

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Standard K.PS2.A.1

**Learning Goal**

Students can 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.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of forces and interactions.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- developing a plan to investigate the relationship between the strength and direction of pushes and pulls and the motion of an object.
  - describing the cause and effect relationship between pushes and pulls and object motion to be determined.
  - comparing the effects of the motion of the objects caused by changes in the strength or direction of the pushes and pulls and recording their data.
- 2: Student demonstrates he/she is nearing proficiency by:
- predicting the effect of the push or pull on the motion of the object.
  - describing the relative strengths of the push or pull that will be applied to the object to start or stop its motion or change its speed OR describing the relative directions of the push or pull that will be applied to the object.
- 1: Student demonstrates limited understanding of forces and interactions.

**Learning Targets- Pushes and Pulls Unit**

**Science and Engineering Practice**

With guidance, plan and conduct an investigation in collaboration with peers.

**Disciplinary Core Ideas**

- Understand pushes and pulls can have different strengths and directions.
- Compare how pushes and pulls can change the speed or direction of an object.
- Identify that a bigger push or pull makes things speed up or slow down more quickly.

**Cross Cutting Concept**

Generalize that a bigger push or pull makes things speed up and move more quickly than a smaller push or pull.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Standard K.PS2.A.2

**Learning Goal**

Students can 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.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of forces and interactions.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- organizing data using graphical or visual displays.
  - describing relative changes in the speed or direction of the object caused by pushes or pulls from the design solution.
  - describing, from the observed data, whether the push or pull from the design solution causes the intended change in speed or direction of motion of the object.
- 2: Student demonstrates he/she is nearing proficiency by:
- organizing data with guidance.
  - describe how the pushes or pull from the design solution causes the change in the object's motion.
- 1: Student demonstrates limited understanding of forces and interactions.

## **Learning Targets- Pushes and Pulls Unit**

### **Science and Engineering Practices**

- Collect observational data on the motion of objects.
- Analyze observational data and categorize what made an object's motion change (i.e., go slower, go faster, go farther, change direction, stop).

### **Disciplinary Core Idea**

- Describe the ways we can cause an object to change motion.

### **Cross Cutting Concept**

Describe the effect of actions on an object to make it change motion (i.e., go slower, go faster, go farther, change direction, stop) and generalize the relationship between the force applied and resulting motion of an object.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Standard K.PS3.A.1

**Learning Goal**

Students can make observations to determine the effect of sunlight on Earth's surface.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of weather and climate.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- describing observations of the relative warmth of materials in the presence and absence of sunlight.
  - identifying patterns of relative warmth of materials in sunlight and in shade.
- 2: Student demonstrates he/she is nearing proficiency by:
- describing that sunlight warms the earth.
  - comparing the warmth of earth materials placed in sunlight and the same earth materials placed in shade.
- 1: Student demonstrates limited understanding of weather and climate.

**Learning Targets- Weather and Climate Unit**

**Science and Engineering Practice**

Collect observational data using relative terms (e.g., warmer, hotter, colder, cooler, brighter, darker, lighter) on the effect of sunlight on Earth's surface.

**Disciplinary Core Idea**

Recall that sunlight warms Earth's surface and that more sunlight means more warmth (e.g., it is generally warmer in the day than at night).

**Cross Cutting Concept**

Generalize that the shielding or reduction of direct sunlight will result in reducing the warming effect of sunlight and that, conversely, an increase in direct sunlight will result in increasing the warming effect.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Standard K.PS3.B.1

**Learning Goal**

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

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of weather and climate.

3: Student demonstrates mastery with the learning goal as evidenced by:

- designing and building a structure that reduces warming caused by the sun.
- describing whether the structure meets the expectations in terms of cause (structure blocks sunlight) and effect (less warming of the surface).

2: Student demonstrates he/she is nearing proficiency by:

- designing and building a structure with guidance and support.
- describing that the structure is expected to reduce warming for a designed area by providing shade.

1: Student demonstrates limited understanding of weather and climate.

**Learning Targets- Weather and Climate Unit**

**Science and Engineering Practices**

- Design and build a model device, using provided tools and materials, to reduce the warming effect of sunlight.
- Generate and compare multiple solutions to the engineering challenge.

**Disciplinary Core Idea**

Recall that sunlight warms Earth's surface

**Cross Cutting Concept**

Generalize that the shielding or reduction of direct sunlight will result in reducing the warming effect of sunlight and that, conversely, an increase in direct sunlight will result in increasing the warming effect.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Standard K.ESS2.D.1

**Learning Goal**

Students can use and share observations of local weather conditions to describe patterns over time.

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of weather and climate.

3: Student demonstrates mastery with the learning goal as evidenced by:

- organizing data from given observations (firsthand or from media) about local weather conditions using graphical displays (pictures, charts, etc.).
- describing patterns and sharing that:
  - certain months have more days of some kinds of weather than do other months.
  - the differences in relative temperature over the course of a day are directly related to the time of day.

2: Student demonstrates he/she is nearing proficiency by:

- organizing data with guidance and support.
- identifying in the data:
  - the change in the relative temperature over the course of a day.
  - the relative number of days of different types of weather conditions in a month.

1: Student demonstrates limited understanding of weather and climate.

**Learning Targets - Weather and Climate Unit**

**Science and Engineering Practice**

Analyze observations (data points).

**Disciplinary Core Idea**

Make relevant local weather observations that include noticing the amount of sunlight, wind, snow/rain, and temperature, both throughout a day and/or across multiple days.

**Cross Cutting Concept**

Identify general patterns in the local weather data collected over a period of time.

## High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)

Missouri Learning Standard 1.PS3.A.1

### Learning Goal

Students can identify the source of energy that causes an increase in the temperature of an object.

### Proficiency Scale

4: Student demonstrates advanced application and understanding of energy.

3: Student demonstrates mastery with the learning goal as evidenced by:

- identifying a source of energy and explaining how the source can cause an increase in the temperature of an object
- describing, using evidence, that the Sun is a source of energy that can increase temperature

2: Student demonstrates he/she is nearing proficiency by:

- identifying a source of energy
- understanding that energy can increase the temperature of objects.

1: Student demonstrates limited understanding of energy

### Learning Targets - Weather and Climate Unit

#### **Science and Engineering Practices**

- Ask questions based on observations to find out more information about the natural and/or designed world.
- Ask and/or identify questions that can be answered by an investigation.
- Use information from observations to construct an evidence-based account for natural phenomena.

#### **Disciplinary Core Ideas**

- Energy sources that increase the temperature of objects (e.g., sun, stove, flame, light bulb, oven)
- The sun is the primary source of energy on Earth.
- Temperature is a measure of hot or cold.

#### **Cross Cutting Concepts**

- Energy can cause the temperature of an object to increase.
- Events have causes that generate observable patterns.
- Simple tests can be designed to gather evidence to support or refute student ideas about causes.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Standard K.LS1.C.1

**Learning Goal**

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

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of plants and animals.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- organizing data from given observations (firsthand or from media) using graphical displays (pictures, charts, etc.).
  - describing the patterns identified in the data provided to show evidence that:
    - plants and animals need light and water to live and grow.
    - animals get their food from plants, other animals, or both.
- 2: Student demonstrates he/she is nearing proficiency by:
- organizing data with guidance and support.
  - identifying patterns in the data including:
    - all animals eat food.
    - all animals drink water.
    - plants cannot live or grow if there is no water or light.
- 1: Student demonstrates limited understanding of plants and animals.

**Learning Targets - Plants and Animals Unit**

**Science and Engineering Practices**

- Collect observations and information on the needs of various plants and animals.
- Organize or classify collected observations into like survival categories (e.g., food sources, water sources, shelter, air).

**Disciplinary Core Ideas**

- Understand the basic food source needs of animals.
- Understand that plants need water and light to live and grow.

**Cross Cutting Concept**

Make a generalization about the similar needs of all plants and similar needs of all animals and describe that pattern in the natural world.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Standard K.ESS2.E.1

**Learning Goal**

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

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of plants and animals.

3: Student demonstrates mastery with the learning goal as evidenced by:

- making a claim to be supported by evidence that plants and animals (including humans) can change the environment to meet their needs.
- supporting the claim and presenting an argument connecting various needs of plants and animals to show evidence about how plants/animals change their environments to meet their needs.
- The argument includes:
  - examples of how plants affect other parts of their system by changing their environments to meet their needs.
  - examples of how animals affect other parts of their systems by changing their environments to meet their needs.

2: Student demonstrates he/she is nearing proficiency by:

- making and supporting a claim with guidance and support.
- identifying and describing:
  - examples of plants changing their environments.

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|  | <ul style="list-style-type: none"><li>○ examples of animals (including humans) changing their environments.</li><li>○ examples of plant and animal needs.</li></ul> |
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1: Student demonstrates limited understanding of plants and animals.

### **Learning Targets**

#### **Science and Engineering Practices**

- Engage in an argument.
- Use relative evidence to support a claim.

#### **Disciplinary Core Ideas**

- Describe how plants and animals change their environment (e.g., squirrel digs in the ground, ants build anthills).
- Identify ways humans have altered the natural environment and recognize how plants and animals have changed the environment to meet their needs (e.g., tree roots break concrete, vines grow around fences, birds use some human-made materials to build nests).

#### **Cross Cutting Concept**

Describe the relationship (system) between plants and animals and their environment (natural or human-made).

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal K.ESS3.A.1

**Learning Goal**

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

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of plants and animals.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- using a given model to represent and describe the relationships between the components including:
    - the relationships between the different plants and animals and the materials they need to survive.
    - the relationship between places where different plants and animals live and the resources those places provide.
    - the relationships between specific plants and animals and where they live.
  - using a given model to describe that plants and animals, the places in which they live, and the resources found in those places are each part of a system, and that these parts of systems work together and allow living things to meet their needs.
- 2: Student demonstrates he/she is nearing proficiency by:
- identifying and describing the components in a given model representing:
    - different plants and animals (including humans).
    - the places where the different plants and animals live.
    - the things that plants and animals need.
  - describing the relationship between the components with guidance and support
- 1: Student demonstrates limited understanding of plants and animals.

## **Learning Targets**

### **Science and Engineering Practices**

- Use a model.
- Relate a model to relationships in nature.

### **Disciplinary Core Ideas**

- Describe the needs of living things, both plants and animals (including humans).
- Identify that living things use their environment to meet their needs.
- Understand that humans use natural resources daily.

### **Cross Cutting Concept**

Identify the mutual relationship between living things and their natural environment (i.e., deer eat buds and leaves and are therefore often found in forest, grasses need sun and are therefore often found in meadows).

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal K.ESS3.C.1

**Learning Goal**

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

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of plants and animals.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- communicating information clearly about solutions in oral and/or written form.
  - communicating information about solutions that reduce the negative effects of humans on the local environment, including:
    - examples of things that people do to live comfortably and how those things can cause changes to the land, water, air, and/or living things in the local environment.
    - examples of choices that people can make to reduce negative impacts and the effects those choices have on the local environment.
- 2: Student demonstrates he/she is nearing proficiency by:
- communicating information, with guidance and support, about solutions in oral and/or written form
  - describing information about:
    - how people affect the land, water, air, and/or living things in the local environment in positive and negative ways.
    - solutions that reduce the negative effects of humans on the local environment.
- 1: Student demonstrates limited understanding of plants and animals.

## **Learning Targets**

### **Science and Engineering Practices**

Communicate solutions with others in oral and/or written forms, using models and/or drawings that provide detail about scientific ideas.

### **Disciplinary Core Ideas**

- Understand that humans impact the world around them.
- Create sketches, drawings, or physical models to communicate ideas for a problem's solutions.
- Identify ways to reduce human impact on land, water, air, and other living things.

### **Cross Cutting Concept**

Identify the impact of human choices on the environment and the general observable patterns that are formed.

## High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)

Missouri Learning Goal 1.LS1.A.1

### Learning Goal

Students can 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.

### Proficiency Scale

4: Student demonstrates advanced application and understanding of structure, function, and information processing.

3: Student demonstrates mastery with the learning goal as evidenced by:

- designing a device and describing the specific or required features in their designs and devices including:
  - the device provides a solution to the given human problem.
  - the device mimics plant and/or animal external parts, and/or information processing.

2: Student demonstrates he/she is nearing proficiency by:

- describing the given human problem to be solved by the design.
- explaining how external structures are used to help the plant and/or animal grow and/or survive.

1: Student demonstrates limited understanding of structure, function, and information processing.

### Learning Targets - Life Science Unit

#### **Science and Engineering Practices**

- Define a simple problem that can be solved through mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.
- Design a solution to a given human problem by mimicking how plants and animals use their structures.
- Ask questions based on observations of how different plants and animals use their body parts in different ways to protect themselves.
- Develop a model to represent relationships in the natural world, such as animals' external parts and the animals' ability to move from place to place.
- Make observations (firsthand or from media) to construct an evidence-based account for how plant and animal structures (e.g., roots of plants,

duck feet) help them survive and grow.

**Disciplinary Core Ideas**

- All organisms have external parts that they use to perform daily functions.
- Different animals use their body parts in different ways (e.g., see; hear; grasp objects; protect themselves; move from place to place; seek, find, and take in food, water, and air).
- Plants have different parts (e.g., roots, stems, leaves, flowers, fruits) that help them survive and grow.
- Animals have body parts that capture and convey different kinds of information needed for growth and survival.
- Animals respond to inputs with behaviors that help them survive. Plants also respond to external inputs.

**Cross Cutting Concept**

- The shape and stability of structures of natural and designed objects are related to their function(s).
- Describe simple tests that can be designed to gather evidence to support or refute student ideas about how different plant and animal parts contribute to survival.

## High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)

Missouri Learning Goal 1.LS3.A.1

### Learning Goal

Students who demonstrate understanding can make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

### Proficiency Scale

- 4: Student demonstrates advanced application and understanding of inheritance and variation of traits..
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- connecting the evidence of observed patterns in features to support that:
    - young plants and animals are very similar to their parents.
    - young plants and animals are not exactly the same as their parents.
    - similarities and differences in features are evidence that although individuals of the same type of animal or plant are recognizable as similar, they can also vary in many ways.
- 2: Student demonstrates he/she is nearing proficiency by:
- describing evidence from observations that:
    - there are key differences between different types of plants and animals.
    - young plants and animals of the same type have similar, but not identical features.
    - adult plants and animals of the same type have similar, but not identical features.
- 1: Student demonstrates limited understanding of inheritance and variation of traits.

### Learning Targets - Life Science Unit

#### **Science and Engineering Practices**

- Make observations (firsthand or from media [e.g., books, videos]) to collect data that can be used to make comparisons of parent and baby plants and animals.
- Read grade-appropriate texts and/or use media to obtain scientific information to determine patterns in and/or evidence about similarities in young plants and animals and their parents.

- Make qualitative observations to compare and contrast parents and offspring.
- Observe the growth of a plant from seed to flowering plant.

**Disciplinary Core Ideas**

- Adult plants and animals can have young.
- Animals and plants of the same kind have the same structures (e.g., wings, number of legs, fur, leaf shape, flower).
- Young organisms are very much, but not exactly, like their parents and also resemble other organisms of the same kind.

**Cross Cutting Concept**

- Observe the pattern that parents and their young are alike, but not exactly alike (i.e., animals and plants).
- Observe the pattern that animals and plants of the same kind have the same structures.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 5.PS4.A.1

**Learning Goal**

Students can make observations to construct an evidence-based account that objects in darkness can be seen only when light is reflected off them or when they produce their own light.

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of light waves.

3: Student demonstrates mastery with the learning goal as evidenced by:

- logically connecting the evidence to support and describe that:
  - the presence of light in a space causes objects to be able to be seen in that space.
  - objects cannot be seen if there is no light to illuminate them, but the same object in the same space can be seen if a light source is introduced.
  - the ability of an object to give off its own light causes the object to be seen in a space where there is no other light.

2: Student demonstrates he/she is nearing proficiency by:

- making observations about:
  - the appearance of objects in a space with no light.
  - the appearance of objects in a space with light.
  - the appearance of objects that give off light in a space with no other light.

1: Student demonstrates limited understanding of light waves.

**Learning Targets - Light and Sound**

**Science and Engineering Practices**

Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena.

**Disciplinary Core Ideas**

Objects can be seen when light reflected from their surfaces enters our eyes.

**Cross Cutting Concept**

Simple tests can be designed to gather evidence to support or refute student ideas about causes.

## High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)

Missouri Learning Goal 1.PS4.C.1

### Learning Goal

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

### Proficiency Scale

- 4: Student demonstrates advanced application and understanding of light and sound waves.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- designing and building a device that is able to send or receive information over a given distance and uses light or sound to communicate.
- 2: Student demonstrates he/she is nearing proficiency by:
- describing a given problem involving people communicating over long distances.
  - designing and building, with guidance, a device that uses light or sound to solve the given problem.
- 1: Student demonstrates limited understanding of light and sound waves.

### Learning Targets - Light and Sound

#### **Science and Engineering Practices**

- Define a simple problem that can be solved through the development of a new or improved object or tool.
- Make observations to construct an evidence-based account of devices that can help people communicate over long distances.
- Communicate design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.
- With guidance, students use tools and materials to design and build a device that uses light or sound to solve the given problem.

#### **Disciplinary Core Ideas**

- Objects can only be seen if there is light to illuminate them or they give off their own light.
- Objects made of different materials allow light to pass through them in different ways.
- Materials can block light and create shadows.
- Materials (e.g., mirror, aluminum foil) can change the direction of the light.
- People use a variety of devices to communicate over long distances to send and/or receive information.

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| <p><b>Cross Cutting Concept</b><br/>Objects are related to their function(s).</p> |
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## High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)

Missouri Learning Goal 1.PS4.A.1 and 2.PS4.A.1

### Learning Goal

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

### Proficiency Scale

- 4: Student demonstrates advanced application and understanding of light and sound waves.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- developing an investigation plan and describing the evidence that will result from the investigation including:
    - observations that sounds can cause materials to vibrate.
    - observations that vibrating materials can cause sounds.
    - how the data will support evidence to support or refute ideas about the relationship between vibrating materials and sound.
- 2: Student demonstrates he/she is nearing proficiency by:
- describing how materials can be made to vibrate to make sound.
  - describing what sounds can be used to make materials vibrate.
  - describing how to determine that a material is vibrating.
- 1: Student demonstrates limited understanding of light and sound waves.

### Learning Targets - Light and Sound

#### **Science and Engineering Practices**

- With guidance, predict, plan and conduct simple investigations to observe the vibrations of various materials producing sounds.
- Record information from observations that sound can make matter vibrate and vibrating matter can make sound.
- With guidance, use qualitative data to compare two alternative solutions to a problem (e.g., sound makes matter vibrate / vibrations make sound).

#### **Disciplinary Core Ideas**

- Observe that sound can make materials (matter) vibrate.
- Observe that vibrating materials (matter) can make sound.

**Cross Cutting Concept**

- Vibrations make sound, and sounds make vibrations.
- Events have causes that generate observable patterns in creating sound.
- Simple tests can be designed to gather evidence to support or refute student ideas about the cause and effect relationship of vibrations and sound.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 1.ESS1.A.2

**Learning Goal**

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

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of patterns and cycles in space.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- identifying and describing patterns in the organized data, including:
    - stars are not seen in the sky during the day, but they are seen in the sky during the night.
    - the sun is at different positions in the sky at different times of the day, appearing to rise in one part of the sky in the morning and appearing to set in another part of the sky in the evening.
    - the moon can be seen during the day and at night, but the sun can only be seen during the day
    - the moon is at a different position in the sky at different times of the day or night, appearing to rise in one part of the sky and appearing to set in another part of the sky.
  - using the identified patterns of the motions and appearance of objects in the sky to provide evidence that future appearances of those objects can be predicted.
- 2: Student demonstrates he/she is nearing proficiency by:
- using graphical displays to organize data from given observations with guidance and support including:
    - objects visible in the sky during the day.
    - objects visible in the sky during the night.
    - the position of the sun in the sky at various times during the day.
    - the position of the moon in the sky at various times during the day or night.
- 1: Student demonstrates limited understanding of patterns and cycles in space.

## **Learning Targets - Space Systems**

### **Science and Engineering Practices**

- Make observations and collect data that can be used to make comparisons and predict patterns of the sun and moon during the day.
- Ask questions based on observations to find more information about the patterns of the sun, moon, and stars.
- Make predictions based on observations of the sun, moon, and stars.
- Use observations to describe patterns and/or relationships of the sun, moon, and stars to answer scientific questions.

### **Disciplinary Core Ideas**

- Patterns of movement of the sun, moon, and stars as seen from Earth can be observed, described, and predicted.
- The sun is observed at different positions in the sky at different times of the day (e.g., rises in the morning, sets in the evening, high in the sky at midday, moves east to west).
- The moon is observed at different positions in the sky at different times during the day and/or night.

### **Cross Cutting Concept**

- Make predictions using patterns (e.g., day/night, movement and position of sun and moon, observable during day and/or night).
- Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal K.ESS1.B.1

**Learning Goal**

Students who demonstrate understanding can make observations at different times of year to relate the amount of daylight to the time of year.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of patterns and cycles in space.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- making and recording observations about the relative length of the day in different seasons to reveal the pattern between the amount of daylight at different times of the year.
- 2: Student demonstrates he/she is nearing proficiency by:
- describing the data with guidance and support including observations of relative length of the day throughout the year.
- 1: Student demonstrates limited understanding of patterns and cycles in space.

**Learning Targets - Space Systems Unit**

**Science and Engineering Practices**

- Collect and analyze observations (data points).
- Interpret data to make generalizations about seasons and amount of daylight in Missouri.

**Disciplinary Core Ideas**

Recall that different seasons result in longer or shorter amounts of daylight, depending on the time of year (“Have you noticed that you can play outside longer in the summer than in the winter?”) and describe those amounts in relative terms (e.g., more, few, less).

**Cross Cutting Concept**

Describe the observable pattern that can be seen between the seasons and the amount of daylight.

## High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)

Missouri Learning Goal 1.ESS1.A.1

### Learning Goal

Students can describe the presence of the sun, moon, and stars in the sky over time.

### Proficiency Scale

- 4: Student demonstrates advanced application and understanding of the universe and its stars.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- using pictures, models, and/or drawings to describe objects visible in the sky during the day and during the night
- 2: Student demonstrates he/she is nearing proficiency by:
- understands that the sun and moon move to different positions in the sky.
- 1: Student demonstrates limited understanding of the universe and its stars.

### Learning Targets - Space Systems Unit

#### **Science and Engineering Practices**

- Make observations of the sun and moon during the day.
- Communicate information with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about the presence of the sun, moon, and stars in the sky over time.

#### **Disciplinary Core Ideas**

- The sun is observed at different positions in the sky at different times of the day (e.g., rises in the morning, sets in the evening, high in the sky at midday, moves from east to west).
- The moon is observed at different positions in the sky at different times during the day or night.
- Stars (other than the sun) are not observable in the sky during the day but are observed during the night.
- The moon can be observed during the day and during the night, but the sun can only be observed during the day.

#### **Cross Cutting Concept**

- Describe patterns in the presence of objects in the sky (e.g., sun, moon, stars) over time.
- Events have causes that generate observable patterns (e.g., the sun is visible only during the day, the moon is visible during day and night, stars are visible during the night).

- Some things stay the same while other things change (e.g., the sun during the day, the moon during the day or night).

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 2.LS2.A.2

**Learning Goal**

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

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of interdependent relationships in ecosystems.

3: Student demonstrates mastery with the learning goal as evidenced by:

- developing a simple model that includes:
  - relevant structures of the animal.
  - relevant structures of the plant.
  - pollen or seeds from plants.
- describing the relationships between components, including evidence that the developed model mimics how plant and animal structures interact to move pollen or disperse seeds.

2: Student demonstrates he/she is nearing proficiency by:

- developing a simple model with guidance and support that includes:
  - relevant structures of the animal.
  - relevant structures of the plant.
  - pollen or seeds from plants.
- identifying the relevant components of their model, including those components that mimic the natural structure of an animal that helps it disperse seeds or mimic the natural structure of an animal that helps it pollinate plants.

1: Student demonstrates limited understanding of interdependent relationships in ecosystems.

## **Learning Targets - Ecosystems Unit**

### **Science and Engineering Practices**

- Develop a simple model based on evidence to represent a proposed object or tool.
- Develop a simple model to explain the phenomenon of pollination and dispersal of seeds.

### **Disciplinary Core Ideas**

- Plants depend on animals for pollination or to move their seeds around.
- Understand the importance of animals in their specialized role of pollination or seed dispersal.
- Identify that animals have different structures that perform specific functions for dispersing seeds or pollinating plants (e.g., chipmunk's cheeks for carrying seeds; a hummingbird's long beak for drinking nectar; animal fur for seeds to cling to).

### **Cross Cutting Concept**

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

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 2.LS2.A.1

**Learning Goal**

Students can plan and conduct an investigation to determine if plants need sunlight and water to grow.

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of interdependent relationships in ecosystems.

3: Student demonstrates mastery with the learning goal as evidenced by:

- developing an investigation plan that includes:
  - the plants to be used.
  - the source of light.
  - how plants will be kept with/without light in both the light/dark test and the water/no water test.
  - the amount of water plants will be given in both the light/dark test and the water/no water test.
  - how plant growth will be determined.
- describing how the plan will allow them to answer the question about whether plants need sunlight and water to grow.
- collecting and recording accurate data on the effects of plant growth.

2: Student demonstrates he/she is nearing proficiency by:

- describing the evidence to be collected during the investigation, including:
  - plant growth with both light and water.
  - plant growth without light but with water.
  - plant growth without water but with light.
  - plant growth without water and without light.
- collecting and recording data with guidance and support on the effects of plant growth.

1: Student demonstrates limited understanding of interdependent relationships in ecosystems.

## **Learning Targets - Ecosystems Unit**

### **Science and Engineering Practices**

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.
- Determine the types of materials needed for the investigation.
- Guide students to determine the parameters for growing conditions.
  - How much water?
  - Where do we put the plants?
  - What is the source of light?
  - What type of seed/plant?
- Collaboratively develop an investigation plan.

### **Disciplinary Core Ideas**

- Identify basic plant needs.
- Plants depend on water and light to grow.

### **Cross Cutting Concept**

Events have causes that generate observable patterns.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 2.ESS2.B.1

**Learning Goal**

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

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of Earth's systems and processes that shape the Earth.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- developing a model that represents both land and bodies of water in an area.
  - identifying and describing the relationships between the specific shapes and kinds of land and specific bodies of water.
  - describing patterns of water and land in a given area.
- 2: Student demonstrates he/she is nearing proficiency by:
- developing a model with guidance and support that represents both land and bodies of water in an area.
  - describing the land and water in an area.
- 1: Student demonstrates limited understanding of Earth's systems and processes that shape the Earth.

**Learning Targets - Shaping the Earth Unit**

**Science and Engineering Practices**

- Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.
- Distinguish between a model and the actual object, process, and/or events the model represents.
- Develop a model to represent patterns in the natural world.

**Disciplinary Core Ideas**

Maps show where things are located. One can map the shapes and kinds of land and water in any area.

**Cross Cutting Concept**

Patterns in the natural world can be observed.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 2.ESS1.C.1

**Learning Goal**

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

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of Earth's systems and processes that shape the Earth.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- making observations using at least 3 or more sources.
  - connecting the evidence and describing their reasoning that in some cases, Earth events and the resulting changes can be directly observed; therefore, those events must occur rapidly.
  - connecting the evidence and describing their reasoning that in other cases, the resulting changes of Earth events can be observed only after a long period of time; therefore, these Earth events occur slowly, and changes happen over a time period that is much longer than one can observe.
- 2: Student demonstrates he/she is nearing proficiency by:
- making observations using 1-2 sources.
  - describing evidence from observations that:
    - some Earth events occur quickly.
    - some Earth events occur slowly.
    - some results of Earth events that occur quickly and some slowly.
- 1: Student demonstrates limited understanding of Earth's systems and processes that shape the Earth.

## **Learning Targets - Shaping the Earth Unit**

### **Science and Engineering Practices**

- Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.
- Make observations from several sources to construct an evidence-based account for natural phenomena.

### **Disciplinary Core Ideas**

Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.

### **Cross Cutting Concept**

Things may change slowly or rapidly.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 2.ESS2.A.1

**Learning Goal**

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

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of Earth's systems and processes that shape the Earth.

3: Student demonstrates mastery with the learning goal as evidenced by:

- describing two or more solutions in terms of how they slow or prevent wind or water from changing the shape of the land.
- evaluating features in the solution that would slow or prevent wind or water from washing away sand or soil.
- using their evaluation and comparing the given solution to each other.

2: Student demonstrates he/she is nearing proficiency by:

- describing one solution in terms of how it slows or prevents wind or water from changing the shape of the land.
- describing features in the solution that would slow or prevent wind or water from washing away sand or soil.
- describing features in the solution that would address problems created by slow and rapid changes in the environment.

1: Student demonstrates limited understanding of Earth's systems and processes that shape the Earth.

## **Learning Targets - Shaping the Earth Unit**

### **Science and Engineering Practices**

- Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.
- Compare multiple solutions to a problem.

### **Disciplinary Core Ideas**

Wind and water can change the shape of the land.

### **Cross Cutting Concept**

- Things may change slowly or rapidly.
- Developing and using technology have impacts on the natural world.
- Connections to Nature of Science.
- Scientists study the natural and material world.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 2.ESS2.C.1

**Learning Goal**

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

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of Earth's systems and processes that shape the Earth.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- using books and other reliable media to identify patterns of where water is found, and what form it is in.
- 2: Student demonstrates he/she is nearing proficiency by:
- using books and other reliable media to identify where water is found on Earth, including oceans, rivers, lakes, ponds, and glaciers.
  - using books and other reliable media to describe that water can be found on Earth as liquid water or solid ice.
- 1: Student demonstrates limited understanding of Earth's systems and processes that shape the Earth.

**Learning Targets - Shaping the Earth Unit**

**Science and Engineering Practices**

- Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.
- Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question.

**Disciplinary Core Ideas**

Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.

**Cross Cutting Concept**

Patterns in the natural world can be observed.



**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 2.PS1.A.1

**Learning Goal**

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

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of structure and properties of matter.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- developing an investigation plan and describing the properties of matter of the materials that would allow for classification and the temperature at which those properties are observed.
  - describing how the properties will be classified by their observable similarities (pattern of the properties) and the method for classifying them.
  - collecting and recording data on the properties of the materials.
- 2: Student demonstrates he/she is nearing proficiency by:
- describing which materials will be classified.
  - describing which materials will be observed at different temperatures, and how those temperatures will be determined.
  - collecting and recording data with guidance and support on the properties of the materials.
- 1: Student demonstrates limited understanding of structure and properties of matter.

**Learning Targets - Matter Unit**

**Science and Engineering Practices**

Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.

**Disciplinary Core Ideas**

- Classify different kinds of materials by their observable properties
- Different properties are suited to different purposes.
- Which materials will be observed at different temperatures, and how those temperatures will be determined (e.g., using ice to cool and a lamp

to warm) and measured (e.g., qualitatively or quantitatively).

**Cross Cutting Concept**

- To describe and classify
- Patterns in the natural and human designed world can be observed

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 2.PS1.A.2

**Learning Goal**

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

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of structure and properties of matter.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- describing relationships between properties of materials and some potential uses.
  - using organized data to support or refute their ideas about which properties of materials allow the object or tool to be best suited for the given intended purpose relative to the other given objects/tools.
- 2: Student demonstrates he/she is nearing proficiency by:
- using the given data from tests of different materials to organize those materials by their properties.
  - describing relationships between materials and their properties.
- 1: Student demonstrates limited understanding of structure and properties of matter.

### **Learning Targets - Matter Unit**

#### **Science and Engineering Practices**

Analyze data from tests of an object or tool to determine if it works as intended.

#### **Disciplinary Core Ideas**

Different properties are suited to different purposes.

#### **Cross Cutting Concept**

Simple tests can be designed to gather evidence to support or refute student ideas about causes.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 3.PS1.B.1

**Learning Goal**

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

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of structure and properties of matter.

3: Student demonstrates mastery with the learning goal as evidenced by:

- evaluating whether changes in a material after heating or cooling are reversible or non-reversible.
- providing evidence to support their claim about reversible and non-reversible changes.

2: Student demonstrates he/she is nearing proficiency by:

- describing the characteristics of the material before and after heating or cooling.
- describing the difference between a reversible and non-reversible change.

1: Student demonstrates limited understanding of structure and properties of matter.

**Learning Targets - Matter Unit**

**Science and Engineering Practices**

- Engaging in argument from evidence in grades 3–5 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed worlds.
- Construct an argument with evidence to support a claim.

**Disciplinary Core Ideas**

Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.

**Cross Cutting Concept**

Cause and effect relationships are routinely identified, tested, and used to explain change.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 3.LS3.C.1

**Learning Goal**

Students can 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.

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of environmental impacts on ecosystems.

3: Student demonstrates mastery with the learning goal as evidenced by:

- evaluating evidence to determine the similarities and differences in needs among at least 3 types of organisms.
- evaluating evidence to determine how and what features of the habitat meet and do not meet the needs of each of the organisms.
- constructing an argument with evidence that suggests a cause-and-effect relationship within the system between the characteristics of a habitat and the survival of organisms within it.

2: Student demonstrates he/she is nearing proficiency by:

- describing the characteristics of a given particular environment.
- describing the characteristics and needs of a particular organism.

1: Student demonstrates limited understanding of environmental impacts on ecosystems.

**Learning Targets - Life and Environment Unit**

**Science and Engineering Practices**

Engaging in argument from evidence in grades 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed worlds.

**Disciplinary Core Ideas**

For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.

**Cross Cutting Concept**

Cause and effect relationships are routinely identified and used to explain change.



**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 3.LS3.D.1

**Learning Goal**

Students can 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.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of environmental impacts on ecosystems.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- evaluating the solution to the problem and describing how well the proposed solution reduces the impact of the problem created by the environmental change in the system.
  - describing how the solution makes changes to one part of the system, affecting the other parts of the system and how the solution affects plants and animals.
- 2: Student demonstrates he/she is nearing proficiency by:
- describing a system of plants, animals, and a given environment within which they live before the given environmental change occurs.
  - describing a given change in the environment.
  - describing how the change in the given environment causes a problem for existing plants and animals living within that area.
- 1: Student demonstrates limited understanding of environmental impacts on ecosystems.

**Learning Targets - Life and Environment Unit**

**Science and Engineering Practices**

- Engaging in argument from evidence in grades 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed worlds.
- 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.

**Disciplinary Core Ideas**

- When the environment changes in ways that affect a place’s physical characteristics, temperature, or availability of resources, some organisms

survive and reproduce, some move to new locations, some move into the transformed environment, and some die.

- Populations live in a variety of habitats, and change in those habitats affects the organisms living there.

**Cross Cutting Concept**

- A system can be described in terms of its components and their interactions.
- Knowledge of relevant scientific concepts and research findings is important in engineering.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 3.LS1.B.1

**Learning Goal**

Students can develop models to compare and contrast observations on the life cycles of different plants and animals.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of life cycles and traits.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- developing models and identifying the following:
    - organisms (both plant and animal)
    - birth
    - growth
    - reproduction
    - death
  - describing the causal direction of the cycle.
  - describing that although organisms can display life cycles that look different, they all follow the same pattern.
- 2: Student demonstrates he/she is nearing proficiency by:
- developing models and identifying some but not all of the following:
    - organisms (both plant and animal)
    - birth
    - growth
    - reproduction
    - death
  - describing that organisms are born, grow and die in a pattern known as a life cycle.
- 1: Student demonstrates limited understanding of life cycles and traits.

### **Learning Targets - Life and Environment Unit**

#### **Science and Engineering Practices**

Develop models to describe phenomena.

#### **Disciplinary Core Ideas**

Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles.

#### **Cross Cutting Concept**

Patterns of change can be used to make predictions.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 3.LS3.A.1

**Learning Goal**

Students can analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and some are influenced by the environment.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of life cycles and traits.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- identifying and describing patterns in the data to show similarities and differences in the traits of a parent and the traits of an offspring or among siblings.
  - using reasoning to connect the evidence to describe a cause-and-effect relationship between a specific causal environmental factor and its effect of a given variation in a trait.
- 2: Student demonstrates he/she is nearing proficiency by:
- identifying the traits of plant and animal parents and offspring or siblings
  - identifying observable inherited traits or organisms in varied environmental conditions.
  - describing environmental factors that may influence organisms' traits.
- 1: Student demonstrates limited understanding of life cycles and traits.

## **Learning Targets - Life and Environment Unit**

### **Science and Engineering Practices**

- Analyze and interpret data to make sense of phenomena using logical reasoning.
- Constructing explanations and designing solutions in grades 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.
- Use evidence (e.g., observations, patterns) to support an explanation.

### **Disciplinary Core Ideas**

- Many characteristics of organisms are inherited from their parents.
- Different organisms vary in how they look and function because they have different inherited information.
- Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment.
- The environment also affects the traits that an organism develops.

### **Cross Cutting Concept**

- Similarities and differences in patterns can be used to sort and classify natural phenomena.
- Cause and effect relationships are routinely identified and used to explain change.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 3.LS3.B.1

**Learning Goal**

Students can 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.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of life cycles and traits.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- using reasoning to logically connect the evidence to describe that certain variations in characteristics make it harder or easier for an animal to survive, find mates, and reproduce.
  - using reasoning to logically connect the evidence to describe characteristics that make it easier for some organisms to survive, find mates, and reproduce give those organisms an advantage over other organisms of the same species that don't have those traits.
  - using reasoning to logically connect the evidence to describe that there can be a cause-and-effect relationship between a specific variation in a characteristic and its effect on the ability of the individual organism to survive and reproduce.
- 2: Student demonstrates he/she is nearing proficiency by:
- describing a given characteristic of a species.
  - describing the patterns of variation of a given characteristic among individuals in a species.
  - describing the potential benefits of a given variation of the characteristic.
- 1: Student demonstrates limited understanding of life cycles and traits.

**Learning Targets - Life and Environment Unit**

**Science and Engineering Practices**

- Constructing explanations and designing solutions in grades 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.
- Use evidence (e.g., observations, patterns) to support an explanation.

**Disciplinary Core Ideas**

Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.

**Cross Cutting Concept**

Cause and effect relationships are routinely identified and used to explain change.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 4.PS2.A.2

**Learning Goal**

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

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of forces and interactions.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- developing an investigation which produces sufficient data to serve as the basis for evidence for how balanced and unbalanced forces determine an object's motion.
  - describing the change in motion of an object at rest after different strengths and directions of balanced and unbalanced forces are applied to the object.
- 2: Student demonstrates he/she is nearing proficiency by:
- describing an object at rest and identifying the forces acting on it.
  - describing an object in motion and identifying the forces acting on it.
- 1: Student demonstrates limited understanding of forces and interactions.

## **Learning Targets - Force and Motion Unit**

### **Science and Engineering Practices**

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.

### **Disciplinary Core Ideas**

Each force acts on one particular object and has both strength and 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.

### **Cross Cutting Concept**

Cause and effect relationships are routinely identified.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 4.PS2.A.1

**Learning Goal**

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

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of forces and interactions.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- identifying and describing the data to be collected through observations and/or measurement, including data on the motion of the object as it repeats a pattern over time.
  - identifying a pattern that can be used to predict future motion.
- 2: Student demonstrates he/she is nearing proficiency by:
- observing and identifying the motion of an object.
  - predicting the future motion of an object.
- 1: Student demonstrates limited understanding of forces and interactions.

**Learning Targets - Force and Motion Unit**

**Science and Engineering Practices**

Make observations and/or measurements to provide evidence for the explanation of a pattern within a phenomenon.

**Disciplinary Core Ideas**

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.

**Cross Cutting Concept**

Patterns of change can be used to make predictions.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 3.PS2.B.1

**Learning Goal**

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

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of forces and interactions.

3: Student demonstrates mastery with the learning goal as evidenced by:

- asking questions from observations of two objects not in contact with each other interacting through electric or magnetic forces.
- identifying the cause-and-effect relationships between:
  - the sizes of the forces on two interacting objects due to the distance between the two objects.
  - the presence of a magnet and the force the magnet exerts on other objects.
  - static electrically charged objects and a static electric force.

2: Student demonstrates he/she is nearing proficiency by:

- asking questions with guidance and support from observations of two objects not in contact with each other interacting through static electric or magnetic forces.
- determining the relationship between the relative orientation of two magnets and whether the force between the magnets is attractive or repulsive.

1: Student demonstrates limited understanding of forces and interactions.

**Learning Targets - Force and Motion Unit**

**Science and Engineering Practices**

Ask questions that can be investigated based on patterns such as cause and effect relationships.

**Disciplinary Core Ideas**

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, their distances apart, and, for forces between two magnets, on their orientation relative to each other.

**Cross Cutting Concept**

Cause and effect relationships are routinely identified, tested, and used to explain change.

## High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)

Missouri Learning Goal 4.PS2.B.1

### Learning Goal

Students can plan and conduct a fair test to compare and contrast the forces (measured by a spring scale in Newtons) required to overcome friction when an object moves over different surfaces (i.e., rough/smooth)

### Proficiency Scale

4: Student demonstrates advanced application and understanding of forces and interactions.

3: Student demonstrates mastery with the learning goal as evidenced by:

- developing a testing plan that includes:
  - the surfaces to be tested.
  - the object that will move across each surface.
  - using a spring scale to measure Newtons.
- conducting a fair test that includes an accurate way to collect and record data.
- using the data collected, comparing and contrasting the forces needed to overcome friction when the object moved over different surfaces.

2: Student demonstrates he/she is nearing proficiency by:

- measuring the force required to overcome friction when an object moves over different surfaces using a spring scale in Newtons.
- conducting a fair test and recording data, with guidance and support, to show the forces needed to overcome friction.

1: Student demonstrates limited understanding of forces and interactions.

### Learning Targets - Force and Motion Unit

#### **Science and Engineering Practices**

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.

#### **Disciplinary Core Ideas**

The effect of unbalanced forces on an object results in a change of motion. Patterns of motion can be used to predict future motion. Some forces act through contact; some forces act even when the objects are not in contact. The gravitational force of Earth acting on an object near Earth's surface

pulls that object toward Earth's center.

**Cross Cutting Concept**

Cause and effect relationships are routinely identified.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 4.LS1.A.1

**Learning Goal**

Students can construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of structure, function, and information processing.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- using reasoning to connect the relevant and appropriate evidence and construct an argument that:
    - internal and external structures serve specific functions within plants and animals.
    - the functions of internal and external structures can support survival, growth, behavior, and/or reproduction in plants and animals.
    - different structures work together as part of a system to support survival, growth, behavior and/or reproduction.
- 2: Student demonstrates he/she is nearing proficiency by:
- identifying the internal and external structures of selected plants and animals.
  - describing the primary functions of those structures.
- 1: Student demonstrates limited understanding of structure, function, and information processing.

**Learning Targets - Survival, Senses, and Adaptations Unit**

**Science and Engineering Practices**

Construct an argument with evidence, data, and/or a model.

**Disciplinary Core Ideas**

Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction

**Cross Cutting Concept**

A system can be described in terms of its components and their interactions.



**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 4.LS1.D.1

**Learning Goal**

Students can 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.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of structure, function, and information processing.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- using a model to describe that different types of sensory information are relayed to the brain via different sensory receptors allowing experiences to be perceived, stored as memories, and influence behavior.
  - using a model to describe interactions between the following:
    - information in the environment.
    - different types of sense receptors.
    - perception and memory of sensory information.
    - animal behavior.
- 2: Student demonstrates he/she is nearing proficiency by:
- identifying and describing from a given model:
    - different types of information about the surroundings.
    - sense receptors able to detect different types of information from the environment.
    - animals' actions.
- 1: Student demonstrates limited understanding of structure, function, and information processing.

**Learning Targets - Survival, Senses, and Adaptations Unit****Science and Engineering Practices**

Use a model to test interactions concerning the functioning of a natural system.

**Disciplinary Core Ideas**

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 interaction.

**Cross Cutting Concept**

A system can be described in terms of its components and their interactions.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 5.LS1.A.1

**Learning Goal**

Students can compare and contrast the major organs/organ systems (e.g. support, reproductive, digestive, transport/circulatory, excretory, response) that perform similar functions for animals belonging to different vertebrate classes.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of structure, function, and information processing.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- comparing and contrasting major organs/organ systems that perform similar function in at least two different vertebrate classes (ex. fish, amphibians, reptiles, birds, mammals).
- 2: Student demonstrates he/she is nearing proficiency by:
- identifying major organs/organ systems in animals.
  - identifying the functions of major organs/organ systems in animals.
- 1: Student demonstrates limited understanding of structure, function, and information processing.

**Learning Targets - Survival, Senses, and Adaptations Unit**

**Science and Engineering Practices**

- Identify the evidence that supports particular points and in explanation.
- Construct and/or support an argument with evidence, data, and/or a model

**Disciplinary Core Ideas**

Organisms have both internal and external macroscopic structures that allow for growth, survival, behavior, and reproduction with organs that are specialized for particular body functions.

**Cross Cutting Concept**

- Students understand that a system is a group of related parts that make up a whole and can carry out functions its individual parts cannot. Students can also describe a system in terms of its components and their interactions.
- Energy can be transferred in various ways and between objects.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 4.PS4.A.1

**Learning Goal**

Students can develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of waves.

3: Student demonstrates mastery with the learning goal as evidenced by:

- developing a model of waves and identifying the following:
  - waves
  - wave amplitude
  - wavelength
  - motion of objects
- identifying and describing that waves can be described in terms of patterns of repeating amplitude and wavelength.
- using the model to describe the similarities and differences in patterns underlying waves and uses these patterns to describe simple relationships involving wave amplitude, wavelength, and the motion of an object.

2: Student demonstrates he/she is nearing proficiency by:

- developing a model of waves and identifying some but not all of the following:
  - waves
  - wave amplitude
  - wavelength
  - motion of objects
- identifying and describing that waves can cause an object to move.
- using the model to describe how waves may be initiated.

1: Student demonstrates limited understanding of waves.

## **Learning Targets - Waves and Energy Unit**

### **Science and Engineering Practices**

Develop a model using an analogy, example, or abstract representation to describe a scientific principle.

### **Disciplinary Core Ideas**

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

### **Cross Cutting Concept**

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

## High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)

Missouri Learning Goal 4.PS3.A.1

### Learning Goal

Students can use evidence to construct an explanation relating the speed of an object to the energy of that object.

### Proficiency Scale

4: Student demonstrates advanced application and understanding of energy.

3: Student demonstrates mastery with the learning goal as evidenced by:

- using evidence to describe that motion can indicate the energy of an object.
- creating models that demonstrate how energy is transferred from a moving object interacting with its surroundings and transferring between objects.

2: Student demonstrates he/she is nearing proficiency by:

- identifying and describing the relative speed of the object.
- identifying and describing the qualitative indicators of the amount of energy of the object, as determined by a transfer of energy from that object.

1: Student demonstrates limited understanding of energy.

### Learning Targets - Waves and Energy Unit

#### **Science and Engineering Practices**

Use evidence (e.g., measurements, observations, patterns) to construct an explanation.

#### **Disciplinary Core Ideas**

Moving objects contain energy. The faster a given object is moving, the more energy it possesses. Energy can be moved from place to place by moving objects.

#### **Cross Cutting Concept**

Energy can be transferred in various ways and between objects.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 4.PS3.B.1

**Learning Goal**

Students can make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of energy.

3: Student demonstrates mastery with the learning goal as evidenced by:

- making and recording observations to provide evidence that energy is present whenever there are moving objects, sound, light, or heat.
- making and recording observation to provide evidence that energy has been transferred from place to place.

2: Student demonstrates he/she is nearing proficiency by:

- describing the motion and collision of objects before and after an interaction.
- describing the relative presence of sound, light, or heat before and after an interaction.
- describing the presence of electric currents flowing through wires causally linking one form of energy output to another form of energy output.
- describing that energy can be transferred from place to place by:
  - moving objects
  - sound
  - light
  - heat
  - electric currents

1: Student demonstrates limited understanding of energy.

## **Learning Targets - Waves and Energy Unit**

### **Science and Engineering Practices**

Use evidence (e.g. measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.

### **Disciplinary Core Ideas**

Energy can be moved from place to place by moving objects or through sound, light, heat and temperature change, and magnetic effects.

### **Cross Cutting Concept**

Energy can be transferred in various ways and between objects.

## High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)

Missouri Learning Goal 4.PS3.B.2

### Learning Goal

Students can apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

### Proficiency Scale

4: Student demonstrates advanced application and understanding of energy.

3: Student demonstrates mastery with the learning goal as evidenced by:

- designing a solution to a given problem that converts energy from one form to another.
- testing the device and using the results of the test to address problems in the design or improve its functioning.

2: Student demonstrates he/she is nearing proficiency by:

- designing a solution to a given problem with guidance and support that converts energy from one form to another.
- describing the initial and final forms of energy.
- identifying the device by which the energy will be transformed.

1: Student demonstrates limited understanding of energy.

### Learning Targets - Waves and Energy Unit

#### **Science and Engineering Practices**

Apply scientific ideas to solve design problems.

#### **Disciplinary Core Ideas**

Energy can 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 transforming the energy of motion into electrical energy.

#### **Cross Cutting Concept**

Energy can be transferred in various ways and between objects.



**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 4.PS3.C.1

**Learning Goal**

Students can use models to explain that simple machines change the amount of effort and/or direction of force.

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of simple machines.

3: Student demonstrates mastery with the learning goal as evidenced by:

- using 3 or more models to explain how the amount of effort and/or direction of forces is changed with a simple machine.
- describing the relationship between the amount of effort and the direction of force when using a simple machine.

2: Student demonstrates he/she is nearing proficiency by:

- using 1-2 models to explain how the amount of effort and/or direction of forces is changed with a simple machine.
- describing the effort, force, and movement of simple machines.

1: Student demonstrates limited understanding of simple machines.

**Learning Targets - Waves and Energy Unit**

**Science and Engineering Practices**

Develop a model using an analogy, example, or abstract representation to describe a scientific principle.

**Disciplinary Core Ideas**

A simple machine can change the amount of force or distance necessary to do work.

**Cross Cutting Concept**

A system can be described in terms of its components and their interactions.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 1.ESS2.D.1

**Learning Goal**

Students can identify patterns indicating relationships between observed weather data and weather phenomena (e.g., temperature and types of precipitation, clouds and amounts of precipitation)

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of weather and climate.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- identifying patterns showing the relationship between observed weather data and weather phenomena.
- 2: Student demonstrates he/she is nearing proficiency by:
- identifying the signs that different weather is going to happen.
  - describing typical attributes of weather.
- 1: Student demonstrates limited understanding of weather and climate.

**Learning Targets - Weather Unit**

**Science and Engineering Practices**

- Make observations and collect data about local weather conditions (e.g., temperature, types of precipitation, amount of precipitation, clouds, sun, wind).
- Record weather information using pictures, drawings, and/or writings of observations.
- Use observations to identify patterns and/or relationships of weather phenomena.
- Use information from observations to construct an evidence-based account for weather phenomena.
- Read grade-appropriate texts and/or use media to obtain scientific and/or technical information
- Determine patterns in and/or evidence about the natural and designed world(s).

**Disciplinary Core Ideas**

- Weather is the combination of sunlight, wind, snow or rain, and temperature at a particular time.
- Temperature varies during the day (e.g., cooler, warmer, hotter, colder).
- Types of precipitation (e.g., rain, snow, sleet, hail) Relationships between weather conditions (e.g., precipitation and clouds, temperature, type of precipitation)

- People measure weather conditions to describe and record the weather and to notice patterns and relationships over time.

**Cross Cutting Concept**

Weather events have causes that generate observable patterns (e.g., cold temperature cause snow).

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 3.ESS3.B.1

**Learning Goal**

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

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of weather and climate.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- evaluating the evidence to determine how the proposed solution addresses the problem, including the impact of the weather-related hazard after the design solution have been implemented.
  - evaluating the merits of a given solution in reducing the impact of a weather-related hazard.
  - evaluating the benefits and risks a given solution poses when responding to the societal demand to reduce the impact of the hazard.
- 2: Student demonstrates he/she is nearing proficiency by:
- identifying weather related hazards.
  - identifying problems caused by weather related hazards.
  - describing with guidance and support how a proposed solution addresses the problem.
- 1: Student demonstrates limited understanding of weather and climate.

**Learning Targets - Weather Unit**

**Science and Engineering Practices**

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.

**Disciplinary Core Ideas**

A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.

**Cross Cutting Concept**

Cause and effect relationships are routinely identified, tested, and used to explain change.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 3.ESS2.D.2

**Learning Goal**

Students can obtain and combine information to describe climates in different regions of the world.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of weather and climate.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- combining obtained information to provide evidence about the climate patterns in a region that can be used to make predictions about typical weather conditions in that region.
- 2: Student demonstrates he/she is nearing proficiency by:
- describing the difference between weather and climate.
  - collecting information about the climate of a region of the world.
- 1: Student demonstrates limited understanding of weather and climate.

**Learning Targets - Weather Unit**

- **Science and Engineering Practices**
- Obtain and combine information from books and other reliable media to explain phenomena (observable events).
- **Disciplinary Core Ideas**
- Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.
- **Cross Cutting Concept**
- Patterns of change can be used to make predictions.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 3.ESS2.D.1

**Learning Goal**

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

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of weather and climate.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- organizing and representing given data by season using tables, pictographs, and/or bar graphs including weather condition data from the same area across multiple seasons and weather conditions data from different areas.
  - using patterns of weather conditions in different seasons and different areas to predict the typical weather conditions expected during a particular season in different areas.
- 2: Student demonstrates he/she is nearing proficiency by:
- organizing and representing given data with guidance and support by season using tables, pictographs, and/or bar graphs.
  - identifying and describing weather conditions across different seasons and in different areas.
- 1: Student demonstrates limited understanding of weather and climate.

**Learning Targets - Weather Unit**

**Science and Engineering Practices**

Represent data in tables and various graphical displays (e.g., bar graphs, line graphs, pictographs) to reveal patterns that indicate relationships.

**Disciplinary Core Ideas**

Scientists record patterns of the weather across different times and areas so they can make predictions about what kind of weather might happen next.

**Cross Cutting Concept**

Patterns of change can be used to make predictions.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 4.ESS1.C.1

**Learning Goal**

Students can identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of Earth's systems and processes that shape the Earth.

3: Student demonstrates mastery with the learning goal as evidenced by:

- using reasoning to connect the evidence to support the explanation that specific rock layers in the same location show specific fossil patterns.
- using reasoning to connect the evidence to support the explanation that since lower layers were formed first then covered up by upper layers, this pattern indicates that the landscape of the area was transformed onto the landscape indicated by the upper layer.
- using reasoning to connect the evidence to support the explanation that irregularities in the patterns of rock layers indicate disruptions due to Earth forces.

2: Student demonstrates he/she is nearing proficiency by:

- identifying different rock layers found in an area.
- identifying the order of rock layers.
- identifying the presence of particular fossils.
- identifying the occurrence of events due to Earth forces.
- describing how rock layers are formed.

1: Student demonstrates limited understanding of Earth's systems and processes that shape the Earth.

## **Learning Targets - Our Dynamic Earth Unit**

### **Science and Engineering Practices**

Identify the evidence that supports particular points in an explanation.

### **Disciplinary Core Ideas**

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.

### **Cross Cutting Concept**

- Patterns can be used as evidence to support an explanation.
- For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 4.ESS2.A.1

**Learning Goal**

Students can make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, wind, or vegetation.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of Earth's systems and processes that shape the Earth.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- making and recording observations to provide evidence on how weathering breaks rocks, soil, and sediments into smaller pieces and moves them around.
  - identifying the cause and effect relationships between weathering or erosion, and Earth materials.
- 2: Student demonstrates he/she is nearing proficiency by:
- describing the kind of weathering or erosion to which the Earth material is exposed.
  - identifying a variety of forces that break down rocks, soil and sediments.
  - defining weathering and erosion and describing the similarities and differences between them.
- 1: Student demonstrates limited understanding of Earth's systems and processes that shape the Earth.

**Learning Targets - Our Dynamic Earth Unit**

**Science and Engineering Practices**

Make observations and/or measurements to provide evidence for the explanation of a pattern within a phenomenon.

**Disciplinary Core Ideas**

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.

**Cross Cutting Concept**

Cause and effect relationships are routinely identified, tested, and used to explain change.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 4.ESS2.B.1

**Learning Goal**

Students can analyze and interpret data from maps to describe patterns of Earth's features.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of Earth's systems and processes that shape the Earth.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- using maps to identify areas of the Earth where it can be predicted that features such as mountain chains, deep ocean trenches, volcanoes, and earthquake regions can occur.
  - describing that Earth features occur in patterns that reflect information about how they are formed or occur.
- 2: Student demonstrates he/she is nearing proficiency by:
- recognizing that there are areas of the earth that have common patterns such as mountain chains, deep ocean trenches, volcanoes, and earthquake regions.
  - identify the location of Earth features, including the locations of mountain ranges, deep ocean trenches, earthquakes, and volcanoes.
- 1: Student demonstrates limited understanding of Earth's systems and processes that shape the Earth.

**Learning Targets - Our Dynamic Earth Unit**

**Science and Engineering Practices**

Analyze and interpret data to make sense of phenomena using logical reasoning.

**Disciplinary Core Ideas**

The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and 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 of Earth.

|                                                                                                        |
|--------------------------------------------------------------------------------------------------------|
| <p><b>Cross Cutting Concept</b></p> <p>Patterns can be used as evidence to support an explanation.</p> |
|--------------------------------------------------------------------------------------------------------|

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 4.ESS3.A.1

**Learning Goal**

Students who demonstrate understanding can generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of Earth's systems and processes that shape the Earth.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- designing at least two solutions that reduce the impacts of natural Earth processes on humans.
  - describing and using cause and effect relationships between the Earth's processes and its observed effect.
- 2: Student demonstrates mastery with the learning goal as evidenced by:
- designing at least two solutions that reduce the impacts of natural Earth processes on humans.
  - describing and using cause and effect relationships between the Earth's processes and its observed effect.
- 1: Student demonstrates limited understanding of Earth's systems and processes that shape the Earth.

**Learning Targets - Our Dynamic Earth Unit**

**Science and Engineering Practices**

Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.

**Disciplinary Core Ideas**

A variety of hazards result from natural processes (e.g., earthquakes, floods, tsunamis, volcanic eruptions, landslides, hurricanes). Humans cannot eliminate the hazards but can take steps to reduce their impacts.

**Cross Cutting Concept**

Cause and effect relationships are routinely identified, tested, and used to explain changes.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 5.PS1.B.1

**Learning Goal**

Students can plan and conduct investigations to separate the components of a mixture/solution by their physical properties (ie. sorting, filtration, magnets, screening).

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of properties of matter.

3: Student demonstrates mastery with the learning goal as evidenced by:

- developing a plan to separate the components of a mixture/solution by its physical properties.
- collecting and recording observations about different components and their physical properties.
- describing the relationship between the physical properties of different components and the best method used to separate it from the mixture/solution.

2: Student demonstrates he/she is nearing proficiency by:

- identifying and describing the materials to be used to separate the components of a mixture/solution.
- identifying physical properties of different components.

1: Student demonstrates limited understanding of properties of matter.

**Learning Targets - Matter Unit**

**Science and Engineering Practices**

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using a fair test in which variables are controlled and the number of trials are considered.
- Describe ways to separate the components of a mixture/solution by their properties (i.e., sorting, filtration, magnets, screening).

**Disciplinary Core Ideas**

Matter exists as different substances that have observable different properties. Components of mixtures and solutions can be separated using a variety of methods, depending on the properties of the individual components.

**Cross Cutting Concept**

Cause and Effect relationships are routinely identified and used to explain change.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 5.PS1.A.1

**Learning Goal**

Students can develop a model to describe that matter is made of particles too small to be seen.

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of matter.

3: Student demonstrates mastery with the learning goal as evidenced by:

- developing a model that includes the idea that matter is made of particles too small to be seen.
- identifying the relevant components in the model of bulk matter and particles of matter that are too small to be seen.
- describing the relevant relationships between bulk matter and tiny particles that cannot be seen.

2: Student demonstrates he/she is nearing proficiency by:

- using a model to identify the relevant components of bulk matter and particles of matter that are too small to be seen.

1: Student demonstrates limited understanding of matter.

**Learning Targets - Matter Unit**

**Science and Engineering Practices**

Using models to describe phenomena

**Disciplinary Core Ideas**

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.

**Cross Cutting Concept**

Natural objects exist from the very small to the immensely large.

## High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)

Missouri Learning Goal 5.PS1.A.2

### Learning Goal

Students can 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.

### Proficiency Scale

4: Student demonstrates advanced application and understanding of the conservation of matter.

3: Student demonstrates mastery with the learning goal as evidenced by:

- measuring and/or calculating the difference between the total weight of the substances before and after they are heated, cooled, and/or mixed.
- describing the changes in properties they observe during and/or after heating, cooling, or mixing substances.
- using their measurements and calculations to describe that the total weight of the substances did not change, regardless of the reaction or changes in properties that were observed.

2: Student demonstrates he/she is nearing proficiency by:

- measuring and graphing the weight of substances before they are heated, cooled, or mixed.
- measuring and graphing the weight of substances, including any new substances produced by a reaction, after they are heated, cooled, or mixed.

1: Student demonstrates limited understanding of the conservation of matter.

### Learning Targets - Matter Unit

#### **Science and Engineering Practices**

Measure and graph quantities such as weight to address scientific and engineering questions and problems.

#### **Disciplinary Core Ideas**

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

**Cross Cutting Concept**

Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.

## High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)

Missouri Learning Goal 5.PS1.B.2

### Learning Goal

Students can conduct an investigation to determine whether the mixing of two or more substances results in new substances.

### Proficiency Scale

4: Student demonstrates advanced application and understanding of matter.

3: Student demonstrates mastery with the learning goal as evidenced by:

- describing the evidence from data that will be collected including:
  - quantitative (e.g. weight) and qualitative (e.g. state of matter, color, texture, odor) properties of the substances to be mixed).
  - quantitative and qualitative properties of the resulting substances.
- describing how the collected data can serve as evidence for whether the mixing of the two or more rested substances results in one or more new substances.

2: Student demonstrates he/she is nearing proficiency by:

- collaboratively collecting and recording data, including data about the substances before and after mixing.

1: Student demonstrates limited understanding of matter.

### Learning Targets - Matter Unit

#### **Science and Engineering Practices**

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 is considered.

#### **Disciplinary Core Ideas**

When two or more different substances are mixed, a new substance with different properties may be formed.

#### **Cross Cutting Concept**

Cause and effect relationships are routinely identified and used to explain change.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goals K.PS1.A.1 and 2.PS1.A.1

**Learning Goal**

Students can make observations and measurements to identify materials based on their properties.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of structure and properties of matter.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- describing how data will be collected through:
    - quantitative measures of properties in standard units (e.g. grams, liters).
    - observations of properties such as color, conductivity, and reflectivity.
    - determination of conductors vs. nonconductors and magnetic vs. nonmagnetic materials.
  - describing how the observations and measurements they make will allow them to identify materials based on their properties.
- 2: Student demonstrates he/she is nearing proficiency by:
- collecting and recording data on the properties of materials that can be used to identify those materials (e.g. color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility).
- 1: Student demonstrates limited understanding of structure and properties of matter.

**Learning Targets - Matter Unit**

**Science and Engineering Practices**

Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.

**Disciplinary Core Ideas**

Measurements of a variety of properties can be used to identify materials.

**Cross Cutting Concept**

Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 5.LS1.C.1

**Learning Goal**

Students can support an argument that plants get the materials (i.e. carbon dioxide, water, sunlight) they need for growth chiefly from air and water.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of energy flow in organisms.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- using reasoning to connect the evidence to support the claim with argumentation that:
    - plants do not acquire most of the material for growth from soil, because some plants don't need soil to grow.
    - a plant cannot grow without water or air.
    - plant growth must come chiefly from water and air
- 2: Student demonstrates he/she is nearing proficiency by:
- describing the given evidence, data, and/or models that support the claim.
  - showing evidence of plant growth over time and a plant's inability to grow without water or air.
- 1: Student demonstrates limited understanding of energy flow in organisms.

**Learning Targets - Ecosystems**

**Science and Engineering Practices**

Support an argument with evidence, data, or a model.

**Disciplinary Core Ideas**

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

**Cross Cutting Concept**

Matter is transported into, out of, and within systems.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 5.LS2.B.1

**Learning Goal**

Students can develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of the movement of matter in an ecosystem.

3: Student demonstrates mastery with the learning goal as evidenced by:

- developing a model describing the movement of matter within an ecosystem and identifying all of the relevant components, including:
  - matter
  - plants
  - animals
  - decomposers, such as fungi and bacteria
  - environment
- using the model to describe:
  - the cycling of matter in the system between plants, animals, decomposers, and the environment.
  - how interactions in the system of plants, animals, decomposers, and the environment allow multiple species to meet their needs.

2: Student demonstrates he/she is nearing proficiency by:

- developing a model describing the movement of matter within an ecosystem and identifying some, but not all of the relevant components, including:
  - matter
  - plants
  - animals
  - decomposers, such as fungi and bacteria

- environment
- Using the model to show:
  - animals that consume other animals.
  - animals that consume other plants.
  - organisms that consume dead plants and animals.

1: Student demonstrates limited understanding of the movement of matter in an ecosystem.

### **Learning Targets - Ecosystems**

#### **Science and Engineering Practices**

Develop a model to describe phenomena.

#### **Disciplinary Core Ideas**

- 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.
- Matter cycles between the air and soil and between 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 Concept**

A system can be described in terms of its components and their interactions. 2

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 5.PS3.D.1

**Learning Goal**

Students can 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.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of food chains and food webs.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- using models to identify and describe the relationships between all of the following:
    - plants and the energy they get from the sunlight to produce food.
    - food and the energy and materials that animals require for bodily functions (body repair, growth, motion, body warmth maintenance).
    - animals and the food they eat, which is either other animals or plants (or both), to obtain energy for bodily functions and materials for growth and repair.
- 2: Student demonstrates he/she is nearing proficiency by:
- using models to identify and describe the relationships between some, but not all of the following:
    - plants and the energy they get from the sunlight to produce food.
    - food and the energy and materials that animals require for bodily functions (body repair, growth, motion, body warmth maintenance).
    - animals and the food they eat, which is either other animals or plants (or both), to obtain energy for bodily functions and materials for growth and repair.
- 1: Student demonstrates limited understanding of food chains and food webs.

## **Learning Targets - Ecosystems**

### **Science and Engineering Practices**

Use models to describe phenomena.

### **Disciplinary Core Ideas**

- 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).
- Food provides animals with the materials they need for body repair and growth, the energy they need to maintain body warmth, and for motion.

### **Cross Cutting Concept**

Energy can be transferred in various ways and between objects.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 5.ESS2.A.1

**Learning Goal**

Students can develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

**Proficiency Scale**

4: Student demonstrates advanced application and understanding of Earth's systems and interactions between them.

3: Student demonstrates mastery with the learning goal as evidenced by:

- developing a model to show the interactions between 2 of Earth's systems.
- describing the interactions of how parts of an individual Earth system work together to affect the functioning of the Earth system and contribute to the functioning of the other relevant Earth system.

2: Student demonstrates he/she is nearing proficiency by:

- developing a model of 2 of Earth's systems.
- identifying the relationships between the 2 Earth systems.

1: Student demonstrates limited understanding of Earth's systems and the interactions between them.

**Learning Targets - Earth Unit**

**Science and Engineering Practices**

Develop a model using an example to describe a scientific principle.

**Disciplinary Core Ideas**

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 Concept**

A system can be described in terms of its components and their interactions



**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 5.ESS2.C.1

**Learning Goal**

Students can describe and graph the amounts and percentages of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

**Proficiency Scale**

4: Student demonstrates advanced application, understanding, and in-depth inferences with water distribution on Earth.

3: Student demonstrates mastery with the learning goal as evidenced by:

- graphing the given data about the amount and percentage of saltwater and freshwater in each of the following reservoirs, as well as in all the reservoirs combined:
  - oceans
  - lakes
  - rivers
  - glaciers
  - ground water
  - polar ice caps
- using the graphs to describe all of the following:
  - the majority of water on Earth is found in the oceans.
  - most of the Earth's freshwater is stored in glaciers or underground.
  - a small percentage of freshwater is found in lakes, rivers, wetlands, and the atmosphere.

2: Student demonstrates he/she is nearing proficiency by:

- graphing the given data about the amount and percentage of saltwater and freshwater in some, but not all, of the following reservoirs, as well as in all the reservoirs combined:
  - oceans
  - lakes
  - rivers

- glaciers
- ground water
- polar ice caps
- using the graphs to describe some, but not all of the following:
  - the majority of water on Earth is found in the oceans.
  - most of the Earth's freshwater is stored in glaciers or underground.
  - a small percentage of freshwater is found in lakes, rivers, wetlands, and the atmosphere.

1: Student demonstrates limited understanding of the water distribution on Earth.

### **Learning Targets - Earth Unit**

#### **Science and Engineering Practices**

Describe and graph quantities such as area and volume to address scientific questions.

#### **Disciplinary Core Ideas**

Nearly all of Earth's available water is in the oceans. Most freshwater is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.

#### **Cross Cutting Concept**

Standard units are used to measure and describe physical quantities such as weight and volume.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 5.ESS3.C.1

**Learning Goal**

Students can obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of Earth and human activity.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- obtaining and combining information from two or more sources to provide and describe evidence about the positive and negative effects on the environment as a result of human activities.
  - describing evidence about how individual communities can use scientific ideas and a scientific understanding of interactions between components of environmental systems to protect a natural resource and the environment in which the resource is found.
- 2: Student demonstrates he/she is nearing proficiency by:
- obtaining information from books and other reliable media about how a given human activity affects the Earth's resources and environments.
  - describing evidence about how a given community uses scientific ideas to protect a given natural resource and the environment in which the resource is found.
- 1: Student demonstrates limited understanding of Earth and human activity.

**Learning Targets - Earth Unit**

**Science and Engineering Practices**

Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.

**Disciplinary Core Ideas**

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 Concept**

A system can be described in terms of its components and their interactions.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 5.PS2.B.1

**Learning Goal**

Students can support an argument that the gravitational force exerted by Earth on objects is directed towards the planet's center.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of gravitational forces.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- defending the conclusion that gravitational force draws towards the Earth's center based on the location of its surface using evidence, data, or a model.
- 2: Student demonstrates he/she is nearing proficiency by:
- describing how gravitational forces are present on Earth and that this force is equal on different objects.
  - identifying that the gravitational force exerted by Earth on objects is directed down in any location.
- 1: Student demonstrates limited understanding of gravitational forces.

**Learning Targets - Space Unit**

**Science and Engineering Practices**

Support an argument with evidence, data, or a model.

**Disciplinary Core Ideas**

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

**Cross Cutting Concept**

Cause and effect relationships are routinely identified and used to explain change.

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 5.ESS1.A.1

**Learning Goal**

Students can support an argument that relative distances from Earth affects the apparent brightness of the sun compared to other stars.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of Earth's place in the universe.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- supporting an argument that the apparent brightness of the sun compared to other stars are due to their relative distances from the Earth.
- 2: Student demonstrates he/she is nearing proficiency by:
- understanding that differences in the sun's brightness and star brightness is caused by their relative distances from Earth.
  - understanding the brightness of a light source is affected by its distance from the location being measured from.
- 1: Student demonstrates limited understanding of Earth's place in the universe.

**Learning Targets - Space Unit**

**Science and Engineering Practices**

Support an argument with evidence, data, or a model.

**Disciplinary Core Ideas**

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 Concept**

Natural objects exist, from the very small to the immensely large.

## High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)

Missouri Learning Goal 5.ESS1.B.2

### Learning Goal

Students can represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearances of some stars in the night sky.

### Proficiency Scale

4: Student demonstrates advanced application and understanding of Earth's place in the universe.

3: Student demonstrates mastery with the learning goal as evidenced by:

- using data in graphical displays to connect observable patterns and their causes. These include all of the following:
  - daily patterns in length and direction of shadows.
  - daily patterns of day and night.
  - patterns of seasonal appearances of some stars in the night sky.

2: Student demonstrates he/she is nearing proficiency by:

- using data in graphical displays to connect observable patterns and their causes. These include 1-2 of the following:
  - daily patterns in length and direction of shadows.
  - daily patterns of day and night.
  - patterns of seasonal appearances of some stars in the night sky.

1: Student demonstrates limited understanding of Earth's place in the universe.

### Learning Targets - Space Unit

#### **Science and Engineering Practices**

Represent data in graphical displays (e.g. bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.

#### **Disciplinary Core Ideas**

The orbits of Earth around the sun and 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 Concept**

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

**High Priority Standards (Missouri Learning Standards, National, CREDE, etc.)**

Missouri Learning Goal 5.ESS1.B.1

**Learning Goal**

Students can make observations during different seasons to relate the amount of daylight to the time of year.

**Proficiency Scale**

- 4: Student demonstrates advanced application and understanding of Earth's place in the universe.
- 3: Student demonstrates mastery with the learning goal as evidenced by:
- identifying and describing the relationship between the amount of daylight and the time of year.
- 2: Student demonstrates he/she is nearing proficiency by:
- making and recording observations about the relative length of the day in different seasons.
- 1: Student demonstrates limited understanding of Earth's place in the universe.

**Learning Targets - Space Unit**

**Science and Engineering Practices**

- Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.
- Represent data in tables and/or various graphical displays, bar graphs, pictographs, and/or pie charts to reveal patterns that indicate relationships.
- Organize simple data sets to reveal patterns that suggest relationships.

**Disciplinary Core Ideas**

Patterns of seasons can be observed, described, and predicted.

**Cross Cutting Concept**

- Patterns of change can be used to make predictions.
- Events that occur together with regularity might or might not be a cause and effect relationship.
- Natural objects and/or observable phenomena exist, from the very small to the immensely large or from very short to very long time periods.

