SUPPORT GUIDE 3.0 FOR FIRST GRADE

SOUTH CAROLINA ACADEMIC STANDARDS AND PERFORMANCE INDICATORS FOR SCIENCE

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SOUTH CAROLINA
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INTRODUCTION TO GRADE ONE 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.

Profile of the South Carolina Graduate

World Class Knowledge

- Rigorous standards in language arts and math for career and college readiness
- Multiple languages, science, technology, engineering, mathematics (STEM), arts and social sciences

World Class Skills

- Creativity and innovation
- Critical thinking and problem solving
- Collaboration and teamwork
- Communication, information, media and technology
- Knowing how to learn

Life and Career Characteristics

- Integrity
- Self-direction
- Global perspective
- Perseverance
- Work ethic
- Interpersonal skills

Approved by SCASA Superintendents Roundtable and SC Chamber of Commerce SC Education Oversight Committee, SC State Board of Education, SC Department of Education, SC General Assembly, SC Council on Competitiveness, TransformSC, & SC Arts in Basic Curriculum Steering Committee

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 ONE

- Physical Science: Exploring Light and Shadows
- Earth Science: Exploring the Sun and Moon
- Earth Science: Earth's Natural Resources
- Life Science: Plants and Their Environments

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CONTENT SUPPORT GUIDE
FOR GRADE ONE
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.

Physical Science: Exploring Light and Shadows

Standard 1.P.2 The student will demonstrate an understanding of the properties of light and how shadows are formed.	
1.P.2A. Conceptual Understanding: Objects can only be seen when light shines on them. Some materials allow light to pass through them; others allow only some light to pass through; and some do not allow any light to pass through and will create a shadow of the object. Technology such as mirrors can change the direction of a beam of light.	
Performance Indicator	**1.P.2A.1:** Obtain and communicate information to describe how light is required to make objects visible.
Science and Engineering Practice	**1.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 clearly through 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 Cause and Effect Stability and Change

Essential Learning Experiences:
It is essential that students obtain and communicate information to describe how light is required to make objects visible. In order for an object to be visible, it must either give off its own light (be a source of light) or it must reflect light:

- If there is no light, then it is impossible to see an object.
- The Sun, a candle flame, or a flashlight gives off visible light.
- The Moon and many objects around us reflect light in order to be seen.

NOTE TO TEACHER: A scientific tool students may use to demonstrate the properties of light and how shadows are formed includes a flashlight.

Extended Learning Experiences:
The following knowledge and learning experiences are not essential to the success of this learning goal but can be used by teachers to extend the depth and rigor of student engagements.

- The intensity of light, or brightness, is related to the amount of light being seen.
- The closer the source of light is, the greater the brightness.
- "White light" is made up of many different colors.

- Objects absorb some light waves and reflect some light waves.

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 (2-5):** **4.P.4A.3:** Obtain and communicate information to explain how the visibility of an object is related to light.

Physical Science: Exploring Light and Shadows

Standard 1.P.2 The student will demonstrate an understanding of the properties of light and how shadows are formed.	
1.P.2A. Conceptual Understanding:. Objects can only be seen when light shines on them. Some materials allow light to pass through them; others allow only some light to pass through; and some do not allow any light to pass through and will create a shadow of the object. Technology such as mirrors can change the direction of a beam of light.	
Performance Indicator	**1.P.2A.2:** Analyze and interpret data from observations to compare how light behaves when it shines on different materials.
Science and Engineering Practice	**1.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 Cause and Effect Stability and Change

Essential Learning Experiences:
It is essential that students analyze and interpret data to compare how light behaves when it shines on different materials.

- Light behaves differently when it strikes different types of materials. Some materials allow light to pass through them.
- Objects can be seen clearly when viewed through materials that allow light to pass through.
- Air, glass, and water are examples of these materials. Some materials allow only some light to pass through.
- Objects appear as blurry shapes when viewed through materials that only allow some light to pass through.
- Waxed paper and frosted glass are examples of materials that allow some light to pass through. Some materials do not allow any light to pass through.
- Wood, metals, and cardboard are examples of materials that do not allow any light to pass through.

Extended Learning Experiences:
The following knowledge and learning experiences are not essential to the success of this learning goal but can be used by teachers to extend the depth and rigor of student engagements.

- Students could use the terms transparent, translucent, or opaque as an extension of this knowledge.

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 (2-5):** **2.P.3:** The student will demonstrate an understanding of the observable properties of solids and liquids and the special properties of magnets. **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. **4.P.4A.4:** Develop and use models to describe how light travels and interacts when it strikes an object (including reflection, refraction, and absorption) using evidence from observations. **4.P.4A.5:** Plan and conduct scientific investigations to explain how light behaves when it strikes transparent, translucent, and opaque materials

Physical Science: Exploring Light and Shadows

Standard 1.P.2 The student will demonstrate an understanding of the properties of light and how shadows are formed.	
1.P.2A. Conceptual Understanding: Objects can only be seen when light shines on them. Some materials allow light to pass through them; others allow only some light to pass through; and some do not allow any light to pass through and will create a shadow of the object. Technology such as mirrors can change the direction of a beam of light.	
Performance Indicator	**1.P.2A.3:** Conduct structured investigations to answer questions about how shadows change when the position of the light source changes.
Science and Engineering Practice	**1.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 Stability and Change

Essential Learning Experiences:
It is essential that students conduct structured investigations to answer questions about how shadows change when the position of the light source changes.

- The position of a light source affects the appearance of a shadow.
- Shadows change size and location depending on the position of the light source.
- Light travels in a straight line away from a light source until an object blocks it.
- When an object blocks light, the object casts a shadow.
- When the distance between the light source and an object changes, the size of the shadow changes.
- When the position of the light source to the object changes, the location of the shadow changes. This can be observed over the course of a sunny day by measuring and observing the size and position of the shadows cast by objects outside.

NOTE TO TEACHER: When conducting the structured investigations, students will discover how the position and location of the light source affects the shadow of an object.
Students should explore and discover the following:

- Shadows grow larger as the light source moves toward an object. Shadows grow smaller as the light source moves away from an object.
- When the light source shines down from directly above the object; there will be a very small shadow or no shadow at all. For example, when the Sun is directly overhead, trees cast short shadows or no shadow at all.
- Moving the light source up (from the bottom to the top) in front of an object causes the shadow to grow shorter.
- Moving the light source down (from the top to the bottom) in front of an object causes the shadow to grow taller.
- Moving the light source to the left causes the shadow to move to the right. Moving the light source to the right causes the shadow to moves to the left.
- A scientific tool that students may use conduct structured investigations to answer questions about how shadows change when the position of the light source changes include a flashlight.

Extended Learning Experiences:
The following knowledge and learning experiences are not essential to the success of this learning goal but can be used by teachers to extend the depth and rigor of student engagements.

- The shape of the shadow of an object can change depending on the angle of the light source and the shape of the object. For example, a pumpkin with a stem will produce a round shadow if the light source is located near the bottom of the pumpkin. Moving the light source toward the top of the pumpkin will produce a shadow that is round and includes a stem.

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 (2-5):** **4.E.3B.3:** Construct explanations of how the Sun appears to move throughout the day using observations of shadows.

Physical Science: Exploring Light and Shadows

Standard 1.P.2 The student will demonstrate an understanding of the properties of light and how shadows are formed.	
1.P.2A. Conceptual Understanding:. Objects can only be seen when light shines on them. Some materials allow light to pass through them; others allow only some light to pass through; and some do not allow any light to pass through and will create a shadow of the object. Technology such as mirrors can change the direction of a beam of light.	
Performance Indicator	**1.P.2A.4:** Develop and use models to describe what happens when light shines on mirrors based on observations and data collected.
Science and Engineering Practice	**1.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 Cause and Effect Stability and Change

Essential Learning Experiences:
It is essential that students develop and use models to describe what happens when light shines on mirrors.

Light travels in a straight line away from the light source.

- Mirrors:
  - A mirror (plane/flat) is a tool that reflects light.
  - Mirrors can be used to redirect light toward a given direction.
  - Mirrors can also be used to see around corners and behind you.
- Reflection:
  - When light strikes a mirror, it is reflected.
  - When light is reflected, it bounces back from a surface.
  - When light bounces off a mirror, the direction of the light changes.

NOTE TO TEACHER: A mirror is a tool that can be used to reflect light. However, all visible objects reflect some light. Students may have misconceptions that only mirrors or shiny objects reflect light. Scientific tools that can be used to investigate what happens when light shines on mirrors include mirrors and flashlights.

Extended Learning Experiences:
The following knowledge and learning experiences are not essential to the success of this learning goal but can be used by teachers to extend the depth and rigor of student engagements.

- Images reflected in a mirror are different from the actual object. Mirror images are actually reversals of the image.
- Curved mirrors can be used to magnify or reduce the size of images reflected by them

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 (2-5):** **4.P.4A.4:** Develop and use model to describe how light travels and interacts when it strikes an object (including reflection, refraction, and absorption) using evidence from observations.

Earth Science: Exploring the Sun and Moon

Standard 1.E.3 The student will demonstrate an understanding of the patterns of the Sun and the Moon and the Sun's effect on Earth.	
1.E.3A. Conceptual Understanding: Objects in the sky move in predictable patterns. Some objects are better seen in the day sky and some are better seen in the night sky. The Sun is a star that provides heat and light energy for Earth.	
Performance Indicator	**1.E.3A.1:** Use, analyze, and interpret data from observations to describe and predict seasonal patterns of sunrise and sunset.
Science and Engineering Practice	**1.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 Cause and Effect Stability and Change

Essential Learning Experiences:
It is essential that students use, analyze, and interpret data from observations, measurements, or investigations to describe and predict seasonal patterns of sunrise and sunset.

- The Earth turns (rotates) and the Sun appear to rise and set.
- The Sun appears to move across the sky during the day. It is lower in the sky in the morning (sunrise) and in the evening (sunset).

Day sky

- The day sky is when there is enough light from the Sun to see.
    - Examples of features found in the day sky might include the Sun, the moon, clouds, birds, or airplanes.
- The Sun is the only star seen in the day sky.
- Sunrise and sunset do not occur at the same times during the year and do not occur at the same times at other locations in the world.

NOTE TO TEACHER: This may be an appropriate opportunity for students to collect, organize, and represent data using picture graphs or tallies and then to draw conclusions from the representations.

Extended Knowledge
Students can use a sundial as a device that can be utilized to tell time by the position of the sun. The sun's position in the sky affects the size of shadows.

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 (2-5):** **2.E.2A.2:** Analyze local weather data to predict daily and seasonal patterns over time.

Earth Science: Exploring the Sun and Moon

Standard 1.E.3 The student will demonstrate an understanding of the patterns of the Sun and the Moon and the Sun's effect on Earth.	
1.E.3A. Conceptual Understanding: Objects in the sky move in predictable patterns. Some objects are better seen in the day sky and some are better seen in the night sky. The Sun is a star that provides heat and light energy for Earth.	
Performance Indicator	**1.E.3A.2:** Use data from personal observations to describe, predict, and develop models to exemplify how the appearance of the moon changes over time in a predictable pattern.
Science and Engineering Practice	**1.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 Cause and Effect Stability and Change

Essential Learning Experiences:
It is essential that students develop and use models, along with data from personal observations to exemplify how the appearance of the moon changes over time in a predictable pattern.

- The Moon's appearance changes over time.
- The Moon is a ball of rock that moves around Earth.
- The Moon goes around earth about once every month.
- The Moon does not make its own light.
- The Moon can be seen because the sun's light shines on it.
- As the Moon moves around Earth, it appears to change shape. For example, we can see the entire Moon, part of the Moon, or none of the Moon.
- The appearance of the Moon changes shape in a regular pattern each month

NOTE TO TEACHER: This may be an appropriate opportunity for students to collect, organize, and represent data using picture graphs or tallies and then to draw conclusions from the representations.

Extended Knowledge

- Create a moon calendar and record patterns over a month's time.
- Research and write facts about the moon.
- Create a chart showing phases of the moon.

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 (2-5):** **4.E.3B.1:** Analyze and interpret data from observations to describe patterns in the (1) location, (2) movement, and (3) appearance of the Moon throughout the year.

Earth Science: Exploring the Sun and Moon

Standard 1.E.3 The student will demonstrate an understanding of the patterns of the Sun and the Moon and the Sun's effect on Earth.	
1.E.3A. Conceptual Understanding: Objects in the sky move in predictable patterns. Some objects are better seen in the day sky and some are better seen in the night sky. The Sun is a star that provides heat and light energy for Earth.	
Performance Indicator	**1.E.3A.3:** Obtain and communicate information to describe how technology has enabled the study of the Sun, the Moon, planets, and stars.
Science and Engineering Practice	**1.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 clearly through 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. Pattern Cause and Effect Stability and change

Essential Learning Experiences:
It is essential that students obtain, evaluate, and communicate information to describe how technology has enabled man to study the Sun, the Moon, planets, and stars.

- Powerful telescopes can be used to learn about the sun, moon, planets, and stars.
- Man-made satellites are machines that are launched by rockets into space and are used by scientist to study the sun, moon, planets, and stars.
- Some man-made satellites take pictures of the sun, moon, planets, and stars.

Extended Knowledge:
Satellites come in many shapes and sizes.
They contain two basic parts; an antennae and a power source.

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	This indicator will not be addressed again in grades 2-5.

Earth Science: Exploring the Sun and Moon

Standard 1.E.3 The student will demonstrate an understanding of the patterns of the Sun and the Moon and the Sun's effect on Earth.	
1.E.3A. Conceptual Understanding: Objects in the sky move in predictable patterns. Some objects are better seen in the day sky and some are better seen in the night sky. The Sun is a star that provides heat and light energy for Earth.	
Performance Indicator	**1.E.3A.4:** Conduct structured investigations to answer questions about the effect of sunlight on Earth's surface.
Science and Engineering Practice	**1.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 Stability and Change

Essential Learning Experiences:
It is essential that students conduct structured investigations to answer questions about the effect of sunlight on Earth's surface.

The Sun is a star in the daytime sky that provides energy in the form of heat and light.

- The heat from the Sun provides warmth for Earth's surfaces.
- Without the Sun, Earth would be too cold to live on.
- Plants need the light from the Sun so that they can make their own food.
- To measure the effects of sun's heat on earth's materials.
    - For example: soil (warmth of soil enables growth for plants) and water.

Extended Knowledge
Conduct structured investigations to answer questions about three different areas and try to determine the effect of sunlight on that particular area.

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	This indicator will not be addressed again in grades 2-5.

Earth Science: Exploring the Sun and Moon

Standard 1.E.3 The student will demonstrate an understanding of the patterns of the Sun and the Moon and the Sun's effect on Earth.	
1.E.3A. Conceptual Understanding: Objects in the sky move in predictable patterns. Some objects are better seen in the day sky and some are better seen in the night sky. The Sun is a star that provides heat and light energy for Earth.	
Performance Indicator	**1.E.3A.5:** Define problems related to the warming effect of sunlight and design possible solutions to reduce its impact on a particular area.
Science and Engineering Practice	**1.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. Patterns Cause and Effect Stability and Change

Essential Learning Experiences:
It is essential that students construct devices or design solutions to solve specific problems related to the warming effect of sunlight.

- The Sun provides warmth and light to Earth's surfaces.
- If an area is shielded from the Sun, the temperature effect will be less.

Extended Knowledge
Test solutions and redesign solutions based on test results.

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	This indicator will not be addressed again in grades 2-5.

Earth Science: Earth's Natural Resources

Standard 1.E.4 The student will demonstrate an understanding of the properties and uses of Earth's natural resources	
1.E.4A. Conceptual Understanding: Earth is made of different materials, including rocks, sand, soil, and water. An Earth material is a resource that comes from Earth. Earth materials can be classified by their observable properties	
Performance Indicator	**1.E.4A.1:** Analyze and interpret data from observations and measurements to compare the properties of Earth materials (including rocks, soils, sand, and water).
Science and Engineering Practice	**1.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 Energy and Matter

Essential Learning Experiences:
It is essential that students analyze and interpret data to compare the properties of Earth materials. An Earth material is defined as a resource that comes from Earth.

Types of Earth materials include:

- Rocks
  - Rocks are hard, solid, non-living materials that make up Earth.
  - Rocks come in many different shapes, sizes, and colors and can be classified into different groups based on similar characteristics.
  - Rocks and sand can be classified by their physical appearance. Examples of physical appearances used to classify rocks and sand might include color, size and shape, texture (rough or smooth), shiny or dull.
- Sand
  - Sand is made of tiny pieces of rock.
- Soil
  - Different soils have different properties.
  - Soils can be sorted by color, texture, and the capacity to nourish growing plants.
  - Soil is the loose, top layer of Earth's surface made up of pieces of rock, sand, water, air, and pieces of dead organisms.
  - The type of soil used the most for supporting life is the topsoil.
  - Nutrients in soil are used to grow plants.

- Water
    - Water is one of our most valuable resources on Earth.
    - Every living thing needs water to survive.
    - Water covers most of Earth, but only a small portion of it can be used for drinking. It can be saltwater or freshwater.
    - Water is a liquid that takes the shape of its container. For example, water on Earth may be found in containers known as lakes, ponds, or oceans.
    - Water will flow downhill.
    - Water flows in streams and rivers toward the ocean.
    - Water feels wet.
    - Water is needed by all living things.

NOTE TO TEACHER: This may be an appropriate opportunity for students to collect, organize, and represent data using picture graphs or tallies and then to draw conclusions from the representations. Additionally, students may be required to order up to 3 objects by length using indirect comparison (i.e. sorting rocks from a distance).

Extended Knowledge
Students can begin to research classification of rocks.
Students can begin to investigate layers of soil.

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 (2-5):** **3.E.4A.1:** Analyze and interpret data from observations and measurements to describe and compare different Earth materials (including rocks, minerals, and soil) and classify each type of material based on its distinct physical properties

Earth Science: Earth's Natural Resources

Standard 1.E.4 The student will demonstrate an understanding of the properties and uses of Earth's natural resources	
1.E.4A. Conceptual Understanding: Earth is made of different materials, including rocks, sand, soil, and water. An Earth material is a resource that comes from Earth. Earth materials can be classified by their observable properties	
Performance Indicator	**1.E.4A.2:** Develop and use models (such as drawings or maps) to describe patterns in the distribution of land and water on Earth and classify bodies of water (including oceans, rivers and streams, lakes, and ponds).
Science and Engineering Practice	**1.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

Essential Learning Experiences:
It is essential that students develop and use models to represent an understanding of the relationships between water and land on Earth.

- Classify bodies of water as freshwater or saltwater.
- Compare and contrast different bodies of water (oceans vs. lakes, rivers vs. ponds, etc.)
- There are more bodies of water in comparison to the amount of continental land.

Extended Knowledge
Students can classify other bodies of water, like, estuaries, swamps, etc.
Students can differentiate between additional bodies of 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	**Future Learning Connections (2-5):** **3.E.4A.2:** Develop and use models to describe and classify the pattern distribution of land and water features on Earth.

Earth Science: Earth's Natural Resources

Standard 1.E.4 The student will demonstrate an understanding of the properties and uses of Earth's natural resources	
1.E.4A. Conceptual Understanding: Earth is made of different materials, including rocks, sand, soil, and water. An Earth material is a resource that comes from Earth. Earth materials can be classified by their observable properties	
Performance Indicator	**1.E.4A.3:** Conduct structured investigations to answer questions about how the movement of water can change the shape of the land.
Science and Engineering Practice	**1.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

Essential Learning Experiences:
It is essential that students conduct structured investigations to represent an understanding of how the movement of water can change the shape of land.
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- Water is a liquid that takes the shape of its container. For example, water on Earth may be found in containers known as lakes, ponds, or oceans.
- Water will flow downhill.
- Water flows in streams and rivers toward the ocean.
- Running water is a major force that shapes the landscape of Earth.

Extended Knowledge

- Water can change from a solid (ice) to a liquid.

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 Experiences (2-5):** **5.E.3A.1:** Construct explanations of how different landforms and surface features result from the location and movement of water on Earth's surface through watersheds (drainage basins) and rivers.

Earth Science: Earth's Natural Resources

Standard 1.E.4 The student will demonstrate an understanding of the properties and uses of Earth's natural resources.	
1.E.4B. Conceptual Understanding: Natural resources are things that people use that come from Earth (such as land, water, air, and trees). Natural resources can be conserved.	
Performance Indicator	**1.E.4B.1:** Obtain and communicate information to summarize how natural resources are used in different ways (such as soil and water to grow plants; rocks to make roads, walls, or buildings; or sand to make glass).
Science and Engineering Practice	**1.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 clearly through 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 Energy and Matter

Essential Learning Experiences:
It is essential that students obtain and communicate information to summarize how natural resources are used in different ways.

Examples of some ways Earth materials can be used by humans include:

- Rocks
  - Rocks are used to make roads, walls, or buildings.
- Sand
  - Sand is used to make glass, and grow certain types of plants (desert plants).
- Soil
  - Soil is used to make bricks, and grow certain types of plants (forest plants).
- Water
  - Plants need to absorb water through their roots.

Earth materials can also be used by animals. Examples of some ways Earth materials can be used by animals include:

- Birds use twigs, leaves, soil, and straw to make their homes.
- Some insect homes are made from soil.

Extended Knowledge

- Types of specific Earth materials (for example granite, kaolin, slate).

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):** **K.L.2A.2:** Conduct structured investigations to determine what plants need to live and grow (including water and light). **Future Learning Connections (2-5):** **1.L.5B.1:** Conduct structured investigations to answer questions about what plants need to live and grow (including air, water, sunlight, minerals, and space).

Earth Science: Earth's Natural Resources

Standard 1.E.4 The student will demonstrate an understanding of the properties and uses of Earth's natural resources.	
1.E.4B. Conceptual Understanding: Natural resources are things that people use that come from Earth (such as land, water, air, and trees). Natural resources can be conserved.	
Performance Indicator	**1.E.4B.2:** Obtain and communicate information to explain ways natural resources can be conserved (such as reducing trash through reuse, recycling, or replanting trees).
Science and Engineering Practice	**1.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 clearly through 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 Energy and Matter

Essential Learning Experiences:
It is essential that students obtain and communicate information to explain ways to conserve natural resources.

- Students should have a firm understanding of what the terms "natural resources" and "conservation" mean. Students should be able to sort and classify objects as trash and recyclables (plastic, paper, glass).
- Replanting trees after they have been cut down is important in soil restoration and preservation.
- Replanting trees is also important to replenish a natural resource.

Extended Knowledge
- Students will classify resources as renewable or nonrenewable.
- Students will learn about the different ways to obtain energy (wind, solar, 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	**Future Learning Connections (2-5):** **3.E.4B.4:** Define problems caused by a natural event or human activity and design devices or solutions to reduce the impact on the environment **5.E.3B.4:** Define problems caused by natural processes or human activities and test possible solutions to reduce the impact on landforms and the ocean shore zone.

Life Science: Plants and Their Environments

Standard 1.L.5 The student will demonstrate an understanding of how the structures of plants help them survive and grow in their environments.	
1.L.5A. Conceptual Understanding: Plants have specific structures that help them survive, grow, and produce more plants. Plants have predictable characteristics at different stages of development.	
Performance Indicator	**1.L.5A.1:** Obtain and communicate information to construct explanations for how different plant structures (including roots, stems, leaves, flowers, fruits, and seeds) help plants survive, grow, and produce more plants.
Science and Engineering Practice	**1.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 clearly through 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 Cause and Effect Systems and Systems Models Structure and Function

Essential Learning Experiences:
It is essential that students obtain and communicate information to explain how different structures of plants help them survive, grow, and produce more plants.

These structures include:

- Stem
  - The part of the plant that grows out of the ground, supports the leaves, flowers, and fruit, and carries water from the roots to the rest of the plant.
- Root
  - The part of the plant that grows under the ground, holds the plant in place, and takes in water and nutrients from the ground.
- Leaf
  - The flat, usually green, part of the plant that grows from the stem and makes food for the plant.
- Flower
  - The part of the flowering plant that helps the plant make new plants like itself. It has special characteristics, such as color or scent, which attracts insects and makes the seeds.

- Fruit
    - The part of the flowering plant that grows from the flower and contains the seeds (Fruit forms around the seeds to protect them).
    - Seed The part of the flowering plant that will grow into a new plant; seeds are usually covered with a protective coating (seed coat)

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 (2-5):** **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.

Life Science: Plants and Their Environments

Standard 1.L.5 The student will demonstrate an understanding of how the structures of plants help them survive and grow in their environments.	
1.L.5A. Conceptual Understanding: Plants have specific structures that help them survive, grow, and produce more plants. Plants have predictable characteristics at different stages of development.	
Performance Indicator	**1.L.5A.2:** Construct explanations of the stages of development of a flowering plant as it grows from a seed using observations and measurements.
Science and Engineering Practice	**1.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 Cause and Effect Systems and Systems Models Structure and Function

Essential Learning Experiences:
It is essential that students construct explanations of the stages of development of a flowering plant using student-generated observations and measurements, results of scientific measurement, or data communicated in graphs, tables, or diagrams.

Plants have life cycles with distinct stages. A plant's life cycle describes the stages it goes through during its life, or how it germinates, grows, flowers, and makes seeds.

- Germination
  - The process in which a plant begins to sprout or grow from the seed
- Growth
  - The process of getting larger in size and developing from a seedling to a mature plant
- Flowers
  - Flowers make pollen.
  - Flowers have to receive pollen to make seeds.
  - Most flowers have special characteristics (color, scent) that attract insects.
  - Insects carry pollen from flower to flower.
  - Flowers make seeds deep inside.

- Seeds
  - Flowering plants grow from seeds.
  - Seeds contain the materials that allow plants to begin growing.

It is also essential for students to make observations (using the senses) and take measurements (in standard whole units) of a flowering plant to learn more about the plant's life cycle.

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 (2-5):** **4.L.5A.2:** Analyze and interpret data from observations and measurements to compare the stages of development of different seed plants.

Life Science: Plants and Their Environments

Standard 1.L.5 The student will demonstrate an understanding of how the structures of plants help them survive and grow in their environments.	
1.L.5B. Conceptual Understanding: Plants have basic needs that provide energy in order to grow and be healthy. Each plant has a specific environment where it can thrive. There are distinct environments in the world that support different types of plants. These environments can change slowly or quickly. Plants respond to these changes in different ways	
Performance Indicator	**1.L.5B.1:** Conduct structured investigations to answer questions about what plants need to live and grow (including air, water, sunlight, minerals, and space).
Science and Engineering Practice	**1.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 Systems and Systems Models Structure and Function

Essential Learning Experiences:
It is essential that students conduct structured investigations to understand what plants need to live and grow.
Plants use the food to produce the energy needed in order to grow and make new plants like itself. The basic needs of a plant are:

- Air
  - Plants need air to make their own food and grow.
- Water
  - Plants need water to make their own food and grow.
  - Too much water or too little water could cause the plant to die.
- Sunlight
  - Plants need sunlight to make their own food and grow.
- Minerals
  - Plants need minerals to help them grow and stay healthy.
  - Minerals can be found in the soil or water.

    - Just as with water, too many minerals or too few minerals could cause the plant to die.
- Space
    - Plants need a certain amount of space to grow.
    - The space above the ground allows the plant to get the light and air it needs.
    - The space below the ground allows the plant to get the water and minerals it needs through its roots.
    - If there are too many plants in a particular area, the plant may not get the materials it needs to grow.

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):** **K.L.2A.2:** Conduct structured investigations to determine what plants need to live and grow (including water and light). **Future Learning Connections (2-5):** **4.L.5B.2:** Structural adaptations that allow plants to survive.

Life Science: Plants and Their Environments

Standard 1.L.5 The student will demonstrate an understanding of how the structures of plants help them survive and grow in their environments.	
1.L.5B. Conceptual Understanding: Plants have basic needs that provide energy in order to grow and be healthy. Each plant has a specific environment where it can thrive. There are distinct environments in the world that support different types of plants. These environments can change slowly or quickly. Plants respond to these changes in different ways	
Performance Indicator	**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).
Science and Engineering Practice	**1.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 Cause and Effect Systems and Systems Models Structure and Function

Essential Learning Experiences:
It is essential that students develop and use models to compare how different plant characteristics help them survive in distinct environments.

A distinct environment is a special surrounding that supports the life of different plants. Plants can survive only in environments in which their needs can be met.

The world has many distinct environments that support varied types of plants. Some of these environments include:

- Deserts
  - Some desert plants store water in their stems or leaves.
  - Other plants may have especially long roots that spread out to reach as much water as possible.
  - Cacti (the plural form of cactus) are one of the best known desert plants. Cacti are designed to store water from one rainfall to the next.
  - Cacti have needle-like leaves to keep in moisture and to keep predators away.

- Forests
  - Forests have many trees (with needles or with leaves), shrubs, and grasses.
  - Some trees lose their leaves in the winter when it is cold and often dry. (These are deciduous trees.) By losing their leaves, they are able to conserve energy and water.
  - Some trees have needle-like leaves with a waxy coating. This needle-like leaves help them hold in water and continue to make food in the winter.
  - Some trees have thick bark to protect them from the cold.
  - Many forest plants have large leaves so they can get plenty of sunlight.
- Grasslands
  - Grasses have long roots to soak up water deep in the ground. This also keeps animals from pulling out the roots when grazing.
  - During a fire, the roots of many grasses survive so they can grow back quickly.
  - Grasslands have many grasses that die every year. The grasses decay leaving nutrient-rich topsoil.
  - Many grasses have flexible stems. This allows them to bend in the wind, instead of breaking.

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):** **K.L.2A.6:** Obtain and communicate information about the needs of organisms to explain why they live in particular areas. **Future Learning Connections (2-5):** **3.L.5A.1:** Analyze and interpret data about the characteristics of environments (including salt and freshwater, deserts, grasslands, forests, rainforests, and polar lands) to describe how the environment supports a variety of organisms.

Life Science: Plants and Their Environments

Standard 1.L.5 The student will demonstrate an understanding of how the structures of plants help them survive and grow in their environments.	
1.L.5B. Conceptual Understanding: Plants have basic needs that provide energy in order to grow and be healthy. Each plant has a specific environment where it can thrive. There are distinct environments in the world that support different types of plants. These environments can change slowly or quickly. Plants respond to these changes in different ways	
Performance Indicator	**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).
Science and Engineering Practice	**1.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 Cause and Effect Systems and Systems Models Structure and Function

Essential Learning Experiences:
It is essential that students analyze and interpret data from observations to describe how changes in the environment cause plants to respond in different ways.

- An environment refers to the surroundings of living things (air, water, soil, plants, and animals). These environments can change slowly or quickly.

- Plants respond to these changes in different ways.
    - Some plants have leaves that turn toward the Sun so they can get the most sunlight possible.
    - Some plants have leaves that wilt when they get too hot or when the plant does not get enough water.
    - In the autumn, some leaves change color.
    - In winter, some trees shed their leaves.

NOTE TO TEACHER: This may be an appropriate opportunity for students to collect, organize, and represent data using picture graphs or tallies and then to draw conclusions from the representations.

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	This indicator will not be addressed again in grades 2-5.

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