Kindergarten

Module 1: Forces and Motion

Lesson 1 Pushes and Pulls
Lesson 2 Strength and Distance
Lesson 3 When Objects Collide
Lesson 4 Direction and Forces

Performance Expectations

K-PS2-1 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.

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.

Assessment Boundary: Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.

K-PS2-2 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.*

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.

Assessment Boundary: Assessment does not include friction as a mechanism for change in speed.

Science and Engineering Practices
Planning and Carrying Out Investigations
With guidance, plan and conduct an investigation in collaboration with peers. (1)

Analyzing and Interpreting Data
Analyze data from tests of an object or tool to determine if it works as intended. (2)

Disciplinary Core Ideas
PS2.A: Forces and Motion
Pushes and pulls can have different strengths and directions. (1), (2)

Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (1), (2)

PS2.B: Types of Interactions
When objects touch or collide, they push on one another and can change motion. (1)

PS3.C: Relationship Between Energy and Forces
A bigger push or pull makes things speed up or slow down more quickly. (secondary to K-PS2-1)

Crosscutting Concepts
Cause and Effect
Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1), (2)
Module 2: Energy and the Sun

Lesson 1 Sunlight and Earth’s Surface

Lesson 2 Sunlight and Shade

Performance Expectations

K-PS3-1 Make observations to determine the effect of sunlight on Earth’s surface.
Clarification Statement: Examples of Earth’s surface could include sand, soil, rocks, and water.

Assessment Boundary: Assessment of temperature is limited to relative measures such as warmer/cooler.

K-PS3-2 Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.*
Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.

Science and Engineering Practices

Planning and Carrying Out Investigations
Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1)

Constructing Explanations and Designing Solutions
Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem. (2)

Disciplinary Core Ideas

PS3.B: Conservation of Energy and Energy Transfer
Sunlight warms Earth’s surface. (1), (2)

Crosscutting Concepts

Cause and Effect
Events have causes that generate observable patterns. (1), (2)
Module 3: Weather

Lesson 1 Weather Patterns

Lesson 2 Describe Weather

Lesson 3 Forecast Weather

Lesson 4 Severe Weather

Performance Expectations

K-ESS2-1 Use and share observations of local weather conditions to describe patterns over time.

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.

Assessment Boundary: Assessment of quantitative observations limited to whole numbers and relative measures such as warmer/cooler.

K-ESS3-2 Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.*

Clarification Statement: Emphasis is on local forms of severe weather.

Science and Engineering Practices

Analyzing and Interpreting Data
Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1)

Asking Questions and Defining Problems
Ask questions based on observations to find more information about the designed world. (2)

Obtaining, Evaluating, and Communicating Information
Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world. (2)

Disciplinary Core Ideas

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. (1)

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. (2)

ETS1.A: Defining and Delimiting an Engineering Problem
Asking questions, making observations, and gathering information are helpful in thinking about problems. (secondary to K-ESS3-2)

Crosscutting Concepts

Patterns
Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1)

Cause and Effect
Events have causes that generate observable patterns. (2)

Module 4: Plants and Animals

Lesson 1 Plant and Animal Needs

Lesson 2 Places Plants Grow
Lesson 3 Animal Habitats

**Performance Expectations**

**K-LS1-1** Use observations to describe patterns of what plants and animals (including humans) need to survive.

*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.*

**K-ESS3-1** Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

*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.*

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<td><strong>Analyzing and Interpreting Data</strong></td>
<td><strong>LS1.C: Organization for Matter and Energy Flow in Organisms</strong></td>
<td><strong>Patterns</strong></td>
</tr>
<tr>
<td>Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (L1)</td>
<td>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. (L1)</td>
<td><strong>Patterns in the natural and human designed world can be observed and used as evidence.</strong> (L1)</td>
</tr>
<tr>
<td><strong>Developing and Using Models</strong></td>
<td><strong>ESS3.A: Natural Resources</strong></td>
<td><strong>Systems and System Models</strong></td>
</tr>
<tr>
<td>Use a model to represent relationships in the natural world. (E1)</td>
<td>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. (E1)</td>
<td>Systems in the natural and designed world have parts that work together. (E1)</td>
</tr>
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</table>

Module 5: Impact on the Earth’s Systems

Lesson 1 Plants Change Their Environments

Lesson 2 Animals Change Their Environments

Lesson 3 People Change Environments

**Performance Expectation**

**K-ESS2-2** Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.

*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.*

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<td><strong>Engaging In Argument from Evidence</strong></td>
<td><strong>ESS2.E: Biogeology</strong></td>
<td><strong>Systems and System Models</strong></td>
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<tr>
<td>Construct an argument with</td>
<td>Plants and animals can change their environment.</td>
<td>Systems in the natural and designed world have parts that work</td>
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**Module 6: Protecting Our Earth**

**Lesson 1** Land, Air, and Water Pollution

**Lesson 2** Help Save Natural Resources

**Lesson 3** Reduce, Reuse, Recycle

**Performance Expectations**

**K-ESS3-3** Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.*

*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.

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<tr>
<td><strong>Obtaining, Evaluating, and Communicating Information</strong> Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas.</td>
<td><strong>ESS3.C: Human Impacts on Earth Systems</strong> 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.</td>
<td><strong>Cause and Effect</strong> Events have causes that generate observable patterns.</td>
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<tr>
<td><strong>ETS1.B: Developing Possible Solutions</strong> Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem’s solutions to other people. (secondary to K-ESS3-3)</td>
<td><strong>ETS3.C: Human Impacts on Earth Systems</strong> 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.</td>
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### Module 1: Sound Energy

Lesson 1 **Sound**

Lesson 2 **Making Sounds**

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<tr>
<td><strong>1-PS4-1</strong> Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.</td>
<td><strong>PS4.A: Wave Properties</strong> Sound can make matter vibrate, and vibrating matter can make sound.</td>
<td><strong>Cause and Effect</strong> Simple tests can be designed to gather evidence to support or refute student ideas about causes.</td>
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<td><strong>Plan and conduct investigations collaboratively to produce data to serve as the basis for evidence to answer a question.</strong></td>
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### Module 2: Light Energy

Lesson 1 **Light and Shadows**

Lesson 2 **Properties of Light**

Lesson 3 **How Light Travels**

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<tr>
<td><strong>1-PS4-2</strong> Make observations to construct an evidence-based account that objects can be seen only when illuminated.</td>
<td><strong>PS4.B: Electromagnetic Radiation</strong> Objects can be seen if light is available to illuminate them or if they give off their own light. (2)</td>
<td><strong>Cause and Effect</strong> Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2), (3)</td>
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Module 3: Use Energy to Communicate

Lesson 1 Communicate with Sound

Lesson 2 Communicate with Light

Performance Expectation
1-PS4-4 Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.*

Clarification Statement: Examples of devices could include a light source to send signals, paper cup and string “telephones,” and a pattern of drum beats.

Assessment Boundary: Assessment does not include technological details for how communication devices work.

Science and Engineering Practices
Conducting Explanations and Designing Solutions
Use tools and materials provided to design a device that solves a specific problem.

Disciplinary Core Ideas
PS4.C: Information Technologies and Instrumentation
People also use a variety of devices to communicate (send and receive information) over long distances.

Crosscutting Concepts
Module 4: Plant and Animal Parts

Lesson 1 Living and Nonliving Things

Lesson 2 Parts of Plants

Lesson 3 Parts of Animals

Lesson 4 Plant and Animal Survival

Performance Expectation

1-LS1-1 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.*

Clarification statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include:
- designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales;
- stabilizing structures by mimicking animal tails and roots on plants;
- keeping out intruders by mimicking thorns on branches and animal quills; and
- detecting intruders by mimicking eyes and ears.

Science and Engineering Practices
- Constructing Explanations and Designing Solutions

Use materials to design a device that solves a specific problem or a solution to a specific problem.

Disciplinary Core Ideas

LS1.A: Structure and Function
All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air.

Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.

LS1.D: Information Processing
Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive.

Plants also respond to some external inputs.

Crosscutting Concepts

Structure and Function
The shape and stability of structures of natural and designed objects are related to their function(s).

Module 5: Offspring and Their Parents

Lesson 1 Plants Grow and Change
Lesson 2 Plants and Their Parents

Lesson 3 Compare Animals

Lesson 4 Animals and Their Parents

Lesson 5 Offspring and Survival

Performance Expectations

1-LS1-2 Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).

1-LS3-1 Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.

Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.

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<td>patterns in the natural world.</td>
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<td>Constructing Explanations and</td>
<td>LS3.A: Inheritance of</td>
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<td>Designing Solutions</td>
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<td>natural phenomena. (1)</td>
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<td>LS3.B: Variation of Traits</td>
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<td>Individuals of the same kind of</td>
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<td>plant or animal are recognizable</td>
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<td>many ways. (1)</td>
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Module 6: Earth and Space

Lesson 1 Day and Night

Lesson 2 Seasonal Patterns

Lesson 3 The Moon

Lesson 4 The Sun and Stars
Performance Expectations

1-ESS1-1 Use observations of the sun, moon, and stars to describe patterns that can be predicted.
Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.
Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.

1-ESS1-2 Make observations at different times of year to relate the amount of daylight to the time of year.
Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.
Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.

Science and Engineering Practices

Planning and Carrying Out Investigations
Make observations (firsthand or from media) to collect data that can be used to make comparisons. (2)

Analyzing and Interpreting Data
Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1)

Disciplinary Core Ideas

ESS1.A: The Universe and Its Stars
Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1)

ESS1.B: Earth and the Solar System
Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (2)

Crosscutting Concepts

Patterns
Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1), (2)
Module 1: Properties of Matter

Lesson 1 Describe Matter

Lesson 2 Solids

Lesson 3 Liquids and Gases

Lesson 4 Use Matter

Performance Expectations

2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.

2-PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.*
Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.
Assessment Boundary: Assessment of quantitative measurements is limited to length.

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<tr>
<td>Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (1)</td>
<td>Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (1)</td>
<td>Patterns in the natural and human designed world can be observed. (1)</td>
</tr>
<tr>
<td>Analyze data from tests of an object or tool to determine if it works as intended. (2)</td>
<td>Different properties are suited to different purposes. (2), (3)</td>
<td>Cause and Effect Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2)</td>
</tr>
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</table>
# Module 2: Changes to Matter

## Lesson 1 Put Matter Together

## Lesson 2 Mixtures

## Lesson 3 Temperature Changes Matter

### Performance Expectations

**2-PS1-3** 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.  
*Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.*

**2-PS1-4** Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.  
*Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.*

### Science and Engineering Practices

**Engaging in Argument from Evidence**
Construct an argument with evidence to support a claim. (4)

**Constructing Explanations and Designing Solutions**
Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (3)

### Disciplinary Core Ideas

**PS1.A: Structure and Properties of Matter**
Different properties are suited to different purposes. (2), (3)

A great variety of objects can be built up from a small set of pieces. (3)

**PS1.B: Chemical Reactions**
Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (4)

### Crosscutting Concepts

**Energy and Matter**
Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (3)

**Cause and Effect**
Events have causes that generate observable patterns. (4)

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# Module 3: Earth’s Surface

## Lesson 1 Describe Earth’s Surface

## Lesson 2 Oceans

## Lesson 3 Fresh Water

## Lesson 4 Use Maps

### Performance Expectations
### Module 4: Earth’s Surface Changes

#### Lesson 1 Weathering and Erosion

#### Lesson 2 Quick Changes to Earth’s Surface

#### Lesson 3 People Change Earth

#### Performance Expectations

**2-ESS1-1** Use information from several sources to provide evidence that Earth events can occur quickly or slowly.

*Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.*

*Assessment Boundary: Assessment does not include quantitative measurements of timescales.*

**2-ESS2-1** Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*

*Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.*
Module 5: Living Things in Habitats

Lesson 1 Habitats

Lesson 2 Forests and Grasslands

Lesson 3 Water Habitats

Lesson 4 Hot and Cold Deserts

Performance Expectation

2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats.

Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.

Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.

Science and Engineering Practices
Planning and Carrying Out Investigations
Make observations (firsthand or from media) to collect data which can be used to make comparisons.

Disciplinary Core Ideas
LS4.D: Biodiversity and Humans
There are many different kinds of living things in any area, and they exist in different places on land and in water.

Crosscutting Concepts
Structure and function. The shape and stability of structures of natural and designed objects are related to their function(s).

Module 6: Plants and Their Needs

Lesson 1 Plants Need Water

Lesson 2 Plants Need Light

Lesson 3 Plants Make More Plants

Performance Expectations

2-LS2-1 Plan and conduct an investigation to determine if plants need sunlight and water to grow.
Assessment Boundary: Assessment is limited to testing one variable at a time.

2-LS2-2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating
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<td>Relationships in Ecosystems</td>
<td>Events have causes that generate observable patterns. (1)</td>
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<tr>
<td>Plan and conduct an investigation</td>
<td>Plants depend on water and light to grow. (1)</td>
<td>Structure and Function</td>
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<tr>
<td>collaboratively to produce data to serve as the basis for evidence to answer a question. (1)</td>
<td>Plants depend on animals for pollination or to move their seeds around. (2)</td>
<td>The shape and stability of structures of natural and designed objects are related to their function(s). (2)</td>
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<td>Developing and Using Models</td>
<td>ETS1.B: Developing Possible Solutions</td>
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<td>Develop a simple model based on evidence to represent a proposed object or tool. (2)</td>
<td>Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem’s solutions to other people. (secondary to 2-LS2-2)</td>
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**Module 1 Motion, Balanced and Unbalanced Forces**

**Lesson 1 Motion**

**Lesson 2 Forces Can Change Motion**

**Lesson 3 Simple Machines**

### Performance Expectations

**3-PS2-1.** Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. **Clarification Statement:** Examples could include an unbalanced force on one side of a ball can make it start moving; and, balanced forces pushing on a box from both sides will not produce any motion at all.

*Assessment Boundary:* Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.

**3-PS2-2.** Make observations and/or measurements of an object’s motion to provide evidence that a pattern can be used to predict future motion. **Clarification Statement:** Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl, and two children on a see-saw.

*Assessment Boundary:* Assessment does not include technical terms such as period and frequency.

### Science and Engineering Practices

**Planning and Carrying Out Investigations**

Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-PS2-1)

Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-PS2-2)

### Disciplinary Core Ideas

**PS2.A: Forces and Motion**

Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object’s speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.) (3-PS2-1)

The patterns of an object’s motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.) (3-PS2-2)

### Crosscutting Concepts

**Patterns**

Patterns of change can be used to make predictions. (3-PS2-2)

**Cause and Effect**

Cause and effect relationships are routinely identified. (3-PS2-1)
Grade 3

### Module 2 Electric and Magnetic Forces

**Lesson 1 Electricity**

**Lesson 2 Magnets**

#### Performance Expectations

**3-PS2-3. Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.** Clarification Statement: Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paperclips, and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause and effect relationships could include how the distance between objects affects strength of the force and how the orientation of magnets affects the direction of the magnetic force.

Assessment Boundary: Assessment is limited to forces produced by objects that can be manipulated by students, and electrical interactions are limited to static electricity.

**3-PS2-4. Define a simple design problem that can be solved by applying scientific ideas about magnets.*** Clarification Statement: Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.

#### Science and Engineering Practices

**Asking Questions and Defining Problems**

- Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3)

- Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)

#### Disciplinary Core Ideas

**PS2.B: Types of Interactions**

Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3),(3-PS2-4)

#### Crosscutting Concepts

**Cause and Effect**

Cause and effect relationships are routinely identified, tested, and used to explain change. (3-PS2-3)

### Module 3 Weather and Climate

**Lesson 1 Weather Changes**

**Lesson 2 Different Climates**

#### Performance Expectations

**3-ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.** Clarification Statement: Examples of data could include average temperature,
precipitation, and wind direction.

Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.

3-ESS2-2. Obtain and combine information to describe climates in different regions of the world.

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<tr>
<td>Analyzing and Interpreting Data</td>
<td>ESS2.D: Weather and Climate</td>
<td>Patterns</td>
</tr>
<tr>
<td>Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. (3-ESS2-1)</td>
<td>Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)</td>
<td>Patterns of change can be used to make predictions. (3-ESS2-1),(3-ESS2-2)</td>
</tr>
<tr>
<td>Obtaining, Evaluating, and</td>
<td>Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)</td>
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<tr>
<td>Communicating Information</td>
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</table>
Module 4 Life Cycles, Inheritance and Variation of Traits

Lesson 1 Life Cycles

Lesson 2 Inherited Traits

Lesson 3 Variation of Traits

**Performance Expectations**

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. Clarification Statement: Changes organisms go through during their life form a pattern.

Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.

3-LS3-1. 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. Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.

Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.

3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment. Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.

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<td><strong>Developing and Using Models</strong></td>
<td><strong>LS1.B: Growth and Development of Organisms</strong></td>
<td><strong>Patterns</strong></td>
</tr>
<tr>
<td>Develop models to describe phenomena. (3-LS1-1)</td>
<td>Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)</td>
<td>Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1)</td>
</tr>
<tr>
<td><strong>Analyzing and Interpreting Data</strong></td>
<td><strong>LS3.A: Inheritance of Traits</strong></td>
<td><strong>Patterns of change can be used to make predictions.</strong> (3-LS1-1)</td>
</tr>
<tr>
<td>Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1)</td>
<td>Many characteristics of organisms are inherited from their parents. (3-LS3-1)</td>
<td><strong>Cause and Effect</strong></td>
</tr>
<tr>
<td><strong>Constructing Explanations and Designing Solutions</strong></td>
<td>Other characteristics result from individuals’ interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3-LS3-2)</td>
<td>Cause and effect relationships are routinely identified and used to explain change. (3-LS3-2),(3-LS4-2)</td>
</tr>
<tr>
<td>Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2)</td>
<td><strong>LS3.B: Variation of Traits</strong></td>
<td></td>
</tr>
<tr>
<td>Different organisms vary in how they look and function because they have different inherited information. (3-</td>
<td></td>
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</table>
The environment also affects the traits that an organism develops. (3-LS3-2)

**Module 5 Adaptations, Natural Selection, Social Interactions, and Group Behavior**

**Lesson 1 Animal Groups**

**Lesson 2 Adaptations**

**Lesson 3 Natural Selection**

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<tr>
<td><strong>3-LS2-1.</strong> Construct an argument that some animals form groups that help members survive.</td>
</tr>
<tr>
<td><strong>3-LS4-3.</strong> 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. <strong>Clarification Statement:</strong> Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.</td>
</tr>
<tr>
<td><strong>3-LS4-2.</strong> 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. <strong>Clarification Statement:</strong> Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.</td>
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<tbody>
<tr>
<td><strong>Analyzing and Interpreting Data</strong></td>
<td><strong>LS2.D: Social Interactions and Group Behavior</strong></td>
<td><strong>Cause and Effect</strong></td>
</tr>
<tr>
<td>Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1)</td>
<td>Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size. (Note: Moved from K–2) (3-LS2-1)</td>
<td>Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1),(3-LS4-3),(3-LS4-2)</td>
</tr>
<tr>
<td><strong>Engaging in Argument from Evidence</strong></td>
<td><strong>LS4.C: Adaptation</strong></td>
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<tr>
<td>Construct an argument with evidence, data, and/or a model. (3-LS2-1)</td>
<td>For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)</td>
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<tr>
<td>Construct an argument with evidence. (3-LS4-3)</td>
<td><strong>LS4.B: Natural Selection</strong></td>
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<tr>
<td><strong>Constructing Explanations and Designing Solutions</strong></td>
<td>Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and</td>
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<tr>
<td>Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2)</td>
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</table>
Module 6 Changes in Ecosystems and Natural Hazards

Lesson 1 Changes Affect Living Things

Lesson 2 Natural Hazards Change Environments

Lesson 3 Humans and Natural Hazards

Performance Expectations

3-LS4-4. 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.*  
Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.

Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.*  
Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.

Science and Engineering Practices
Engaging in Argument from Evidence
Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4),(ESS3-1)

Disciplinary Core Ideas

LS2.C: Ecosystem Dynamics, Functioning, and Resilience
When the environment changes in ways that affect a place’s physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4)

LS4.D: Biodiversity and Humans
Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)

ESS3.B: Natural Hazards
A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) (Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.)

Crosscutting Concepts

Systems and System Models
A system can be described in terms of its components and their interactions. (3-LS4-4)

Cause and Effect
Cause and effect relationships are routinely identified, tested, and used to explain change. (3-ESS3-1)
### Performance Expectation

**3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.** Clarification Statement: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.

Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.

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<td><strong>Analyzing and Interpreting Data</strong></td>
<td><strong>LS4.A: Evidence of Common Ancestry and Diversity</strong></td>
<td><strong>Scale, Proportion, and Quantity</strong></td>
</tr>
<tr>
<td>Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1)</td>
<td>Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (Note: Moved from K–2) (3-LS4-1)</td>
<td>Observable phenomena exist from very short to very long time periods. (3-LS4-1)</td>
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<td>Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)</td>
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</table>
Module 1 Motion and Energy

Lesson 1 Energy and Speed

Lesson 2 Energy Change in Collisions

Performance Expectations

4-PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of that object.
Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.

4-PS3-3. Ask questions and predict outcomes about the changes in energy that occur when objects collide. Clarification Statement: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.
Assessment Boundary: Assessment does not include quantitative measurements of energy.

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<td>Asking Questions and Defining Problems</td>
<td><strong>PS3.A: Definitions of Energy</strong></td>
<td><strong>Energy and Matter</strong></td>
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<td></td>
<td>The faster a given object is moving, the more energy it possesses. (4-PS3-1)</td>
<td>Energy can be transferred in various ways</td>
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<td>Energy can be moved from place to place by moving objects or through sound, light, or</td>
<td>and between objects. (4-PS3-1), (4-PS3-2),</td>
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<td>electric currents. (4-PS3-2),(4-PS3-3)</td>
<td>(4-PS3-3)</td>
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<td><strong>PS3.B: Conservation of Energy and Energy Transfer</strong></td>
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<td>Energy is present whenever there are moving objects, sound, light, or heat. When</td>
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<td>objects collide, energy can be transferred from one object to another, thereby</td>
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<td>changing their motion. In such collisions, some energy is typically also transferred</td>
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<td>to the surrounding air; as a result, the air gets heated and sound is produced.</td>
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<td>(4-PS3-2),(4-PS3-3)</td>
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<td><strong>PS3.C: Relationship Between Energy and Forces</strong></td>
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<td>When objects collide, the contact forces transfer energy so as to change the objects’</td>
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<td>motions. (4-PS3-3)</td>
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Module 2 Energy Transfer

Lesson 1 Types of Energy Transfer

Lesson 2 Transfer of Energy by Light

Lesson 3 Transfer of Energy by Electricity

Lesson 4 Design Energy Solutions

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<tbody>
<tr>
<td>4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.</td>
</tr>
<tr>
<td>Assessment Boundary: Assessment does not include quantitative measurements of energy.</td>
</tr>
</tbody>
</table>

| 4-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.* | Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device. |
| Assessment Boundary: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound. |

| Science and Engineering Practices |
| Planning and Carrying Out Investigations |
| Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2) |

| Constructing Explanations and Designing Solutions |
| Apply scientific ideas to solve design problems. (4-PS3-4) |

| Disciplinary Core Ideas |
| PS3.A: Definitions of Energy |
| Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3) |

| PS3.B: Conservation of Energy and Energy Transfer |
| Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3) |

| Light also transfers energy from place to place. (4-PS3-2) |

| Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by |

| Crosscutting Concepts |
| Energy and Matter |
| Energy can be transferred in various ways and between objects. (4-PS3-1), (4-PS3-2),(4-PS3-3),(4-PS3-4) |
transforming the energy of motion into electrical energy. (4-PS3-2),(4-PS3-4)

**PS3.D: Energy in Chemical Processes and Everyday Life**
The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)

**ETS1.A: Defining Engineering Problems**
Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (secondary to 4-PS3-4)
**Module 3 Living Things: Structures and Functions, Senses, and Responses**

**Lesson 1 Structures and Functions of Plants**

**Lesson 2 Structures and Functions of Animals**

**Lesson 3 Information Processing in Animals**

**Lesson 4 The Role of Animals’ Eyes**

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<tr>
<td>4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.</td>
<td></td>
</tr>
<tr>
<td>4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin. Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.</td>
<td></td>
</tr>
<tr>
<td>4-LS1-2. 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. Clarification Statement: Emphasis is on systems of information transfer. Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.</td>
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<tr>
<td>Developing and Using Models</td>
<td>PS4.B: Electromagnetic Radiation An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)</td>
<td>Cause and Effect Cause and effect relationships are routinely identified. (4-PS4-2)</td>
</tr>
<tr>
<td>Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2)</td>
<td>LS1.A: Structure and Function Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)</td>
<td>Systems and System Models A system can be described in terms of its components and their interactions. (4-LS1-1), (LS1-2)</td>
</tr>
<tr>
<td>Engaging in Argument from Evidence</td>
<td>LS1.D: Information Processing Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal’s brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)</td>
<td></td>
</tr>
</tbody>
</table>
Performance Expectations

4-PS4-1. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. Clarification Statement: Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.

Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.

4-PS4-3. Generate and compare multiple solutions that use patterns to transfer information.*
Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1’s and 0’s representing black and white to send information about a picture, and using Morse code to send text.

Science and Engineering Practices

**Developing and Using Models**
Develop a model using an analogy, example, or abstract representation to describe a scientific principle. (4-PS4-1)

**Constructing Explanations and Designing Solutions**
Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-PS4-3)

Disciplinary Core Ideas

**PS4.A: Wave Properties**
Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach. (Note: This grade band endpoint was moved from K–2). (4-PS4-1)

Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)

**PS4.C: Information Technologies and Instrumentation**
Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)

ETS1.C: Optimizing The Design Solution
Different solutions need to be tested in order to determine which of them best solves the problem, given the

Crosscutting Concepts

**Cause and Effect**
Cause and effect relationships are routinely identified. (4-PS4-2)

**Systems and System Models**
A system can be described in terms of its components and their interactions. (4-LS1-1), (LS1-2)
| criteria and the constraints.  
(secondary to 4-PS4-3) |
|--------------------------|
Module 5 Earth’s Features: Locations, Changes, Observations of Changes

Lesson 1 Earth’s Landforms and Features

Lesson 2 Effects of Erosion

Lesson 3 History of Earth’s Surface

Performance Expectations

4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. Clarification Statement: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.

Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.

4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.

Assessment Boundary: Assessment is limited to a single form of weathering or erosion.

4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth’s features. Clarification Statement: Maps can include topographic maps of Earth’s land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.

Science and Engineering Practices

Planning and Carrying Out Investigations
Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (4-ESS2-1)

Analyzing and Interpreting Data
Analyze and interpret data to make sense of phenomena using logical reasoning. (4-ESS2-2)

Constructing Explanations and Designing Solutions
Identify the evidence that supports particular points in an explanation. (4-ESS1-1)

Disciplinary Core Ideas

ESS1.C: The History of Planet Earth
Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)

ESS2.A: Earth Materials and Systems
Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)

ESS2.B: Plate Tectonics and Large-Scale System Interactions
The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and

Crosscutting Concepts

Patterns
Patterns can be used as evidence to support an explanation. (4-ESS1-1),(4-ESS2-2)

Cause and Effect
Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1),(4-ESS3-2)
Volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2)

**ESS2.E: Biogeology**
Living things affect the physical characteristics of their regions. (4-ESS2-1)
### Performance Expectation

**4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.**

Clarification Statement: Examples of solutions could include designing an earthquake-resistant building and improving monitoring of volcanic activity.

Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.

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<td><strong>Constructing Explanations and Designing Solutions</strong></td>
<td><strong>ESS3.B: Natural Hazards</strong></td>
<td><strong>Cause and Effect</strong></td>
</tr>
<tr>
<td>Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (4-ESS3-2)</td>
<td>A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2) (Note: This Disciplinary Core Idea can also be found in 3.WC.)</td>
<td>Cause and effect relationships are routinely identified, tested, and used to explain change. (4-ESS2-1),(4-ESS3-2)</td>
</tr>
<tr>
<td><strong>ETS1.B: Designing Solutions to Engineering Problems</strong></td>
<td><strong>Natural Hazards</strong></td>
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<tr>
<td>Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary to 4-ESS3-2)</td>
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</table>
Module 7 Natural Resources

Lesson 1 **Energy from Nonrenewable Resources**

Lesson 2 **Energy from Renewable Resources**

<table>
<thead>
<tr>
<th>Performance Expectation</th>
<th>Disciplinary Core Ideas</th>
<th>Crosscutting Concepts</th>
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</table>
| 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels. | **ESS3.A: Natural Resources**
Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1) | **Cause and Effect**
Cause and effect relationships are routinely identified and used to explain change. (4-ESS3-1) |
# Module 1 Structure and Properties of Matter

## Lesson 1 Matter’s Properties

## Lesson 2 Matter’s Structure

## Lesson 3 Metals and Nonmetals

### Performance Expectations

**5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen.** Clarification Statement: Examples of evidence could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.

Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.

**5-PS1-3. Make observations and measurements to identify materials based on their properties.**

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.

Assessment Boundary: Assessment does not include density or distinguishing mass and weight.

### Science and Engineering Practices

**Developing and Using Models**

Develop a model to describe phenomena. (5-PS1-1)

**Planning and Carrying Out Investigations**

Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (5-PS1-3)

### Disciplinary Core Ideas

**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. (5-PS1-1)

Measurements of a variety of properties can be used to identify materials. (Boundary: 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.) (5-PS1-3)

### Crosscutting Concepts

**Scale, Proportion, and Quantity**

Natural objects exist from the very small to the immensely large. (5-PS1-1)

Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-2),(5-PS1-3)
### Module 2 Physical and Chemical Changes

#### Lesson 1 Physical Changes

#### Lesson 2 Mixtures and Solutions

#### Lesson 3 Chemical Changes

#### Performance Expectations

5-PS1-2. 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. Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.

Assessment Boundary: Assessment does not include distinguishing mass and weight.

5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.

#### Science and Engineering Practices

**Planning and Carrying Out Investigations**

Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (5-PS1-4)

**Using Mathematics and Computational Thinking**

Measure and graph quantities such as weight to address scientific and engineering questions and problems. (5-PS1-2)

#### Disciplinary Core Ideas

**PS1.A: Structure and Properties of Matter**

The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)

**PS1.B: Chemical Reactions**

When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)

No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (5-PS1-2)

#### Crosscutting Concepts

**Cause and Effect**

Cause and effect relationships are routinely identified, tested, and used to explain change. (5-PS1-4)

**Scale, Proportion, and Quantity**

Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-2),(5-PS1-3)
**Module 3 Plant and Animal Needs**

**Lesson 1 Plants and Photosynthesis**

**Lesson 2 Animals and Cellular Respiration**

**Lesson 3 Plants and Cellular Respiration**

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<th><strong>Crosscutting Concepts</strong></th>
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<tbody>
<tr>
<td><strong>5-PS3-1.</strong> 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. Clarification Statement: Examples of models could include diagrams, and flow charts.</td>
<td><strong>PS3.D: Energy in Chemical Processes and Everyday Life</strong> 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). (5-PS3-1)  <strong>LS1.C: Organization for Matter and Energy Flow in Organisms</strong> Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1)  <strong>Plants acquire their material for growth chiefly from air and water.</strong> (5-LS1-1)</td>
<td><strong>Energy and Matter</strong>  Matter is transported into, out of, and within systems. (5-LS1-1)  Energy can be transferred in various ways and between objects. (5-PS3-1)</td>
</tr>
</tbody>
</table>
## Module 4 Matter in Ecosystems

### Lesson 1 Interactions of Living Things

### Lesson 2 Relationships of Living and Nonliving Things

### Lesson 3 Cycles in Ecosystems

**Performance Expectations**

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. 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.

Assessment Boundary: Assessment does not include molecular explanations.

<table>
<thead>
<tr>
<th>Science and Engineering Practices</th>
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<tr>
<td><strong>Developing and Using Models</strong></td>
<td><strong>LS2.A: Interdependent Relationships in Ecosystems</strong> 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 plants 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. (5-LS2-1) <strong>LS2.B: Cycles of Matter and Energy Transfer in Ecosystems</strong> 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. (5-LS2-1)</td>
<td><strong>Systems and System Models</strong> A system can be described in terms of its components and their interactions. (5-LS2-1)</td>
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Module 5 Interactions of Earth’s Major Systems

Lesson 1 Earth’s Major Systems

Lesson 2 Effects of Changes on Earth’s Surface

Lesson 3 Importance of Water

Lesson 4 Effects of the Atmosphere

Lesson 5 Human Impact on the Environment

Performance Expectations

5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. 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.

Assessment Boundary: Assessment is limited to the interactions of two systems at a time.

5-ESS2-2. 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. Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.

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

Science and Engineering Practices

Developing and Using Models
Develop a model using an example to describe a scientific principle. (5-ESS2-1)

Using Mathematics and Computational Thinking
Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2)

Obtaining, Evaluating, and Communicating Information
Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1)

Disciplinary Core Ideas

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. (5-ESS2-1)

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. (5-ESS2-2)

Crosscutting Concepts

Scale, Proportion, and Quantity
Standard units are used to measure and describe physical quantities such as weight, and volume. (5-ESS2-2)

Systems and System Models
A system can be described in terms of its components and their interactions. (5-ESS2-1),(5-ESS3-1)
Grade 5

| 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. (5-ESS3-1) |

Module 6 The Solar System and Beyond

Lesson 1 Movements of the Sun, Earth, and the Moon

Lesson 2 Patterns of the Moon

Lesson 3 Objects in Space

Lesson 4 Stars and Star Patterns

Performance Expectations

5-PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down. Clarification Statement: “Down” is a local description of the direction that points toward the center of the spherical Earth.

Assessment Boundary: Assessment does not include mathematical representation of gravitational force.

5-ESS1-1. Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth. Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).

5-ESS1-2. 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. 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.

Assessment Boundary: Assessment does not include causes of seasons.

Science and Engineering Practices

Analyzing and Interpreting Data
Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. (5-ESS1-2)

Engaging in Argument from Evidence
Support an argument with evidence, data, or a model. (5-PS2-1),(5-ESS1-1)

Disciplinary Core Ideas

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. (5-PS2-1)

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. (5-ESS1-1)

Crosscutting Concepts

Patterns
Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena. (5-ESS1-2)

Cause and Effect
Cause and effect relationships are routinely identified and used to explain change. (5-PS2-1)
<table>
<thead>
<tr>
<th>ESS1.B: Earth and the Solar System</th>
<th>Scale, Proportion, and Quantity</th>
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<tbody>
<tr>
<td>The orbits of Earth around the sun</td>
<td>Natural objects exist from the very</td>
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<td>and of the moon around Earth,</td>
<td>small to the immensely large. (5-</td>
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<td>and South poles, cause observable</td>
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<td>and direction of shadows; and</td>
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<td>different positions of the sun,</td>
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<td>moon, and stars at different</td>
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<td>times of the day, month, and year.</td>
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