

Prepared Graduates:

1. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding structure, properties and interactions of matter.

Grade Level Expectation:

1. Matter exists as particles that are too small to be seen; measurements of a variety of observable properties can be used to identify particular materials.

Evidence Outcomes

Students Can:

- a. Develop a model to describe that matter is made of particles too small to be seen. (5-PS1-1) *(Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water and evaporating salt water. Does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.)*
- b. Make observations and measurements to identify materials based on their properties. (5-PS1-3) *(Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces and solubility; density is not intended as an identifiable property. Does not include density or distinguishing mass and weight.) (Boundary Statement: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.)*

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Use models to describe phenomena (Developing and Using Models) (Personal: Initiative/Self-direction).
2. Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon (Planning and Carrying Out Investigations) (Personal: Personal responsibility).

Elaboration on the GLE:

1. Students can answer the question: How do particles combine to form the variety of matter one observes?
2. PS1:A Structure and Properties of Matter: Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. Measurements of a variety of properties can be used to identify materials.

Cross Cutting Concepts:

1. Scale, Proportion and Quantity: Natural objects exist from the very small to the immensely large. Standard units are used to measure and describe physical quantities such as weight, time, temperature and volume.

Prepared Graduates:

1. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding structure, properties and interactions of matter.

Grade Level Expectation:

2. Chemical Reactions that occur when substances are mixed can be identified by the emergence of substances with different properties; the total mass remains the same.

Evidence Outcomes

Students Can:

- a. 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. (5-PS1-1) (*Clarification Statement: Examples of reactions or changes could include phase changes, dissolving and mixing that form new substances. Does not include distinguishing mass and weight.*) (*Boundary Statement: Mass and weight are not distinguished at this grade level.*)
- b. Conduct an investigation to determine whether the mixing of two or more substances results in new substances. (5-PS1-4)

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Measure and graph quantities such as weight to address scientific and engineering questions and problems (Using Mathematics and Computational Thinking) (Entrepreneurial: Critical thinking/Problem solving).

Elaboration on the GLE:

1. Students can answer the questions: How do substances combine or change (react) to make new substances? How does one characterize and explain these reactions and make predictions about them?
2. PS1:B Chemical Reactions: No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary Statement: Mass and weight are not distinguished at this grade level.) When two or more different substances are mixed, a new substance with different properties may be formed.

Cross Cutting Concepts:

1. Scale, Proportion and Quantity: Standard units are used to measure and describe physical quantities such as weight, time, temperature and volume.
2. Scientific Knowledge to Assumes an Order and Consistency in Natural Systems: Science assumes consistent patterns in natural systems.
3. Cause and Effect: Cause - and - effect relationships are routinely identified, tested and used to explain change.



Prepared Graduates:

1. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding structure, properties and interactions of matter.

Grade Level Expectation:

3. The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.

Evidence Outcomes

Students Can:

- a. Support an argument that the gravitational force exerted by Earth on objects is directed down. (5-PS2-1) (*Clarification Statement: "Down" is a local description of the direction that points toward the center of the spherical Earth.*) (*Boundary Statement: Does not include mathematical representation of gravitational force.*)

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Support an argument with evidence, data or a model (Engaging in Argument from Evidence) (Personal: Initiative/Self-direction).

Elaboration on the GLE:

1. Students can answer the question: What underlying forces explain the variety of interactions observed?
2. PS2:B Types of Interactions: The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center.

Cross Cutting Concepts:

1. Cause and Effect: Cause - and - effect relationships are routinely identified and used to explain change.



Prepared Graduates:

1. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding structure, properties and interactions of matter.

Grade Level Expectation:

4. The energy released from food was once energy from the sun.

Evidence Outcomes

Students Can:

- a. Use models to describe that energy in animals' food (used for body repair, growth and motion and to maintain body warmth) was once energy from the sun. (5-PS3-1) (*Clarification Statement: Examples of models could include diagrams and flowcharts.*)

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Use models to describe phenomena (Developing and Using Models) (Personal: Initiative/Self-direction).

Elaboration on the GLE:

1. Students can answer the questions: How do food and fuel provide energy? If energy is conserved, why do people say it is produced or used?
2. PS3:D Energy in Chemical Processes and Everyday Life: The energy released from food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water).

Cross Cutting Concepts:

1. Energy and Matter: Energy can be transferred in various ways and between objects.



Prepared Graduates:

6. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how living systems interact with the biotic and abiotic environment.

Grade Level Expectation:

1. Plants acquire their material for growth chiefly from air and water.

Evidence Outcomes

Students Can:

- a. Support an argument that plants get the materials they need for growth chiefly from air and water. (5-LS1-1) (*Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.*)

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Support an argument with evidence, data or a model (Engaging in Argument from Evidence) (Personal: Initiative/Self-direction).

Elaboration on the GLE:

1. Students can answer the question: How do organisms obtain and use the matter and energy they need to live and grow?
2. LS1:C Organization for Matter and Energy Flow in Organisms: Plants acquire their material for growth chiefly from air and water.

Cross Cutting Concepts:

1. Energy and Matter: Matter is transported into, out of and within systems.

Prepared Graduates:

6. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how living systems interact with the biotic and abiotic environment.

Grade Level Expectation:

2. Matter cycles between air and soil and among plants, animals and microbes as these organisms live and die.

Evidence Outcomes

Students Can:

- a. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. (5-LS2-1) *(Clarification Statement: Emphasis is on the idea that matter that is not food [air, water, decomposed materials in soil] is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.) (Boundary Statement: Does not include molecular explanations.)*

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Develop a model to describe phenomena (Developing and Using Models) (Personal: Initiative/Self-direction).
2. Connections to the Nature of Science: Science Models, Laws, Mechanisms and Theories Explain Natural Phenomena. Science explanations describe the mechanisms for natural events.

Elaboration on the GLE:

1. Students can answer the questions: How do organisms interact with the living and nonliving environments to obtain matter and energy? How do matter and energy move through an ecosystem?
2. LS2:A Interdependent Relationships in Ecosystems: The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plant parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.
3. LS2:B Cycles of Matter and Energy Transfer in Ecosystems: Matter cycles between the air and soil and among plants, animals and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid or solid) back into the environment.

Cross Cutting Concepts:

1. Systems and System Models: A system can be described in terms of its components and their interactions.



Prepared Graduates:

9. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding the universe and Earth's place in it.

Grade Level Expectation:

1. Stars range greatly in size and distance from Earth, and this can explain their relative brightness.

Evidence Outcomes

Students Can:

- a. Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth. (5-ESS1-1) (*Clarification Statement: Limited to relative distances, not sizes, of stars. Does not include other factors that affect apparent brightness [such as stellar masses, age and stage].*)

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Support an argument with evidence, data or a model (Engaging in Argument from Evidence) (Civic/Interpersonal: Collaboration/Teamwork).

Elaboration on the GLE:

1. Students can answer the question: What is the universe, and what goes on in stars?
2. ESS1:A The Universe and its Stars: The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth.

Cross Cutting Concepts:

1. Scale, Proportion and Quantity: Natural objects exist from the very small to the immensely large.

Prepared Graduates:

9. Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding the universe and Earth's place in it.

Grade Level Expectation:

2. Earth's orbit and rotation and the orbit of the moon around earth cause observable patterns.

Evidence Outcomes

Students Can:

- a. 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. (5-ESS1-2) (*Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.*) (*Boundary Statement: Does not include causes of seasons.*)

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. (Analyzing and Interpreting Data) (Entrepreneurial: Critical thinking/Problem solving).

Elaboration on the GLE:

1. Students can answer the question: What are the predictable patterns caused by Earth's movement in the solar system?
2. ESS1:B Earth and the Solar System: The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon and stars at different times of the day, month and year.

Cross Cutting Concepts:

1. Patterns: Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena.

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:

3. Earth's major systems interact in multiple ways to affect Earth's surface materials and processes.

Evidence Outcomes

Students Can:

- a. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere and/or atmosphere interact. (5-ESS2-1)
(Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.) (Boundary Statement: Limited to the interactions of two systems at a time.)

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Develop a model using an example to describe a scientific principle. (Developing and Using Models) (Personal: Initiative/Self-direction).

Elaboration on the GLE:

1. Students can answer the question: How do Earth's major systems interact? How do the properties and movements of water shape Earth's surface and affect its systems?
2. ESS2:A Earth Materials and Systems: Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.

Cross Cutting Concepts:

1. Systems and System Models: A system can be described in terms of its components and their interactions.





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:

4. Most of Earth's water is in the ocean and much of Earth's freshwater in glaciers or underground.

Evidence Outcomes

Students Can:

- a. Describe and graph the amounts and percentages of saltwater and freshwater in various reservoirs to provide evidence about the distribution of water on Earth. (5-ESS2-2) (*Boundary Statement: Limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.*)

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Describe and graph quantities such as area and volume to address scientific questions (Using Mathematics and Computational Thinking) (Entrepreneurial: Critical thinking/Problem solving).

Elaboration on the GLE:

1. Students can answer the question: How do the properties and movements of water shape Earth's surface and affect its systems?
2. ESS2:C The Roles of Water in Earth's Surface Processes: Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands and the atmosphere.

Cross Cutting Concepts:

1. Scale, Proportion, and Quantity: Standard units are used to measure and describe physical quantities such as weight and volume.

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:

5. Societal activities have had major effects on land, ocean, atmosphere and even outer space

Evidence Outcomes

Students Can:

- a. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. (5-ESS3-1)

Academic Context and Connections

Colorado Essential Skills and Science and Engineering Practices:

1. Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (Obtaining, Evaluating, and Communicating Information) (Civic/Interpersonal: Communication)

Elaboration on the GLE:

1. Students can answer the question: How do humans change the planet?
2. ESS3:C Human Impacts on Earth Systems: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

Cross Cutting Concepts:

1. Systems and System Models: A system can be described in terms of its components and their interactions.
2. Science Addresses Questions About the Natural and Material World: Science findings are limited to questions that can be answered with empirical evidence.