SUPPORT GUIDE 3.0 FOR SECOND GRADE

SOUTH CAROLINA ACADEMIC STANDARDS AND PERFORMANCE INDICATORS FOR SCIENCE

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INTRODUCTION TO GRADE TWO STANDARDS

Science is a way of understanding the physical universe using observation and experimentation to explain natural phenomena. Science also refers to an organized body of knowledge that includes core ideas to the disciplines and common themes that bridge the disciplines. This document, *South Carolina Academic Standards and Performance Indicators for Science,* contains the academic standards in science for the state's students in kindergarten through grade twelve.

As science educators we must take a 3 dimensional approach in facilitating student learning. By addressing content standards, science and engineering practices and crosscutting concepts, students are able to have relevant and evidence based instruction that can help solve current and future problems. For more information please see: https://www.nap.edu/catalog/13165/a-framework-for-k-12-science-education-practices-crosscutting-concepts.

ACADEMIC STANDARDS

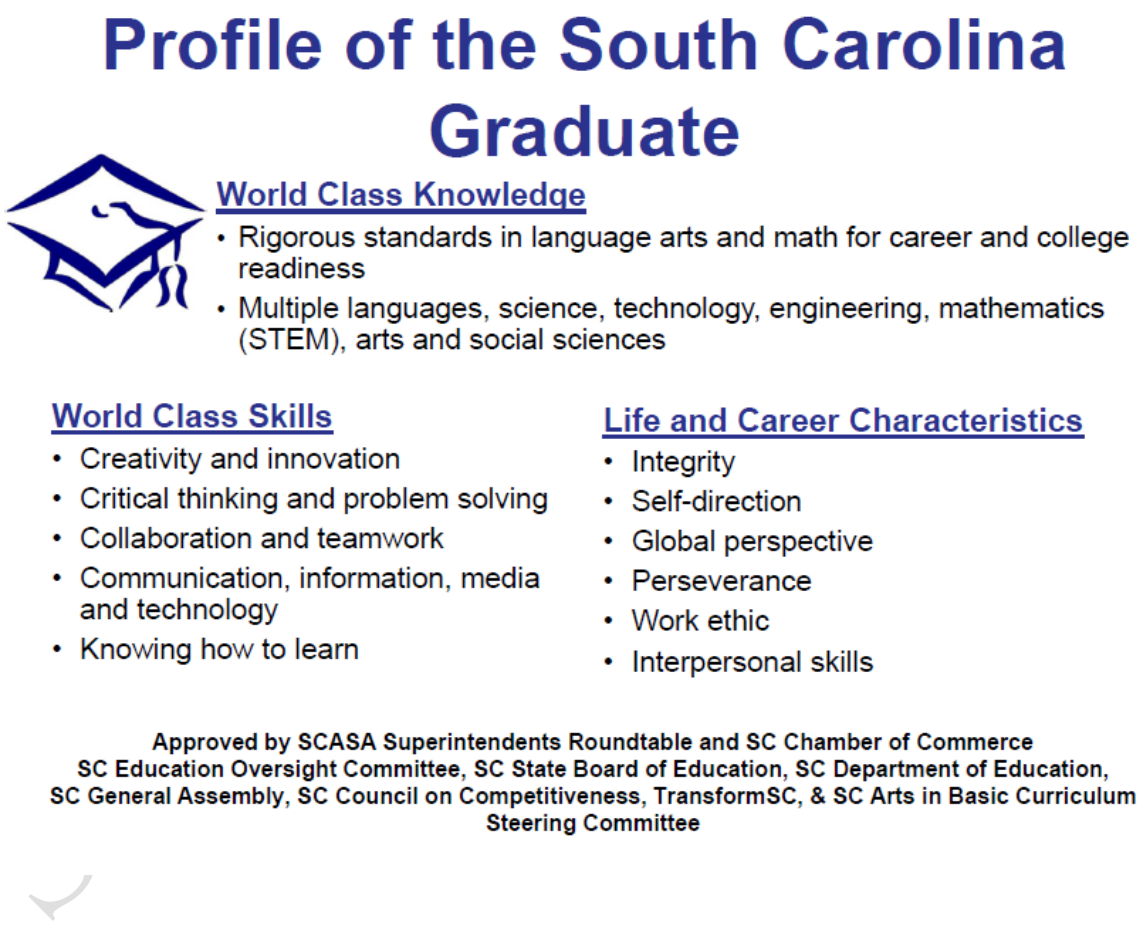
In accordance with the South Carolina Education Accountability Act of 1998 (S.C. Code Ann. § 59-18-110), the purpose of academic standards is to provide the basis for the development of local curricula and statewide assessment. Consensually developed academic standards describe for each grade and high school core area the specific areas of student learning that are considered the most important for proficiency in the discipline at the particular level.

Operating procedures for the review and revision of all South Carolina academic standards were jointly developed by staff at the State Department of Education (SCDE) and the Education Oversight Committee (EOC). According to these procedures, a field review of the first draft of the revised South Carolina science standards was conducted from March through May 2013. Feedback from that review and input from the SCDE and EOC review panels was considered and used to develop these standards.

The academic standards in this document are not sequenced for instruction and do not prescribe classroom activities; materials; or instructional strategies, approaches, or practices. The *South Carolina Academic Standards and Performance Indicators for Science* is not a curriculum.

THE PROFILE OF THE SOUTH CAROLINA GRADUATE

The *2014 South Carolina Academic Standards and Performance Indicators for Science* support the *Profile of the South Carolina Graduate. The Profile of the South Carolina Graduate* has been adopted and approved by the South Carolina Association of School Administrators (SCASA), the South Carolina Chamber of Commerce, the South Carolina Council on Competitiveness, the Education Oversight Committee (EOC), the State Board of Education (SBE), and the South Carolina Department of Education (SCDE) in an effort to identify the knowledge, skills, and characteristics a high school graduate should possess in order to be prepared for success as they enter college or pursue a career. The profile is intended to guide all that is done in support of college- and career-readiness.



SCIENCE AND ENGINEERING PRACTICES

In addition to the academic standards, each grade level or high school course explicitly identifies S*cience and Engineering Practice* standards, with indicators that are differentiated across grade levels and core areas. The term "practice" is used instead of the term "skill," to emphasize that scientists and engineers use skill and knowledge simultaneously, not in isolation. These eight science and engineering practices are:

1. Ask questions and define problems
2. Develop and use models
3. Plan and conduct investigations
4. Analyze and interpret data
5. Use mathematical and computational thinking
6. Construct explanations and design solutions
7. Engage in scientific argument from evidence
8. Obtain, evaluate, and communicate information

Students should engage in scientific and engineering practices as a means to learn about the specific topics identified for their grade levels and courses. It is critical that educators understand that the Science and Engineering Practices are ***not*** to be taught in isolation. There should ***not*** be a distinct "Inquiry" unit at the beginning of each school year. Rather, the practices need to be employed ***within the content*** for each grade level or course.

Additionally, an important component of all scientists and engineers' work is communicating their results both by informal and formal speaking and listening, and formal reading and writing. Speaking, listening, reading and writing is important not only for the purpose of sharing results, but because during the processes of reading, speaking, listening and writing, scientists and engineers continue to construct their own knowledge and understanding of meaning and implications of their research. Knowing how one's results connect to previous results and what those connections reveal about the underlying principles is an important part of the scientific discovery process. Therefore, students should similarly be reading, writing, speaking and listening throughout the scientific processes in which they engage.

For additional information regarding the development, use and assessment of the *2014 Academic Standards and Performance Indicators for Science* please see the official document that is posted on the SCDE science web page https://ed.sc.gov/scdoe/assets/file/agency/ccr/Standards-Learning/documents/South_Carolina_Academic_Standards_and_Performance_Indicators_for_Science_2014.pdf.

Support for the guidance, overviews of learning progressions, and explicit details of each SEP can be found in the Science and Engineering Support Document https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf.

CROSSCUTTING CONCEPTS

Seven common threads or themes are presented in *A Framework for K-12 Science Education* (2012). These concepts connect knowledge across the science disciplines (biology, chemistry, physics, earth and space science) and have value to both scientists and engineers because they identify universal properties and processes found in all disciplines. These crosscutting concepts are:

1. Patterns
2. Cause and Effect: Mechanism and Explanation
3. Scale, Proportion, and Quantity
4. Systems and System Models
5. Energy and Matter: Flows, Cycles, and Conservation
6. Structure and Function
7. Stability and Change

These concepts should not to be taught in isolation but reinforced in the context of instruction within the core science content for each grade level or course.

The link http://www.nap.edu/read/13165/chapter/8 provides support from the framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012) that gives further guidance on each crosscutting concept.

1. **Patterns:** The National Research Council (2012) states that "observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them" (p. 84).
2. **Cause and Effect: Mechanism and Explanation:** The National Research Council (2012) states that "events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts" (p. 84).
3. **Scale, Proportion, and Quantity:** The National Research Council (2012) states that "in considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance" (p. 84).
4. **Systems and Systems Models:** The National Research Council (2012) states that "Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering" (p. 84).
5. **Energy and Matter:** Flows, cycles, and conservation. Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.
6. **Structure and Function:** The National Research Council (2012) states that "the way in which an object or living thing is shaped and its substructure determine many of its properties and functions" (p. 84).
7. **Stability and Change:** The National Research Council (2012) states that "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" (p. 84).

DECIPHERING THE STANDARDS

Kindergarten
Life Science: Exploring Organisms and the Environment

Standard K.L.2: The student will demonstrate an understanding of the effects of forces on the motion and stability of an object.

K.L.2A. Conceptual Understanding: The environment consists of many types of organisms including plants, animals, and fungi. Organisms depend on the land, water, and air to live and grow. Plants need water and light to make their own food. Fungi and animals cannot make their own food and get energy from other sources. Animals (including humans) use different body parts to obtain food and other resources needed to grow and survive. Organisms live in areas where their needs for air, water, nutrients, and shelter are met.

Performance Indicators: Students who demonstrate this understanding can:

K.L.2A.1 Obtain information to answer questions about different organisms found in the environment (such as plants, animals, or fungi).

Figure 1: Example from the Kindergarten Standards

The code assigned to each performance indicator within the standards is designed to provide information about the content of the indicator. For example, the **K.L.2A.1** indicator decodes as the following:

K: The first part of each indicator denotes the grade or subject. The example indicator is from Kindergarten. The key for grade levels are as follows:

K: Kindergarten
1: First Grade
2: Second Grade
3: Third Grade
4: Fourth Grade
5: Fifth Grade
6: Sixth Grade
7: Seventh Grade
8: Eighth Grade
H.B: High school Biology I
H.B: High School Chemistry I
H.P: High school Physics I
H.E: High School Earth Science

L: After the grade or subject, the content area is denoted by an uppercase letter. The L in the example indicator means that the content covers Life Science. The key for content areas are as follows:
E: Earth Science
EC: Ecology
L: Life Science
P: Physical Science
S: Science and Engineering Practices

2: The number following the content area denotes the specific academic standard. In the example, the 2 in the indicator means that it is within the second academic standard with the Kindergarten science content.

A: After the specific content standard, the conceptual understanding is denoted by an uppercase letter. The conceptual understanding is a statement of the core idea for which students should demonstrate understanding. There may be more than one conceptual understanding per academic standard. The A in the example means that this is the first conceptual understanding for the standard. Additionally, the conceptual understandings are novel to the *2014 South Carolina Academic Standards and Performance Indicators for Science*.

1: The last part of the code denotes the number of the specific performance indicator. Performance indicators are statements of what students can do to demonstrate knowledge of the conceptual understanding. The example discussed is the first performance indicator within the conceptual understanding.

CORE AREAS OF GRADE TWO

- Earth Science: Weather
- Physical Science: Properties of Solids and Liquids
- Physical Science: Exploring Pushes and Pulls
- Life Science: Animals and Their Environments

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CONTENT SUPPORT GUIDE
FOR GRADE TWO
SOUTH CAROLINA ACADEMIC STANDARDS AND PERFORMANCE INDICATORS

INTRODUCTION

Local districts, schools and teachers may use this document to construct standards-based science curriculum, allowing them to add or expand topics they feel are important and to organize content to fit their students' needs and match available instructional materials. The support document includes standard, conceptual understanding, performance indicator, science and engineering practices, crosscutting concepts, essential learning experiences, extended learning experiences, assessment guidelines, learning connections, and in some cases note to teacher.

FORMAT OF THE CONTENT SUPPORT GUIDE

The format of this document is designed to be structurally uniformed for each of the academic standards and performance indicators. For each, you will find the following sections--

Standard
- This section provides the standard being explicated.

Conceptual Understanding
- This section provides the overall understanding that the student should possess as related to the standard. Additionally, the conceptual understandings are novel to the *2014 South Carolina Academic Standards and Performance Indicators for Science*.

Performance Indicator
- This section provides a specific set of content with an associated science and engineering practice for which the student must demonstrate mastery.

Science and Engineering Practices (SEPs)
- This section lists the specific science and engineering practice that are paired with the content in the performance indicator. Educators should reference the chapter on this specific science and engineering practice in the *Science and Engineering Practices Support Guide.*
- Educators have the freedom to enhance SEPs addressed during instruction.
- SEPs Support Guide https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Crosscutting Concepts (CCCs)
- Cross Cutting Concepts (http://www.nap.edu/read/13165/chapter/8) This link provides support from the Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2012).
- Educators have the freedom to enhance CCCs addressed during instruction.

Essential Learning Experiences

- This section illustrates the knowledge of the content contained in the performance indicator for which it is fundamental for students to demonstrate mastery.

Note to Teacher

- If necessary or appropriate, this section provides additional instructional guidance.

Extended Learning Experiences

- This section provides educators with topics that will enrich students' knowledge related to topics learned with the explicated performance indicator.

Assessment Guidelines

- This section provides guidelines for educators and assessors to check for student mastery of content utilizing interrelated science and engineering practices.

Learning Connections

- This section provides a list of academic content along with the associated academic standard that students will have received in prior or will experience in future grade levels.

Earth Science: Weather

Standard 2.E.2 The student will demonstrate an understanding of the daily and seasonal weather patterns.	
2.E.2A. Conceptual Understanding: Weather is the combination of sunlight, wind, precipitation (rain, sleet, snow, and hail), and temperature in a particular region at a particular time. Scientists measure and record these conditions to describe the weather and to identify patterns over time. Weather scientists (meteorologists) forecast severe weather so that communities can prepare for and respond to these events.	
Performance Indicator	**2.E.2A.1:** Analyze and interpret data from observations and measurements to describe local weather conditions (including temperature, wind, and forms of precipitation).
Science and Engineering Practice	**2.S.1.A.4:** Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation or graphing) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Patterns

Essential Learning Experiences:
It is essential that students analyze and interpret data from a variety of sources to describe local weather conditions.

- Weather conditions can be described using specific weather terminology.
  - Temperature
    - How hot or cold the air is at a given time.
    - Each day the high and low temperatures are recorded.
    - A thermometer can be used to record temperature in degrees Fahrenheit or degrees Celsius.
  - Precipitation
    - The type of water falling from the clouds is rain, snow, sleet, or hail.
    - Rain gauge is used to measure rainfall in centimeters/inches.
  - Wind direction
    - The direction from which the wind blows.
    - The windsock or wind vane is used to determine wind direction.
  - Wind speed
    - How fast or slow the wind blows.
    - Wind speed is recorded in miles per hour (mph)/kilometers per hour (km/h).

NOTE TO TEACHER: This may be an opportunity for students to collect, organize, and represent data with up to four categories using picture graphs and bar graphs with a single-unit scale.

Extended Learning Experiences:

- Students should be able to use pictorial weather symbols to analyze and describe weather patterns and conditions, and also use pictorial weather symbols to justify observations.
- Students should be familiar with the Beaufort Wind Scale for reporting wind speed.

Assessment Guidelines:

Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Previous Learning Connections (K-1):** **K.E.3A.1:** Analyze and interpret local weather condition data (including precipitation, wind, temperature, and cloud cover) to describe weather patterns that occur from day to day, using simple graphs and pictorial weather symbols. **Future Learning Connections (3-5):** **4.E.2B.1:** Analyze and interpret data from observations, measurements, and weather maps to describe patterns in local weather conditions (including temperature, precipitation, wind speed/direction, relative humidity, and cloud types) and predict changes in weather over time.

Earth Science: Weather

Standard 2.E.2 The student will demonstrate an understanding of the daily and seasonal weather patterns.	
2.E.2A. Conceptual Understanding: Weather is the combination of sunlight, wind, precipitation (rain, sleet, snow, and hail), and temperature in a particular region at a particular time. Scientists measure and record these conditions to describe the weather and to identify patterns over time. Weather scientists (meteorologists) forecast severe weather so that communities can prepare for and respond to these events	
Performance Indicator	**2.E.2A.2:** Analyze local weather data to predict daily and seasonal patterns over time.
Science and Engineering Practice	**2.S.1.A.4:** Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation or graphing) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Patterns Stability and Change

Essential Learning Experiences:
It is essential that students analyze and interpret data from a variety of sources to explain and predict local daily and seasonal patterns over time.

- Descriptions of the seasons are as follows:
  - Winter: The weather may be cold or freezing; there may be rain, snow, or sleet.
  - Spring: The weather starts to get warmer; there may be a lot of rain.
  - Summer: The weather is often hot and dry; there may be little or no rain.
  - Fall/Autumn: The weather starts to get cooler; there may be little or no rainfall.

NOTE TO TEACHER: This may be an opportunity for students to collect, organize, and represent data with up to four categories using picture graphs and bar graphs with a single-unit scale.

For students moving into our communities that are not native to South Carolina, they may come from areas that do not experience the four seasons in the same months that we do. Some areas experience seasons of rain and little/no rain and some areas only experience two definite seasons.

Extended Learning Experiences:

- Measure air pressure or humidity conditions, to use other weather instruments, or use the Beaufort Wind Scale.
- Understand that the seasons form the astronomy perspective-revolution around the sun and tilt of Earth's axis.
- Keep track of weather using various media sources.

Assessment Guidelines:

Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Previous Learning Connections (K-1):** **K.E.3A.1:** Analyze and interpret local weather condition data (including precipitation, wind, temperature, and cloud cover) to describe weather patterns that occur from day to day, using simple graphs and pictorial weather symbols. **Future Learning Connections (3-5):** **4.E.2B.1:** Analyze and interpret data from observations, measurements, and weather maps to describe patterns in local weather conditions (including temperature, precipitation, wind speed/direction, relative humidity, and cloud types) and predict changes in weather over time.

Earth Science: Weather

Standard 2.E.2 The student will demonstrate an understanding of the daily and seasonal weather patterns.	
2.E.2A. Conceptual Understanding: Weather is the combination of sunlight, wind, precipitation (rain, sleet, snow, and hail), and temperature in a particular region at a particular time. Scientists measure and record these conditions to describe the weather and to identify patterns over time. Weather scientists (meteorologists) forecast severe weather so that communities can prepare for and respond to these events.	
Performance Indicator	**2.E.2A.3:** Develop and use models to describe and compare the effects of wind (moving air) on objects.
Science and Engineering Practice	**2.S.1.A.2:** Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others. 4S.1A.3 Plan and conduct scientific.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Cause and Effect

Essential Learning Experiences:
It is essential that students develop, use, and refine models in order to describe and compare the effects of wind (moving air) on objects.

- Examples of things that are affected by moving air are kites, leaves, or sailboats.
- If there is no moving air, then neither the kite, leaves, or sailboat will move.
- Moving air can also be called wind.

Extended Learning Experiences:

- Measure the effects of moving air on objects.

Assessment Guidelines:
Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Future Learning Connections (3-5):** **4.E.2B.1:** Analyze and interpret data from observations, measurements, and weather maps to describe patterns in local weather conditions (including temperature, precipitation, wind speed/direction, relative humidity, and cloud types) and predict changes in weather over time.

Earth Science: Weather

Standard 2.E.2 The student will demonstrate an understanding of the daily and seasonal weather patterns.	
2.E.2A. Conceptual Understanding: Weather is the combination of sunlight, wind, precipitation (rain, sleet, snow, and hail), and temperature in a particular region at a particular time. Scientists measure and record these conditions to describe the weather and to identify patterns over time. Weather scientists (meteorologists) forecast severe weather so that communities can prepare for and respond to these events.	
Performance Indicator	**2.E.2A.4:** Obtain and communicate information about severe weather conditions to explain why certain safety precautions are necessary.
Science and Engineering Practice	**2.S.1.A.8:** Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support hypotheses, explanations, claims, or designs. Communicate observations and explanations using the conventions and expectations of oral and written language**.**
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Cause and Effect Scale, Proportion, and Quantity

Essential Learning Experiences:
It is essential that students obtain and evaluate informational texts, observations, or data collected to explain why certain safety precautions are necessary during severe weather.

Some examples of severe weather conditions and the associated safety precautions that are most common to South Carolina are listed below:

- Flood
  - Stay on high ground.
- Lightning storms
  - Stay indoors or low to the ground.
- Tornado
  - Stay indoors away from windows; go to the basement or a windowless room.
- Thunderstorm
  - Do not stand under a tree; stay away from water (pools, puddles, bathtubs.)
- Hurricane
  - Stay indoors away from windows; follow an evacuation route to a safer place away from the hurricane's path.

NOTE TO TEACHER: The above safety precautions are general rules to follow when not at school. At school, students need to know to follow emergency procedures as directed by an adult. Students need to understand why we take the safety precautions listed above.

Extended Learning Experiences:

- Identify safety precautions of other types of severe weather conditions that are not typical of South Carolina.
- Students devise and implement a plan with their families for safety and discuss with classmates.

Assessment Guidelines:

Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Future Learning Connections (3-5):** **4.E.2B.2:** Obtain and communicate information about severe weather phenomena (including thunderstorms, hurricanes, and tornadoes) to explain steps humans can take to reduce the impact of severe weather phenomena.

Physical Science: Solids and Liquids

Standard 2.P.3 The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.	
2.P.3A. Conceptual Understanding: Solids and liquids are two forms of matter that have distinct observable properties. Some matter can be mixed together and then separated again. Solids and liquids can be changed from one form to another when heat is added or removed.	
Performance Indicator	**2.P.3A.1:** Analyze and interpret data from observations and measurements to describe the properties used to classify matter as a solid or a liquid.
Science and Engineering Practice	**2.S.1.A.4:** Analyze and interpret data from informational texts, observations, measurements, or investigations using a range of methods (such as tabulation or graphing) to (1) reveal patterns and construct meaning or (2) support hypotheses, explanations, claims, or designs.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Structure and Function

Essential Learning Experiences:
It is essential that students analyze and interpret data from a variety of sources in order to describe the properties that are used to classify solids and liquids.

- Liquid
  - A liquid is a form of matter that does not have its own shape.
  - A liquid takes the shape of the container it is in.
  - A liquid can flow, be poured, or spilled. A liquid can change to a solid by freezing, for example, water to ice cubes.
- Solids
  - A solid is the only form of matter that has its own shape. Some examples of solids are chairs, rocks, or tables.
  - Some properties of solids are color, shape, size, weight, texture, buoyancy (sinks or floats), hardness, and magnetism.

NOTE TO TEACHER: This may be an opportunity for students to draw conclusions from t-charts, object graphs, picture graphs, and bar graphs.

Extended Learning Experiences:
- Liquids can be poured to fill containers to a measurable level.

- Heating or cooling can cause a substance to change. Some changes are reversible, such as melting and freezing. Some changes are irreversible, such as baking a cake or burning fuel.

Assessment Guidelines:
Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Previous Learning Connections (K-1):** **K.P.4:** The student will demonstrate an understanding of the observable properties of matter. **Future Learning Connections (3-5):** **3.P.2:** The student will demonstrate an understanding of the properties used to classify matter and how heat energy can change matter from one state to another. **5.P.2:** The student will demonstrate an understanding of the physical properties of matter and mixtures.

Physical Science: Solids and Liquids

Standard 2.P.3 The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.	
2.P.3A. Conceptual Understanding: Solids and liquids are two forms of matter that have distinct observable properties. Some matter can be mixed together and then separated again. Solids and liquids can be changed from one form to another when heat is added or removed.	
Performance Indicator	**2.P.3A.2:** Develop and use models to exemplify how matter can be mixed together and separated again based on the properties of the mixture.
Science and Engineering Practice	**2.S.1A.2:** Develop and use models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Cause and Effect Energy and Matter

Essential Learning Experiences:
It is essential that students develop and use models to exemplify how matter can be mixed together and separated again based on the properties of the mixture.

- For example, a salad may contain lettuce, tomatoes, and cucumbers. The ingredients can be mixed all together and then separated out again.
- A handful of different coins or buttons and separating them out into the individual types of coins or buttons.
- The properties of mixtures relate to the physical properties of the substances combined.

NOTE TO TEACHER: This may be an opportunity for students to draw conclusions from t-charts, object graphs, picture graphs, and bar graphs.

Extended Learning Experiences:
- A solution is a type of mixture in which one substance is dissolved in another, such as sugar water.

Assessment Guidelines:
Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Previous Learning Connections (K-1):** **K.P.4:** The student will demonstrate an understanding of the observable properties of matter. **Future Learning Connections (3-5):** **3.P.2:** The student will demonstrate an understanding of the properties used to classify matter and how heat energy can change matter from one state to another. **5.P.2:** The student will demonstrate an understanding of the physical properties of matter and mixtures.

Physical Science: Solids and Liquids

Standard 2.P.3 The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.	
2.P.3A. Conceptual Understanding: Solids and liquids are two forms of matter that have distinct observable properties. Some matter can be mixed together and then separated again. Solids and liquids can be changed from one form to another when heat is added or removed.	
Performance Indicator	**2.P.3A.3:** Conduct structured investigations to test how adding or removing heat can cause changes in solids and liquids.
Science and Engineering Practice	**2.S.1A.3:** With teacher guidance, conduct structured investigations to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Cause and Effect Energy and Matter Structure and Function

Essential Learning Experiences:
It is essential that students, with teacher guidance, conduct structured investigations to test how adding or removing heat can cause changes in solids and liquids.

- When heat is added the following may occur:
  - a solid may melt and change to a liquid solid ice melts and changes to liquid water
  - solid butter, chocolate, popsicles, or ice cream will melt into a liquid
- When heat is removed the following may occur:
  - solids and liquids cool liquids can freeze and change to a solid (ice)
  - melted wax will harden into the shape of its container

NOTE TO TEACHER: Scientific tools used to gather data and make measurements related to adding or removing heat to solids and liquids could include a solar cooker (a device which uses the energy of direct sunlight to heat or cook a food or drink), hot plate (for safety purposes the use a hot plate should be teacher demonstration only), and a cooler or freezer.

Extended Learning Experiences:
- Liquids other than water can freeze and then melt.
- When liquids freeze, they will freeze into the shape of the container.
- Water expands when it freezes.

Assessment Guidelines:
Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Future Learning Connections (3-5):** **3.P.2:** The student will demonstrate an understanding of the properties used to classify matter and how heat energy can change matter from one state to another. **5.P.2:** The student will demonstrate an understanding of the physical properties of matter and mixtures.

Physical Science: Solids and Liquids

Standard 2.P.3 The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.	
2.P.3A. Conceptual Understanding: Solids and liquids are two forms of matter that have distinct observable properties. Some matter can be mixed together and then separated again. Solids and liquids can be changed from one form to another when heat is added or removed.	
Performance Indicator	**2.P.3A.4:** Construct scientific arguments using evidence from investigations to support claims that some changes in solids or liquids are reversible and some are not when heat is added or removed.
Science and Engineering Practice	**2.S.1A.7:** Construct scientific arguments to support claims or explanations using evidence from observations or data collected.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Cause and Effect Energy and Matter Structure and Function

Essential Learning Experiences:
It is essential that students use evidence from structured investigations to construct scientific arguments to support claims or explanations that, when heat is added or removed, some changes in solids or liquids are reversible and some are not.

- Solid to a liquid
  - For example, when solid butter, chocolate, popsicles, or ice cream are heated, the items may melt into a liquid.
- Liquid to a solid
  - For example, when melted wax cools, it will harden into the shape of its container.
  - Some of these changes are reversible, such as removing heat to freeze water into ice is reversed when heat is added to melt ice back into water.
  - Some of these changes are irreversible, such as adding heat to liquid cake batter to cook it into a solid cake; this cannot be reversed by removing the heat.

NOTE TO TEACHER: Scientific tools used to gather data and make measurements related to adding or removing heat to solids and liquids could include a solar cooker (a device which uses the energy of direct sunlight to heat or cook a food or drink), hot plate (for safety purposes the use of a hot plate should be teacher demonstration only), and a cooler or freezer.

Extended Learning Experiences:

- Research or investigate changes from solids to gases or liquids to gases to determine if they are reversible or not when heat is added or removed.

Assessment Guidelines:

Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Previous Learning Connections (K-1):** **K.P.4:** The student will demonstrate an understanding of the observable properties of matter. **Future Learning Connections (3-5):** **3.P.2:** The student will demonstrate an understanding of the properties used to classify matter and how heat energy can change matter from one state to another. **5.P.2:** The student will demonstrate an understanding of the physical properties of matter and mixtures.

Physical Science: Solids and Liquids

Standard 2.P.3 The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.	
2.P.3B. Conceptual Understanding: Magnets are a specific type of solid that can attract and repel certain other kinds of materials, including other magnets. There are some materials that are neither attracted to nor repelled by magnets. Because of their special properties, magnets are used in various ways.	
Performance Indicator	**2.P.3B.1:** Conduct structured investigations to answer questions about how the poles of magnets attract and repel each other.
Science and Engineering Practice	**2.S.1A.3:** With teacher guidance, conduct structured investigations to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Patterns Cause and Effect Structure and Function

Essential Learning Experiences:
It is essential that students conduct structured investigations, record and represent data, and develop explanations about how the poles of magnets attract and repel each other.

- A magnet has two poles. These poles are called the North Pole (N) or the South Pole (S).
- If the poles that are alike (North to North or South to South) are put together, they repel or push away.
- If the poles that are different (North to South or South to North) are put together, they attract or stick together.
- Some magnets, for example ring magnets, do not have the (N) or the (S) marked on them but they do have two poles that are either located on the top or bottom of the magnet.
- The poles can be determined by placing the magnets together. If they stay together then the poles are opposite but if they push away from each other the poles are alike.

NOTE TO TEACHER: Scientific tools used to investigate the poles of magnets (horseshoe magnets, bar magnets, ring magnets, cow magnets, iron filings). For safety purposes the use of iron filings should be teacher demonstration only.

Extended Learning Experiences:

- Magnetic force (pushes and pulls) can be created by magnets. The magnetic force is invisible and is called magnetism.

Assessment Guidelines:

Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Previous Learning Connections (K-1):** **K.P.4:** The student will demonstrate an understanding of the observable properties of matter. **Future Learning Connections (3-5):** **3.P.3B:** Magnets can exert forces on other magnets or magnetizable materials causing energy transfer between them, even when the objects are not touching. An electromagnet is produced when an electric current passes through a coil of wire wrapped around an iron core. Magnets and electromagnets have unique properties. **5.P.2:** The student will demonstrate an understanding of the physical properties of matter and mixtures. **5.P.2B.6:** Design and test the appropriate method(s) (such as filtration, sifting, attraction to magnets, evaporation, chromatography, or floatation) for separating various mixtures.

Physical Science: Solids and Liquids

Standard 2.P.3 The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets.	
2.P.3B. **Conceptual Understanding:** Magnets are a specific type of solid that can attract and repel certain other kinds of materials, including other magnets. There are some materials that are neither attracted to nor repelled by magnets. Because of their special properties, magnets are used in various ways.	
Performance Indicator	**2.P.3B.2:** Analyze and interpret data from observations to compare the effects of magnets on various materials.
Science and Engineering Practice	**2.S.1A.4:** Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see 6. Patterns Cause and Effect Structure and Function

Essential Learning Experiences:
It is essential that students analyze and interpret data from a variety of sources in order to compare the effects of magnets on various materials.

- A magnet has two poles. These poles are called the North pole (N) or the South pole (S).
- If the poles that are alike (North to North or South to South) are put together, they repel or push away.
- If the poles that are different (North to South or South to North) are put together, they attract or stick together.
- Some magnets, for example ring magnets, do not have the (N) or the (S) marked on them but they do have two poles that are either located on the top or bottom of the magnet.
- The poles can be determined by placing the magnets together. If they stay together then the poles are opposite but if they push away from each other the poles are alike.

NOTE TO TEACHER: Scientific tools used to investigate the poles of magnets (horseshoe magnets, bar magnets, ring magnets, cow magnets, and iron filings). For safety purposes the use of iron filings should be teacher demonstration only.

Extended Learning Experiences:
- Magnetic force (pushes and pulls) can be created by magnets. The magnetic force is invisible and is called magnetism.

Assessment Guidelines:
Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Previous Learning Connections (K-1):** **K.P.4:** The student will demonstrate an understanding of the observable properties of matter. **Future Learning Connections (3-5):** **3.P.3B:** Magnets can exert forces on other magnets or magnetizable materials causing energy transfer between them, even when the objects are not touching. An electromagnet is produced when an electric current passes through a coil of wire wrapped around an iron core. Magnets and electromagnets have unique properties. **5.P.2:** The student will demonstrate an understanding of the physical properties of matter and mixtures. **5.P.2B.6:** Design and test the appropriate method(s) (such as filtration, sifting, attraction to magnets, evaporation, chromatography, or floatation) for separating various mixtures.

Physical Science: Exploring Pushes and Pulls

Standard 2.P.4 The student will demonstrate an understanding of the effects of pushes, pulls, and friction on the motion of objects.	
2.P.4A. Conceptual Understanding: An object that is not moving will only move if it is pushed or pulled. Pushes and pulls can vary in strength and direction and can affect the motion of an object. Gravity is a pull that makes objects fall to the ground. Friction is produced when two objects come in contact with each other and can be reduced if needed.	
Performance Indicator	**2.P.4A.1:** Analyze and interpret data from observations and measurements to compare the effects of different strengths and directions of pushing and pulling on the motion of an object.
Science and Engineering Practice	**2.S.1A.4:** Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Cause and Effect Scale, Proportion, and Quantity Stability and Change

Essential Learning Experiences:
It is essential that students analyze and interpret data from a variety of sources in order to compare the effects of different strengths and directions of pushing and pulling on the motion of an object.

- Pushes and pulls can make objects move faster, slower, stop, or change directions.
- If the strength of a push or pull increases, an object will move faster. If the strength of a push or pull decreases, an object will move slower.
- Heavier objects will move slower than lighter objects if the push or pull is the same for both.
- If a push or a pull is applied to a moving object it can change the direction and or speed of the object.
- If the push or pull is in a direction that is not the direction the object is moving, it will change direction.
- If the push or pull is in the same direction as the moving object, the object will speed up.
- If the push or pull is in the opposite direction as the moving object, the object will slow down or stop.
- Magnetism, gravity, and friction are different types of pushes or pulls that can affect motion.

NOTE TO TEACHER: Scientific tools used to measure force include: magnets, rulers, measuring tapes, meter sticks.

Assessment Guidelines:
Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Future Learning Connections (3-5):** **5.P.5:** The student will demonstrate an understanding of the factors that affect the motion of an object.

Physical Science: Exploring Pushes and Pulls

Standard 2.P.4 The student will demonstrate an understanding of the effects of pushes, pulls, and friction on the motion of objects.	
2.P.4A. Conceptual Understanding: An object that is not moving will only move if it is pushed or pulled. Pushes and pulls can vary in strength and direction and can affect the motion of an object. Gravity is a pull that makes objects fall to the ground. Friction is produced when two objects come in contact with each other and can be reduced if needed.	
Performance Indicator	**2.P.4A.2:** Develop and use models to exemplify the effects of pushing and pulling on an object.
Science and Engineering Practice	**2.S.1A.2:** Develop and use models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Cause and Effect Scale, Proportion, and Quantity Energy and Matter Stability and Change

Essential Learning Experiences:
It is essential that students develop and use models to exemplify how different strengths and directions of pushes and pulls will affect the movement of an object.

The following are true on flat surfaces:

- If the strength of a push or pull increases, an object will move faster. If the strength of a push or pull decreases, an object will move slower.
- Heavier objects will move slower than lighter objects if the push or pull is the same for both.
- If a push or a pull is applied to a moving object it can change the direction and or speed of the object.
- If the push or pull is in a direction that is not the direction the object is moving, it will change direction.
- If the push or pull is in the same direction as the moving object, the object will speed up.
- If the push or pull is in the opposite direction as the moving object, the object will slow down or stop.
- Magnetism, gravity, and friction are different types of pushes or pulls that can affect motion.

Assessment Guidelines:
Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Future Learning Connections (3-5):** **5.P.5:** The student will demonstrate an understanding of the factors that affect the motion of an object.

Physical Science: Exploring Pushes and Pulls

Standard 2.P.4 The student will demonstrate an understanding of the effects of pushes, pulls, and friction on the motion of objects.	
2.P.4A. Conceptual Understanding: An object that is not moving will only move if it is pushed or pulled. Pushes and pulls can vary in strength and direction and can affect the motion of an object. Gravity is a pull that makes objects fall to the ground. Friction is produced when two objects come in contact with each other and can be reduced if needed.	
Performance Indicator	**2.P.4A.3:** Construct explanations of the relationship between the motion of an object and the pull of gravity using observations and data collected.
Science and Engineering Practice	**2.S.1A.6:** Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Cause and Effect Scale, Proportion, and Quantity Energy and Matter Stability and Change

Essential Learning Experiences:
It is essential that students use data from a variety of sources in order to explain the relationship between the motion of an object and the pull of gravity.

- If things go up on Earth, gravity pulls them down.
- Things fall to Earth because they are pulled by Earth's gravity.
- The pull of gravity is everywhere on Earth.
- The pull of gravity holds things down on Earth all the time.
- No matter whether an object is dropped or thrown, it will always fall toward the Earth's surface unless there is a push or pull stronger than the pull of the Earth's gravity.

Assessment Guidelines:
Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Future Learning Connections (3-5):** **5.P.5:** The student will demonstrate an understanding of the factors that affect the motion of an object.

Physical Science: Exploring Pushes and Pulls

Standard 2.P.4 The student will demonstrate an understanding of the effects of pushes, pulls, and friction on the motion of objects.	
2.P.4A. Conceptual Understanding: An object that is not moving will only move if it is pushed or pulled. Pushes and pulls can vary in strength and direction and can affect the motion of an object. Gravity is a pull that makes objects fall to the ground. Friction is produced when two objects come in contact with each other and can be reduced if needed.	
Performance Indicator	**2.P.4A.4:** Conduct structured investigations to answer questions about the relationship between friction and the motion of objects.
Science and Engineering Practice	**2.S.1A.3:** With teacher guidance, conduct structured investigations to answer scientific questions, test predictions and develop explanations: (1) predict possible outcomes, (2) identify materials and follow procedures, (3) use appropriate tools or instruments to collect qualitative and quantitative data, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Cause and Effect Scale, Proportion, and Quantity Energy and Matter Stability and Change

Essential Learning Experiences:
It is essential that students conduct structured investigations to explain the relationship between friction and the motion of objects.

- Friction is a pull that acts against motion.
- The following influence the effect of friction:
    - Texture of the surface
        - Rough surfaces tend to create more friction.
        - Smooth surfaces tend to create less friction.
    - Lubrication
        - Lubrication, for example oil or grease, reduces the effects of friction.
        - Without lubrication, moving parts of machines would slow down or stop very quickly.

Assessment Guidelines:
Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
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Learning Connections	**Future Learning Connections (3-5):** **5.P.5A.4:** Analyze and interpret data to describe how a change of force, a change in mass, or friction affects the motion of an object.

Physical Science: Exploring Pushes and Pulls

Standard 2.P.4 The student will demonstrate an understanding of the effects of pushes, pulls, and friction on the motion of objects.	
2.P.4A. Conceptual Understanding: An object that is not moving will only move if it is pushed or pulled. Pushes and pulls can vary in strength and direction and can affect the motion of an object. Gravity is a pull that makes objects fall to the ground. Friction is produced when two objects come in contact with each other and can be reduced if needed.	
Performance Indicator	**2. P.4A.5:** Define problems related to the effects of friction and design possible solutions to reduce the effects on the motion of an object.
Science and Engineering Practice	**2.S.1B.1:** Construct devices or design solutions to solve specific problems or needs: (1) ask questions to identify problems or needs, (2) ask questions about the criteria and constraints of the devices or solutions, (3) generate and communicate ideas for possible devices or solutions, (4) build and test devices or solutions, (5) determine if the devices or solutions solved the problem, and (6) communicate the results.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Cause and Effect Scale, Proportion, and Quantity Energy and Matter Stability and Change

Essential Learning Experiences:
It is essential that students define problems and construct, test, and communicate possible design solutions to show how friction affects the motion of an object.

- Friction is a pull that acts against motion.
- The following influence the effect of friction:
  - Texture of the surface
    - Rough surfaces tend to create more friction.
    - Smooth surfaces tend to create less friction.
  - Lubrication
    - Lubrication, for example oil or grease, reduces the effects of friction.
    - Without lubrication, moving parts of machines would slow down or stop very quickly.

Assessment Guidelines:
Students should engage in multiple science and engineering practices when interacting with the content outlined in this performance indicator. For further information please see SEP Support Guide at:
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Learning Connections	**Future Learning Connections (3-5):** **5.P.5:** The student will demonstrate an understanding of the factors that affect the motion of an object.

Life Science: Animals and Their Environments

Standard 2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.	
2.L.5A. Conceptual Understanding: There are many different groups of animals. One way to group animals is by using their physical characteristics. Animals have basic needs that provide for energy, growth, reproduction, and protection. Animals have predictable characteristics at different stages of development.	
Performance Indicator	**2.L.5A.1:** Obtain and communicate information to classify animals (such as mammals, birds, amphibians, reptiles, fish, or insects) based on their physical characteristics.
Science and Engineering Practice	**2.S.1A.8:** Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations. Communicate observations and explanations using oral and written language.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Patterns Systems and System Models Structure and Function Stability and Change

Essential Learning Experiences:
It is essential that students use a variety of sources to obtain and communicate information about animals and their characteristics in order to classify the animals into groups based on their similarities. Animals can be classified by their physical characteristics, such as their method of modality, their method of obtaining food, or their production of young.

Animals can be classified into the following groups:

- Insects
  - Insects have antennae, three body parts, and six legs and usually have wings.
  - Examples of insects are ants, butterflies, or bees.
  - Spiders are not insects.
- Fish
  - Fish have fins, live in water, and breathe through gills.
  - Some examples of fish are goldfish, guppies, or sharks.

- Amphibians
  - Amphibians live both on land and in water.
  - Amphibians have moist skins and no scales.
  - Most amphibians lay eggs in water, and the young breathe with gills before developing lungs and breathing air as adults.
  - Some examples of amphibians are salamanders, frogs, or toads.
- Reptiles
  - Reptiles have scales or rough, dry skin
  - Some examples of reptiles are snakes, lizards, and turtles.
- Birds
  - Birds have a bill or beak, feathers, wings, and lay eggs.
  - Some examples of birds are parrots, ostriches, or penguins
- Mammals
  - Mammals have fur or hair, usually give birth to live young, and can nurse their young with milk.
  - Some examples of mammals are humans, dogs, or cows

Assessment Guidelines:
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Learning Connections	**Previous Learning Connections (K-1):** **K.L.2A.3:** Develop and use models to exemplify how animals use their body parts to (1) obtain food and other resources, (2) protect themselves, and (3) move from place to place **Future Learning Connections (3-5):** **4.L.5A.1:** Obtain and communicate information about the characteristics of plants and animals to develop models which classify plants as flowering or non-flowering and animals as vertebrate or invertebrate.

Life Science: Animals and Their Environment

Standard 2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.	
2.L.5A. Conceptual Understanding: There are many different groups of animals. One way to group animals is by using their physical characteristics. Animals have basic needs that provide for energy, growth, reproduction, and protection. Animals have predictable characteristics at different stages of development.	
Performance Indicator	**2.L.5A.2:** Construct explanations for how structures (including structures for seeing, hearing, grasping, protection, locomotion, and obtaining and using resources) of different animals help them survive.
Science and Engineering Practice	**2.S.1A.6:** Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Patterns Systems and System Models Structure and Function Stability and Change

Essential Learning Experiences:
It is essential that students gather data from a variety of sources to construct explanations of how an animal's physical structure helps them survive.

These body parts are used for:

- Seeing
  - Animals have eyes for finding food or for seeing other animals that may attack.
    - For example, owls and other birds of prey have exceptional eyesight for finding small rodents.
- Hearing
  - Animals have ears of different sizes that allow them to hear approaching danger or animals they might eat.
    - For example, white-tailed deer have large ears to hear. They can then run away from dangerous animals (predators).

- Grasping Objects
  - Animals have structures for grasping objects.
    - For example, chimpanzees have hands for holding food or tree branches; raccoons have hands that hold food; humans use their hands to hold objects for many purposes (eating, working, and defense).
- Obtaining Food and Other Resources
  - Animals have specialized structures used for obtaining food.
    - For example the beaks of birds, mouths of insects, teeth, or claws. Their feeding structures are specialized to enable them to eat the food available in their environment.
- Protection
  - Some animals have special body parts for defense or protection from being hurt, killed, or eaten.
    - For example quills and claws; wings for taking flight; spraying; camouflage.
- Movement
  - In order for animals to find the resources they need for food, shelter, or space, they must be able to move around.
  - Animals have special structures for moving depending on where they live; for example above ground (swinging, climbing and flying), on the ground (crawling, walking, hopping), or in the water (floating, swimming and diving).
  - The movement of animals over the same route in the same season each year is called migration. This behavior allows animals to take advantage of resources (like food and water) in one location when they run low in another location.

Assessment Guidelines:
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Learning Connections	**Previous Learning Connections (K-1):** **K.L.2A.5**: Construct explanations from observations of what animals need to survive and grow (including air, water, nutrients, and shelter). **Future Learning Connections (3-5):** **4.L.5B.3:** Construct explanations for how structural adaptations (such as methods for defense, locomotion, obtaining resources, or camouflage) allow animals to survive in the environment.

Life Science: Animals and Their Environment

Standard 2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.	
2.L.5A. Conceptual Understanding: There are many different groups of animals. One way to group animals is by using their physical characteristics. Animals have basic needs that provide for energy, growth, reproduction, and protection. Animals have predictable characteristics at different stages of development.	
Performance Indicator	**2. L.5A.3:** Construct explanations using observations and measurements of an animal as it grows and changes to describe the stages of development of the animal.
Science and Engineering Practice	**2.S.1A.6:** Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of scientific investigations, or (3) data communicated in graphs, tables, or diagrams
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Patterns Systems and System Models Structure and Function Stability and Change

Essential Learning Experiences:
It is essential that students have gather data from a variety of sources to construct explanations to describe the stages of development of various animals.

The birth and stages of development organisms go through during their lifespan and ends with the organism dying.

There are two ways that animals are born:

- Live from the mother or hatched from eggs.
  - Some examples of animals that give live birth are humans, dogs, whales, or deer (nearly all mammals).
  - Some examples of animals that hatch from eggs are birds, fish, turtles, alligators, or insects.

Once the animals are born, their stages of development can be different.

- Some animals, for example chickens, are born looking like their parents, and continue to grow into adult chickens.
- Other animals, for example frogs and moths, are born looking different from their parents and go through different stages and change considerably at each stage. (Metamorphosis)

NOTE TO TEACHER: Some animal species within a group may hatch from eggs or give live birth that is different from most of the species. For example, some types of rattlesnakes, guppies, and sharks appear to give live birth, while the duckbill platypus, a mammal, lays eggs.

Assessment Guidelines:
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https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Previous Learning Connections (K-1):** **K.L.2A.5:** Construct explanations from observations of what animals need to survive and grow (including air, water, nutrients, and shelter). **Future Learning Connections (3-5):** **4.L.5B.3:** Construct explanations for how structural adaptations (such as methods for defense, locomotion, obtaining resources, or camouflage) allow animals to survive in the environment.

Life Science: Animals and Their Environment

Standard 2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.	
2.L.5B. Conceptual Understanding: Animals (including humans) require air, water, food, and shelter to survive in environments where these needs can be met. There are distinct environments in the world that support different types of animals. Environments can change slowly or quickly. Animals respond to these changes in different ways. .	
Performance Indicator	**2.L.5B.1:** Obtain and communicate information to describe and compare how animals interact with other animals and plants in the environment.
Science and Engineering Practice	**2.S.1A.8:** Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions about the natural world, (2) understand phenomena, (3) develop models, or (4) support explanations. Communicate observations and explanations using oral and written language.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Patterns Systems and System Models Structure and Function Stability and Change

Essential Learning Experiences:
It is essential that students obtain information from a variety of sources in order to communicate how animals interact with other animals and plants in their environment.

- Plants produce oxygen that animals need for breathing.
- Plants are sources of food for many animals and can provide shelter for other animals. For example, cows eat grass for food and some insects eat leaves; or for shelter, some trees serve as homes for small animals, such as squirrels, birds, or insects.
- Animals produce carbon dioxide, which plants need in order to make food. Some animals can be a source of nutrients for plants. For example, animal waste (such as manure from cows and chickens, or guano from bats) can become fertilizer for plants.

Assessment Guidelines:
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https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Previous Learning Connections (K-1):** **K.L.2A.1:** Obtain information to answer questions about different organisms found in the environment (such as plants, animals, or fungi). **K.L.2A.5:** Construct explanations from observations of what animals need to survive and grow (including air, water, nutrients, and shelter). **K.L.2A.6:** Obtain and communicate information about the needs of organisms to explain why they live in particular areas. **Future Learning Connections (3-5):** **4.L.5B.1:** Develop and use models to compare how humans and other animals use their senses and sensory organs to detect and respond to signals from the environment. **3.L.5B.2:** Develop and use models to explain how changes in a habitat cause plants and animals to respond in different ways (such as hibernating, migrating, responding to light, death, or extinction).

Life Science: Animals and Their Environment

Standard 2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.	
2.L.5B. Conceptual Understanding: Animals (including humans) require air, water, food, and shelter to survive in environments where these needs can be met. There are distinct environments in the world that support different types of animals. Environments can change slowly or quickly. Animals respond to these changes in different ways.	
Performance Indicator	**2.L.5B.2:** Develop and use models to exemplify characteristics of animals that help them survive in distinct environments (such as salt and freshwater, deserts, forests, wetlands, or polar lands).
Science and Engineering Practice	**2.S.1A.2:** Develop and use models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Patterns Systems and System Models Structure and Function Stability and Change

Essential Learning Experiences:
It is essential that students use scientific evidence to develop and use models to exemplify how certain characteristics of animals help them survive in distinct environments.

There are distinct environments in the world (for example, salt and freshwater, deserts, forests, wetlands, or polar lands) that support the life of different types of animals.

Animals have characteristics that help them survive in these distinct environments.

- Saltwater
  - Ocean water can be very cold; therefore marine mammals like whales have a thick layer of blubber (fat) to keep them warm.
  - A shark has fins and a streamlined body to help it move quickly through the water, gills for getting oxygen out of the water, and very sharp teeth for eating other marine animals.
  - At the deepest levels of the ocean, it can be very dark, so those organisms have adapted to survive without the need for light.

- Freshwater
    - Rivers and lakes are freshwater habitats that are home to trees and plants along the edges and many fish, insects, turtles, and birds.
- Deserts
    - Animals that live in the desert have structures that help them cope with a shortage of water, extreme changes in temperature, and a shortage of food.
    - Many desert animals get water directly from the food they eat, so they don't have to search for water.
    - Many desert animals have structures for digging burrows in the sand, where they stay during the hot daytime, for example, lizards.
- Forests
    - Forests have many plants and trees in them. Many animals that live in the forest eat the plants for their food.
    - American forests have distinct seasons, with cold winters where there is limited food available and hot summers during which there may be drought. Many forest animals have adapted to this by hibernating.

Assessment Guidelines:
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https://ed.sc.gov/scdoe/assets/File/instruction/standards/Science/Support%20Documents/Complete_2014SEPsGuide_SupportDoc2_0.pdf

Learning Connections	**Previous Learning Connections (K-1):** **K.L.2A.5:** Construct explanations from observations of what animals need to survive and grow (including air, water, nutrients, and shelter). **K.L.2A.6:** Obtain and communicate information about the needs of organisms to explain why they live in particular areas. **1.L.5B.2:** Develop and use models to compare how the different characteristics of plants help them survive in distinct environments (including deserts, forests, and grasslands). **Future Learning Connections (3-5):** **3.L.5B.2:** Develop and use models to explain how changes in a habitat cause plants and animals to respond in different ways (such as hibernating, migrating, responding to light, death, or extinction). **4.L.5B.3:** Construct explanations for how structural adaptations (such as methods for defense, locomotion, obtaining resources, or camouflage) allow animals to survive in the environment.

Life Science: Animals and Their Environment

Standard 2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.	
2.L.5B. Conceptual Understanding: Animals (including humans) require air, water, food, and shelter to survive in environments where these needs can be met. There are distinct environments in the world that support different types of animals. Environments can change slowly or quickly. Animals respond to these changes in different ways. .	
Performance Indicator	**2.L.5B.3:** Analyze and interpret data from observations to describe how animals respond to changes in their environment (such as changes in food availability, water, or air).
Science and Engineering Practice	**2.S.1A.4:** Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see page 6. Patterns Systems and System Models Structure and Function Stability and Change

Essential Learning Experiences:
It is essential that students analyze and interpret data from a variety of sources in order to describe how animals respond to changes in their environment.

- The number of animals in an environment will increase or decrease depending on the availability of food and other resources.
- Insects produce large numbers of offspring because many of their offspring become food for other animals.
- The temperature, amount of rainfall, and the vegetation in an environment can affect how an animal reacts to its environment.
- Animals may hibernate or migrate to other areas when the temperature becomes too cold and food becomes scarce. For example, bears, whales, or migratory birds.

Assessment Guidelines:
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Learning Connections	**Previous Learning Connections (K-1):** **1.L.5B.3:** Analyze and interpret data from observations to describe how changes in the environment cause plants to respond in different ways (such as turning leaves toward the Sun, leaves changing color, leaves wilting, or trees shedding leaves). **Future Learning Connections (3-5):** **3.L.5B.2:** Develop and use models to explain how changes in a habitat cause plants and animals to respond in different ways (such as hibernating, migrating, responding to light, death, or extinction). **4.L.5B.2:** Construct explanations for how structural adaptations (such as the types of roots, stems, or leaves; color of flowers; or seed dispersal) allow plants to survive and reproduce. **4.L.5B.3:** Construct explanations for how structural adaptations (such as methods for defense, locomotion, obtaining resources, or camouflage) allow animals to survive in the environment.

Life Science: Animals and Their Environment

Standard 2.L.5 The student will demonstrate an understanding of how the structures of animals help them survive and grow in their environments.	
2.L.5B. Conceptual Understanding: Animals (including humans) require air, water, food, and shelter to survive in environments where these needs can be met. There are distinct environments in the world that support different types of animals. Environments can change slowly or quickly. Animals respond to these changes in different ways. .	
Performance Indicator	**2.L.5B.4:** Construct scientific arguments to explain how animals can change their environments (such as the shape of the land or the flow of water).
Science and Engineering Practice	**2.S.1A.7:** Construct scientific arguments to support claims or explanations using evidence from observations or data collected.
Crosscutting Concepts	The Crosscutting Concepts listed below may be applied to the content of this indicator. For more information see 6. Patterns Systems and System Models Structure and Function Stability and Change

Essential Learning Experiences:
It is essential that students use evidence from observations or data collected to construct arguments to explain how animals can change their environments.

- Humans change environments in ways that can be either harmful or helpful for themselves and other organisms. Some examples of human behaviors that change environments may be:
  - Cutting down trees to use the logs for building homes or businesses, but replacing the cut trees by planting new trees.
  - Building a dam on a river that backs up the water to create a lake for recreational use
  - Using chemicals to control insects or weeds.

- Other animals also impact the environments. Some of these changes can be harmful and some can be helpful. Some examples of how other animals can change the environment may be:
  - Herd animals (cattle) might overgraze land leading to erosion, but they can also fertilize the fields on which they graze and new plants can grow.
  - Beavers build dams which block or change the flow of water, which can create pond environments for new plants and animals can survive, but can also cause flooding of homes.

Assessment Guidelines:
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Learning Connections	**Future Learning Connections (3-5):** **5.L.4B.4:** Construct scientific arguments to explain how limiting factors (including food, water, space, and shelter) or a newly introduced organism can affect an ecosystem.

References

National Research Council. A Framework for k-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas. Washington, DC: The National Academies Press, 2012. doi: 10.17226/13165.

South Carolina Department of Education. (2015). South Carolina Academic Standards and Performance Indicators for Science 2014. Retrieved from http://ed.sc.gov/scdoe/assets/file/agency/ccr/StandardsLearning/documents/South_Carolina_Academic_Standards_and_Performance_Indicators_for_Science_2014.pdf