High school · Earth and Space Science

STANDARD

Analyze and interpret data collected through geographic research and field investigations to describe Alabama's biodiversity by region.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.4 ^{AL}

High school · Earth and Space Science

STANDARD

Engage in an evidence-based argument to explain how Earth's systems affect the biosphere and the biosphere affects Earth's systems over various amounts of time.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

ENV.5 ^{AL}

High school · Earth and Space Science

STANDARD

Obtain, evaluate, and communicate information regarding how short-term and long-term natural cyclic fluctuations cause ecosystem change.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.6 ^{AL}

High school · Earth and Space Science

STANDARD

Obtain, evaluate, and communicate information to describe the use of renewable and nonrenewable energy sources.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

ENV.6a ^{AL}

High school · Earth and Space Science

STANDARD

Analyze and interpret data on the origins and availability of renewable and nonrenewable forms of energy to predict consumption trends.

MINI 4WD

Name the energy you put in with the push, and where it went when the car stopped. Do not add a number the run did not give you.

ENV.6b ^{AL}

High school · Earth and Space Science

STANDARD

Construct an argument based on data about the risks and benefits of using renewable and nonrenewable energy sources in Alabama.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

ENV.7 ^{AL}

High school · Earth and Space Science

STANDARD

Obtain, evaluate, and communicate information to describe the development, management, and recycling of mineral resources.

MINI 4WD

Use a published account of the rock or the land the standard names. A plastic body is not that rock.

ENV.8 ^{AL}

High school · Earth and Space Science

STANDARD

Construct or revise a claim based on evidence of the effects of human activities on Earth's systems, natural resources, and ecosystem services.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.8a ^{AL}

High school · Earth and Space Science

STANDARD

Evaluate published information from computational models which illustrate the effects of an increase in atmospheric carbon dioxide on photosynthesis and the effect of ocean acidification on marine populations.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.8b ^{AL}

High school · Earth and Space Science

STANDARD

Use engineering practices to evaluate and refine a current solution designed to protect natural resources from anthropogenic sources of atmospheric, terrestrial, or aquatic pollution.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

ENV.9 ^{AL}

High school · Earth and Space Science

STANDARD

Obtain, evaluate, and communicate information based on evidence to explain how key natural resources, natural hazards, and climate variability influence human activity and welfare.

MINI 4WD

Use a published account for the climate pattern the standard names. One hot afternoon at the track is weather, not that account.

ENV.9a ^{AL}

High school · Earth and Space Science

STANDARD

Communicate scientific information about how environmental change may disproportionately impact people in certain socioeconomic groups or geographic locations.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

ENV.10 ^{AL}

High school · Earth and Space Science

STANDARD

Use mathematics and graphic models to communicate how human activity may affect genetic variation in organism populations, including threatened and endangered species.

MINI 4WD

Read one of those laws in a published account and name one cost and one benefit. The club's waste is a local note beside it.

ENV.II ^{AL}

High school · Earth and Space Science

STANDARD

Construct an explanation of how human populations undergo growth and decline. Clarification: Use of mathematical calculations to determine growth rate is not required.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

ENV.IIa ^{AL}

High school · Earth and Space Science

STANDARD

Analyze and interpret data on human population trends in developing and developed countries and in the global population as a whole.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

ENV.IIb ^{AL}

High school · Earth and Space Science

STANDARD

Construct explanations of the types of environmental impacts produced by human populations in each stage of the demographic transition model.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

ENV.I2 ^{AL}

High school · Earth and Space Science

STANDARD

Obtain, evaluate, and communicate information to describe the effects of human population growth on global ecosystems.

MINI 4WD

Use the living example the standard names. A roller that sticks out, or a body from a mold, can stand beside it. The car is not the organism.

ENV.I2a ^{AL}

High school · Earth and Space Science

STANDARD

Evaluate and communicate information describing the impact of measures used to increase the food supply for the growing human population, including the use of GMOs, monocultures, integrated pest management (IPM), and precision agriculture.

MINI 4WD

Record one thing from a run, then say what the record leaves out.

ENV.I2b ^{AL}

High school · Earth and Space Science

STANDARD

Evaluate and communicate information describing the effects of urbanization on the environment.

MINI 4WD

Ask one question a run of the car can answer, and one question it cannot.

ENV.I3 ^{AL}

High school · Earth and Space Science

STANDARD

Design and defend a sustainability plan to reduce an individual's ecological footprint, taking into account how market forces and societal demands influence personal choices.

MINI 4WD

Build one change, test it on the lane, and say what you would change next. Change one thing at a time.

SC.912.N.1.1^{FL}

High school · Earth and Space Science

STANDARD

Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: 1. pose questions about the natural world, 2. conduct systematic observations, 3. examine books and other sources of information to see what is already known, 4. review what is known in light of empirical evidence, 5. plan investigations, 6. use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), 7. pose answers, explanations, or descriptions of events, 8. generate explanations that explicate or describe natural phenomena (inferences), 9. use appropriate evidence and reasoning to justify these explanations to others, 10. communicate results of scientific investigations, and 11. evaluate the merits of the explanations produced by others.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.2^{FL}

High school · Earth and Space Science

STANDARD

Describe and explain what characterizes science and its methods.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.3^{FL}

High school · Earth and Space Science

STANDARD

Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.

MINI 4WD

State one claim about a run, and the evidence from that run.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.4^{FL}

High school · Earth and Space Science

STANDARD

Identify sources of information and assess their reliability according to the strict standards of scientific investigation.

MINI 4WD

Name the source of a claim about the car, and say why you trust that source.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.5^{FL}

High school · Earth and Space Science

STANDARD

Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome.

MINI 4WD

Run one test on the lane, write down what you saw, and say what you would check next.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.6^{FL}

High school · Earth and Space Science

STANDARD

Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.1.7^{FL}

High school · Earth and Space Science

STANDARD

Recognize the role of creativity in constructing scientific questions, methods and explanations.

MINI 4WD

Ask a new question about one run, then say what that question lets you see.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.1 ^{FL}

High school · Earth and Space Science

STANDARD

Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).

MINI 4WD

Name one question about the lane that a run can answer, and one question a run cannot.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.2 ^{FL}

High school · Earth and Space Science

STANDARD

Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion.

MINI 4WD

Name one question about the lane that a run can answer, and one question a run cannot.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.3 ^{FL}

High school · Earth and Space Science

STANDARD

Identify examples of pseudoscience (such as astrology, phrenology) in society.

MINI 4WD

Name one cost and one benefit of a change you would make to the car, using the kinds of cost the standard names.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.4^{FL}

High school · Earth and Space Science

STANDARD

Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.

MINI 4WD

State one claim about a run, and the evidence from that run.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.2.5^{FL}

High school · Earth and Space Science

STANDARD

Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.1^{FL}

High school · Earth and Space Science

STANDARD

Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.2^{FL}

High school · Earth and Space Science

STANDARD

Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.3^{FL}

High school · Earth and Space Science

STANDARD

Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.4^{FL}

High school · Earth and Space Science

STANDARD

Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.

MINI 4WD

Use the standard's word for a theory and its word for a law, and say which one a single run is not.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.3.5^{FL}

High school · Earth and Space Science

STANDARD

Describe the function of models in science, and identify the wide range of models used in science.

MINI 4WD

Point to the car and say which part of the standard the model is standing in for, and one way the model is not the whole thing.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.4.1^{FL}

High school · Earth and Space Science

STANDARD

Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making.

MINI 4WD

State one claim about a run, then point to what you saw, separate from what you think caused it.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.N.4.2^{FL}

High school · Earth and Space Science

STANDARD

Weigh the merits of alternative strategies for solving a specific societal problem by comparing a number of different costs and benefits, such as human, economic, and environmental.

MINI 4WD

Name one cost and one benefit of a change you would make to the car, using the kinds of cost the standard names.

Florida assigns this standard to grades 9–12, so it is printed in each high school section.

SC.912.E.5.1^{FL}

High school · Earth and Space Science

STANDARD

Cite evidence used to develop and verify the scientific theory of the Big Bang (also known as the Big Bang Theory) of the origin of the universe.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.912.E.5.2 ^{FL}

High school · Earth and Space Science

STANDARD

Identify patterns in the organization and distribution of matter in the universe and the forces that determine them.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.912.E.5.3 ^{FL}

High school · Earth and Space Science

STANDARD

Describe and predict how the initial mass of a star determines its evolution.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.912.E.5.4 ^{FL}

High school · Earth and Space Science

STANDARD

Explain the physical properties of the Sun and its dynamic nature and connect them to conditions and events on Earth.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.912.E.5.5 ^{FL}

High school · Earth and Space Science

STANDARD

Explain the formation of planetary systems based on our knowledge of our Solar System and apply this knowledge to newly discovered planetary systems.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.912.E.5.6 ^{FL}

High school · Earth and Space Science

STANDARD

Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.912.E.5.7 ^{FL}

High school · Earth and Space Science

STANDARD

Relate the history of and explain the justification for future space exploration and continuing technology development.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.912.E.5.8 ^{FL}

High school · Earth and Space Science

STANDARD

Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly- developed observational tools.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.912.E.5.9 ^{FL}

High school · Earth and Space Science

STANDARD

Analyze the broad effects of space exploration on the economy and culture of Florida.

MINI 4WD

Use a published account for what the standard asks about Florida. The car is the object in the room.

SC.912.E.5.10^{FL}

High school · Earth and Space Science

STANDARD

Describe and apply the coordinate system used to locate objects in the sky.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.912.E.5.11^{FL}

High school · Earth and Space Science

STANDARD

Distinguish the various methods of measuring astronomical distances and apply each in appropriate situations.

MINI 4WD

Use a published sky account for the object the standard names. The car on the table is the nearby object.

SC.912.E.6.1^{FL}

High school · Earth and Space Science

STANDARD

Describe and differentiate the layers of Earth and the interactions among them.

MINI 4WD

Use a published Earth account for the rock or the process the standard names. The car is the object on the table.

SC.912.E.6.2^{FL}

High school · Earth and Space Science

STANDARD

Connect surface features to surface processes that are responsible for their formation.

MINI 4WD

Use a published Earth account for what the standard names. The car is the object on the table.

SC.912.E.6.3^{FL}

High school · Earth and Space Science

STANDARD

Analyze the scientific theory of plate tectonics and identify related major processes and features as a result of moving plates.

MINI 4WD

Use a published Earth account for the rock or the process the standard names. The car is the object on the table.

SC.912.E.6.4^{FL}

High school · Earth and Space Science

STANDARD

Analyze how specific geologic processes and features are expressed in Florida and elsewhere.

MINI 4WD

Use a published account for what the standard asks about Florida. The car is the object in the room.

SC.912.E.6.5^{FL}

High school · Earth and Space Science

STANDARD

Describe the geologic development of the present day oceans and identify commonly found features.

MINI 4WD

Use a published Earth account for the rock or the process the standard names. The car is the object on the table.

SC.912.E.6.6^{FL}

High school · Earth and Space Science

STANDARD

Analyze past, present, and potential future consequences to the environment resulting from various energy production technologies.

MINI 4WD

Name one material the standard calls renewable and one it does not. The car is the object in the room, not the resource system.

SC.912.E.7.1 ^{FL}

High school · Earth and Space Science

STANDARD

Analyze the movement of matter and energy through the different biogeochemical cycles, including water and carbon.

MINI 4WD

Use a published Earth account for what the standard names. The car is the object on the table.

SC.912.E.7.2 ^{FL}

High school · Earth and Space Science

STANDARD

Analyze the causes of the various kinds of surface and deep water motion within the oceans and their impacts on the transfer of energy between the poles and the equator.

MINI 4WD

Use a published account for the water or air system the standard names. The car is not that system.

SC.912.E.7.3 ^{FL}

High school · Earth and Space Science

STANDARD

Differentiate and describe the various interactions among Earth systems, including: atmosphere, hydrosphere, cryosphere, geosphere, and biosphere.

MINI 4WD

Use a published account for the water or air system the standard names. The car is not that system.

SC.912.E.7.4 ^{FL}

High school · Earth and Space Science

STANDARD

Summarize the conditions that contribute to the climate of a geographic area, including the relationships to lakes and oceans.

MINI 4WD

Use a published account for the climate the standard names. One hot afternoon at the track is weather, not that account.

SC.912.E.7.5 ^{FL}

High school · Earth and Space Science

STANDARD

Predict future weather conditions based on present observations and conceptual models and recognize limitations and uncertainties of such predictions.

MINI 4WD

Record the weather the standard names. One afternoon at the track is that record.

SC.912.E.7.6 ^{FL}

High school · Earth and Space Science

STANDARD

Cite evidence that the ocean has had a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water.

MINI 4WD

Use a published account for the climate the standard names. One hot afternoon at the track is weather, not that account.

SC.912.E.7.7 ^{FL}

High school · Earth and Space Science

STANDARD

Identify, analyze, and relate the internal (Earth system) and external (astronomical) conditions that contribute to global climate change.

MINI 4WD

Use a published account for the climate the standard names. One hot afternoon at the track is weather, not that account.

SC.912.E.7.8 ^{FL}

High school · Earth and Space Science

STANDARD

Explain how various atmospheric, oceanic, and hydrologic conditions in Florida have influenced and can influence human behavior, both individually and collectively.

MINI 4WD

Use a published account for what the standard asks about Florida. The car is the object in the room.

SC.912.E.7.9^{FL}

High school · Earth and Space Science

STANDARD

Relate the formation of severe weather to the various physical factors.

MINI 4WD

Use a published account of the hazard the standard names. Keep the car off the lane while that hazard is the subject.

References

NG Next Generation Science Standards · April 2013

AL Alabama State Board of Education · 14 December 2023 · 2023 Alabama Course of Study: Science

CA California State Board of Education · 4 September 2013 · Education Code 60605.85

FL Florida State Board of Education · 19 February 2008 · Florida's State Academic Standards for Science

MI Michigan State Board of Education · 10 November 2015 · Michigan K-12 Science Standards

NJ New Jersey State Board of Education · 3 June 2020 · New Jersey Student Learning Standards – Science

OH Ohio State Board of Education · 13 February 2018 · Ohio's Learning Standards for Science

PA Pennsylvania State Board of Education · 13 January 2022 · 22 Pa. Code Chapter 4

TX Texas State Board of Education · 20 November 2020 and 1 December 2021 · 19 TAC Chapter 112