

Prepared Graduates:

2. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding interactions between objects and within systems of objects.

Grade Level Expectation:

1. Pushes and pulls can have different strengths and directions, and can change the speed or direction of an object's motion or start or stop it.

Evidence Outcomes

Students Can:

- a. 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. (K-PS2-1) *(Clarification Statement: Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball and two objects colliding and pushing on each other.) (Boundary: Limited to different relative strengths or different directions, but not both at the same time. Does not include non-contact pushes or pulls such as those produced by magnets.)*
- b. 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. (K-PS2-2) *(Clarification Statement: Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path and knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn.) (Boundary: Does not include friction as a mechanism for change in speed.)*

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. With guidance, plan and conduct an investigation in collaboration with peers (Planning and Carrying Out Investigations) (Personal: Initiative/Self-direction).
2. Analyze data from tests of an object or tool to determine if it works as intended (Analyzing and Interpreting data) (Entrepreneurial: Critical Thinking/Problem solving).
3. Connections to Nature of Science: Scientists use different ways to study the world.

Elaboration on the GLE:

1. Students can answer the question: How can one predict an object's continued motion, changes in motion or stability?
2. PS2:A Forces and Motion: Pushes and pulls can have different strengths and directions. Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
3. PS2:B Types of Interactions: When objects touch or collide, they push on one another and can change motion.
4. PS3:C Relationship Between Energy and Forces: A bigger push or pull makes things speed up or slow down more quickly.

Cross Cutting Concepts:

1. Cause and Effect: Simple tests can be designed to gather evidence to support or refute student ideas about causes.



Prepared Graduates:

3. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how energy is transferred and conserved.

Grade Level Expectation:

2. Sunlight affects the Earth's surface.

Evidence Outcomes

Students Can:

- a. Make observations to determine the effect of sunlight on Earth's surface. (K-PS3-1) (*Clarification Statement: Examples of Earth's surface could include sand, soil, rocks and water*) (*Boundary: Temperature is limited to relative measures such as warmer/cooler.*)
- b. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area. (K-PS3- 2) (*Clarification Statement: Examples of structures could include umbrellas, canopies and tents that minimize the warming effect of the sun.*)

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Make observations (firsthand or from media) to collect data that can be used to make comparisons. (Planning and Carrying Out Investigations) (Personal: Personal responsibility)
2. Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem. (Constructing Explanations and Designing Solutions) (Civic Engagement/Interpersonal: Civic engagement) .
3. Connections to Nature of Science: Scientists use different ways to study the world.

Elaboration on the GLE:

1. Students can answer the question: What is meant by conservation of energy? How is energy transferred between objects or systems?
2. PS3:B Conservation of Energy and Energy Transfer: Sunlight warms Earth's surface.

Cross Cutting Concepts:

1. Cause and Effect: Events have causes that generate observable patterns.



Prepared Graduates:

5. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how individual organisms are configured and how these structures function to support life, growth, behavior and reproduction.

Grade Level Expectation:

1. To live and grow, animals obtain food they need from plants or other animals, and plants need water and light.

Evidence Outcomes

Students Can:

- a. Use observations to describe patterns of what plants and animals (including humans) need to survive. (K-LS1-1) *(Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and that all living things need water.)*

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (Analyzing and Interpreting data) (Entrepreneurial: Critical thinking/Problem solving)
2. Connections to Nature of Science: Scientists look for patterns and order when making observations about the world

Elaboration on the GLE:

1. Students can answer the question: How do the structures of organisms enable life's functions?
2. LS1:C Organization for Matter and Energy Flow in Organisms: All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow.

Cross Cutting Concepts:

1. Patterns: Patterns in the natural and human designed world can be observed and used as evidence.



Prepared Graduates:

10. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how and why Earth is constantly changing.

Grade Level Expectation:

1. Patterns are observed when measuring the local weather, including how humans and other organisms impact their environment.

Evidence Outcomes

Students Can:

- a. Use and share observations of local weather conditions to describe patterns over time. (K-ESS2-1) *(Clarification Statement: Examples of qualitative observations could include descriptions of the weather [such as sunny, cloudy, rainy, and warm]; examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months.) (Boundary: Quantitative observations limited to whole numbers and relative measures such as warmer/cooler.)*
- b. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. (K-ESS2-2) *(Clarification Statement: Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.)*

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (Analyzing and Interpreting data) (Entrepreneurial: Critical thinking/Problem solving).
2. Construct an argument with evidence to support a claim. (Engaging in Argument from Evidence) (Personal: Personal responsibility).
3. Connections to Nature of Science: Scientists look for patterns and order when making observations about the world

Elaboration on the GLE:

1. Students can answer the question: What regulates weather and climate?
2. ESS2:D Weather and Climate: Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time.
3. ESS2:E Biogeology: Plants and animals can change their environment.
4. ESS3:C Human Impacts on Earth Systems: Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air and other living things

Cross Cutting Concepts:

1. Pattern: Patterns in the natural world can be observed, used to describe phenomena and used as evidence.
2. Systems and System Models: Systems in the natural and designed world have parts that work together.



Prepared Graduates:

11. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how human activities and the Earth’s surface processes interact.

Grade Level Expectation:

2. Plants and animals meet their needs in their habitats and impact one another; people can prepare for severe weather.

Evidence Outcomes

Students Can:

- a. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live. (K-ESS3-1)
(Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas; and grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.)
- b. Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. (K-ESS3-2)
(Clarification Statement: Emphasis is on local forms of severe weather.)
- c. Communicate solutions that will reduce the impact of humans on the land, water, air and/or other living things in the local environment. (K-ESS3-3)
(Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.)

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Ask questions based on observations to find more information about the designed world. (Asking Questions and Defining Problems) (Entrepreneurial: Inquiry/Analysis).
2. Use a model to represent relationships in the natural world. (Developing and Using Models) (Personal: Initiative/Self-direction).
3. Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world. (Obtaining, Evaluating and Communicating Information) (Civic/Interpersonal: Communication).
4. Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (Obtaining, Evaluating and Communicating Information) (Civic/Interpersonal: Communication).



Elaboration on the GLE:

1. Students can answer the question: How do Earth's surface processes and human activities affect each other?
2. ESS3:A Natural Resources: Living things need water, air and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.
3. ESS3:B Natural Hazards: Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events.
4. ESS3:C Human Impacts on Earth Systems: Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air and other living things.

Cross Cutting Concepts:

1. Cause and Effect: Events have causes that generate observable patterns.
2. Systems and System Models: Systems in the natural and designed world have parts that work together.
3. Connections to Engineering, Technology, and Applications of Science: People encounter questions about the natural world every day. People depend on various technologies in their lives; human life would be very different without technology.