Kindergarten

South Carolina kindergarten students engage in thinking and solving problems the way scientists and engineers do to help them better see how science is relevant to their lives. To capitalize on the natural curiosity all students have about the world around them, learning experiences are built around the three dimensions of science: **Science and Engineering Practices (SEPs),** **Crosscutting Concepts (CCCs),** and **Disciplinary Core Ideas (DCIs).** This three-dimensional approach to teaching and learning helps educators provide meaningful learning experiences that offer varied entry points for students from diverse backgrounds.

The performance expectations in kindergarten help students engage in inquiry questions such as, **but not limited to:**

What happens if you change how hard you push or pull an object?

Students plan and conduct investigations to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object to analyze data to design solutions.

Where do animals and plants live and why do they live there?

Students develop an understanding of what plants and animals (including humans) need to survive and use models to understand the relationship between their needs and where they live.

What is the weather like today and how is it different from yesterday?

Students ask questions and share observations to develop an understanding of patterns and variations in local weather and the purpose of weather forecasting to prepare for and respond to severe weather.

What can observations tell us about the effect of sunlight on Earth's surface?

Students apply an understanding of sunlight's effect on the Earth's surface to design solutions to reduce the sunlight's warming effect on an area.

***The PEs should be bundled to design classroom experiences. There are multiple ways to bundle the PEs to help students lead inquiry and see connections between ideas, and help teachers facilitate phenomenon-driven learning with efficient use of instructional time.**

Kindergarten

Through the kindergarten performance expectations, students demonstrate grade-appropriate proficiency in each of three dimensions. When students explore **Disciplinary Core Ideas** (Dimension 3), they will do so by engaging in **Science and Engineering Practices** (Dimension 1) and should be supported in making connections to the **Crosscutting Concepts** (Dimension 2) to link their understanding across the four disciplinary core domains.

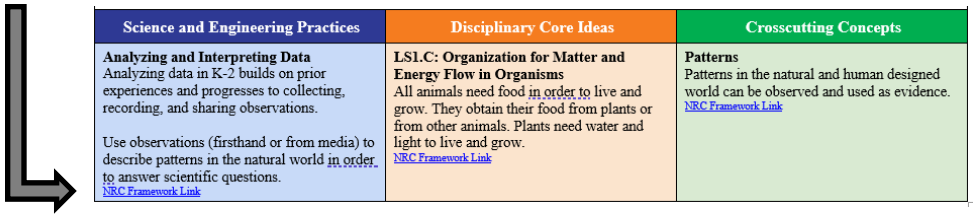
Each performance expectation contains one **SEP** and one **CCC** to be assessable and represents the student performance goal for the end of instruction; however, other **SEPs** and **CCCs** should be applied by students to support their progress leading up to the end of instruction. In kindergarten, these **end-of-instruction SEPs**, **DCIs**, and **CCCs** include:

Science and Engineering Practices	Disciplinary Core Ideas	Cross Cutting Concepts
• Asking Questions and Defining Problems • Developing and Using Models • Planning and Carrying Out Investigations • Analyzing and Interpreting Data • Constructing Explanations and Designing Solutions • Engaging in Argument from Evidence • Obtaining, Evaluating, and Communicating Information	• Physical Science (PS2, PS3) • Life Science (LS1) • Earth and Space Science (ESS2, ESS3) • Engineering, Technology, and Applications of Science (ETS1, ETS2)	• Patterns • Cause and Effect • Systems and System Models

Hyperlinks within the Standards Document

SC Conceptual Vertical Articulation links: Hover over the above underlined and hyperlinked titles to view links for all SEPs, DCIs, and CCCs.

A Framework for K-12 Science Education links: Hover over titles found within the foundation boxes under each PE to link the guiding research for all SEPs, DCIs, and CCCs.



*Equity in science education requires that all students are provided with equitable opportunities to learn science and become engaged in science and engineering practices; with access to quality space, equipment, and teachers to support and motivate that learning and engagement; and adequate time spent on science. In addition, the issue of connecting to students' interests and experiences is particularly important for broadening participation in science (NRC Framework, p. 28).

Motion and Stability: Forces and interactions (PS2)

K-PS2-1. Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

Clarification Statement: *Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other.*
State Assessment Boundary: *Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets.*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K-2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. With guidance, plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. NRC Framework Link	**PS2.A: Forces and Motion** Pushes and pulls can have different strengths and directions. Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. NRC Framework Link **PS2.B: Types of Interactions** When objects touch or collide, they push on one another and can change motion. NRC Framework Link **PS3.C: Relationship Between Energy and Forces** A bigger push or pull makes things speed up or slow down more quickly. NRC Framework Link	**Cause and Effect** Simple tests can be designed to gather evidence to support or refute student ideas about causes. NRC Framework Link

Motion and Stability: Forces and interactions (PS2)

K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

Clarification Statement: *Emphasis on exploration-based play as a means to test objects or tools to determine if they work as intended. Examples of solutions could include tools such as a ramp to increase the speed of the object or a structure that would cause an object, such as a marble or ball, to turn.*

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

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Analyzing data in K-2 builds on prior experiences and progresses to collecting, recording, and sharing observations. Analyze data from tests of an object or tool to determine if it works as intended. NRC Framework Link	**PS2.A: Forces and Motion** Pushes and pulls can have different strengths and directions. Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. NRC Framework Link **ETS1.A: Defining and Delimiting an Engineering Problem** A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. NRC Framework Link **ETS2.A: Interdependence of Science, Engineering, and Technology** There are many types of tools produced by engineering that can be used in science to help answer these questions through observation or measurement. Observations and measurements are also used in engineering to help test and refine design ideas. NRC Framework Link	**Cause and Effect** Simple tests can be designed to gather evidence to support or refute student ideas about causes. NRC Framework Link

Energy (PS3) 
K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface. ***Clarification Statement:*** *Examples of Earth's surface could include sand, soil, rocks, and water.* ***State Assessment Boundary:*** *Assessment of temperature is limited to relative measures such as warmer/cooler.*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K-2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. Make observations (firsthand or from media) to collect data that can be used to make comparisons. NRC Framework Link	**PS3.B: Conservation of Energy and Energy Transfer** Sunlight warms Earth's surface. NRC Framework Link	**Cause and Effect** Events have causes that generate observable patterns. NRC Framework Link

Energy (PS3)

K-PS3-2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.

Clarification Statement: *Structures could incorporate shade, color, and materials that minimize the warming effects of the sun.*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in K-2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions. Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem. NRC Framework Link	**PS3.B: Conservation of Energy and Energy Transfer** Sunlight warms Earth's surface. NRC Framework Link **ETS1.B: Developing Possible Solutions** Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. NRC Framework Link  **ETS2.A: Interdependence of Science, Engineering, and Technology** There are many types of tools produced by engineering that can be used in science to help answer these questions through observation or measurement. NRC Framework Link	**Cause and Effect** Events have causes that generate observable patterns. NRC Framework Link

Molecules to Organisms: Structures and Processes (LS1)

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

Clarification Statement: *Examples of patterns could include that animals need to take in food, but plants make food; the different kinds of food needed by different types of animals; the requirement of plants to have light; and that all living things need water. Patterns could be described using multiple modes of representation.*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Analyzing data in K-2 builds on prior experiences and progresses to collecting, recording, and sharing observations. Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. NRC Framework Link	**LS1.C: Organization for Matter and Energy Flow in Organisms** All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. NRC Framework Link	**Patterns** Patterns in the natural and human designed world can be observed and used as evidence. NRC Framework Link

Earth's Systems (ESS2) 		
K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time. ***Clarification Statement:*** *Examples of qualitative observations could include descriptions of the weather (sunny, cloudy, rainy, or warm). Examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that mornings are cooler than afternoons and the number of sunny days versus cloudy days during different months.* ***State Assessment Boundary:*** *Assessment of quantitative observations are limited to whole numbers and relative measures such as warmer/cooler.*		
Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Analyzing and Interpreting Data Analyzing data in K-2 builds on prior experiences and progresses to collecting, recording, and sharing observations. Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. NRC Framework Link	**ESS2.D: Weather and Climate** Weather is the combination of sunlight, wind, snow, or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. NRC Framework Link	**Patterns** Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. NRC Framework Link

Earth's Systems (ESS2)		
K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. ***Clarification Statement:*** *Examples of plants and animals changing their environment could include beavers building dams, a squirrel digging in the ground to hide its food, and tree roots breaking concrete. Humans have developed means to heat and/or cool our homes and vehicles to protect ourselves from the elements.*		
Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Engaging in Argument from Evidence Engaging in argument from evidence in K-2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s). Construct an argument with evidence to support a claim. NRC Framework Link	**ESS2.E: Biogeology** Plants and animals depend on and can change their environment. NRC Framework Link **ESS3.C: Human Impacts on Earth Systems** Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (*secondary*) NRC Framework Link	**Systems and System Models** Systems in the natural and designed world have parts that work together. NRC Framework Link

Earth and Human Activity (ESS3)

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

Clarification Statement: *Examples of relationships could include that deer eat buds and leaves; therefore, they usually live in forested areas, humans use soil and water to grow food, and grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.*
State Assessment Boundary: *Assessment does not include specific habitats or biomes.*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in K-2 builds on prior experiences and progresses to include using and developing models (i.e. diagram, drawing, physical replica, diorama, dramatization, storyboard) that represent concrete events or design solutions. Use a model to represent relationships in the natural world. NRC Framework Link	**ESS3.A: Natural Resources** Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. NRC Framework Link	**Systems and System Models** Systems in the natural and designed world have parts that work together. NRC Framework Link

Earth and Human Activity (ESS3)

K-ESS3-2. Ask questions to understand the purpose of weather forecasting to prepare for and respond to severe weather.

Clarification Statement: *Emphasis is on weather forecasting of local weather and how weather forecasting can help people plan for and respond to specific types of local weather.*
State Assessment Boundary: *Assessment does not include how severe weather is formed.*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Asking Questions and Defining Problems Asking questions and defining problems in grades K-2 builds on prior experiences and progresses to simple descriptive questions that can be tested. Ask questions based on observations to find more information about the designed world. NRC Framework Link	**ESS3.B: Natural Hazards** Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events. NRC Framework Link **ETS1.A: Defining and Delimiting an Engineering Problem** Asking questions, making observations, and gathering information are helpful in thinking about problems. (*secondary*) NRC Framework Link **ETS2.A: Interdependence of Science, Engineering, and Technology** People encounter questions about the natural world every day. NRC Framework Link	**Cause and Effect** Events have causes that generate observable patterns. NRC Framework Link

Earth and Human Activity (ESS3)

K-ESS3-3. Obtain and communicate information to define problems related to human impact on the local environment.

Clarification Statement: *Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of human choices could include reusing and recycling materials.*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Obtaining, Evaluating, and Communicating Information Obtaining, evaluating, and communicating information in K-2 builds on prior experiences and uses observations and texts to communicate new information. Communicate information with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas. NRC Framework Link	**ESS3.C: Human Impacts on Earth Systems** Things that people do to live comfortably can affect the world around them, but they can make choices that reduce their impacts on the land, water, air, and other living things. NRC Framework Link **ETS1.A: Defining and Delimiting an Engineering Problem** Asking questions, making observations, and gathering information are helpful in thinking about problems. NRC Framework Link	**Cause and Effect** Events have causes that generate observable patterns. NRC Framework Link