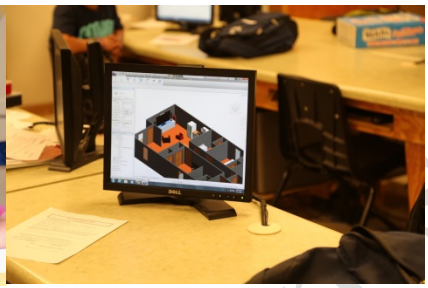
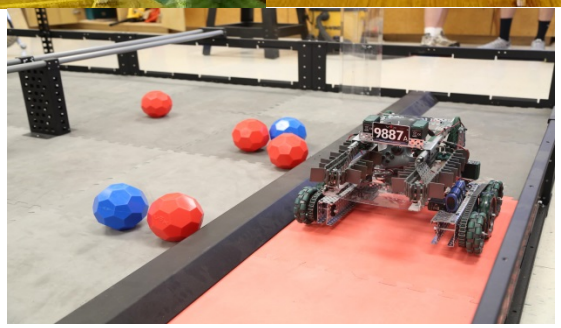
SUPPORT GUIDE FOR KINDERGARTEN SOUTH CAROLINA ACADEMIC STANDARDS AND PERFORMANCE INDICATORS FOR SCIENCE

Molly M. Spearman
State Superintendent of Education

SOUTH CAROLINA
STATE DEPARTMENT
OF EDUCATION





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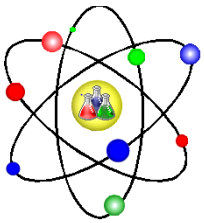


INTRODUCTION TO KINDERGARTEN STANDARDS

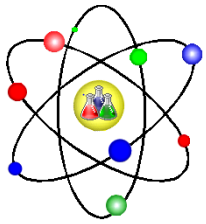
Science is a way of understanding the physical universe using observation and experimentation to explain natural phenomena. Science also refers to an organized body of knowledge that includes core ideas to the disciplines and common themes that bridge the disciplines. This document, *South Carolina Academic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

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 Superintendent's Roundtable and SC Chamber of Commerce.

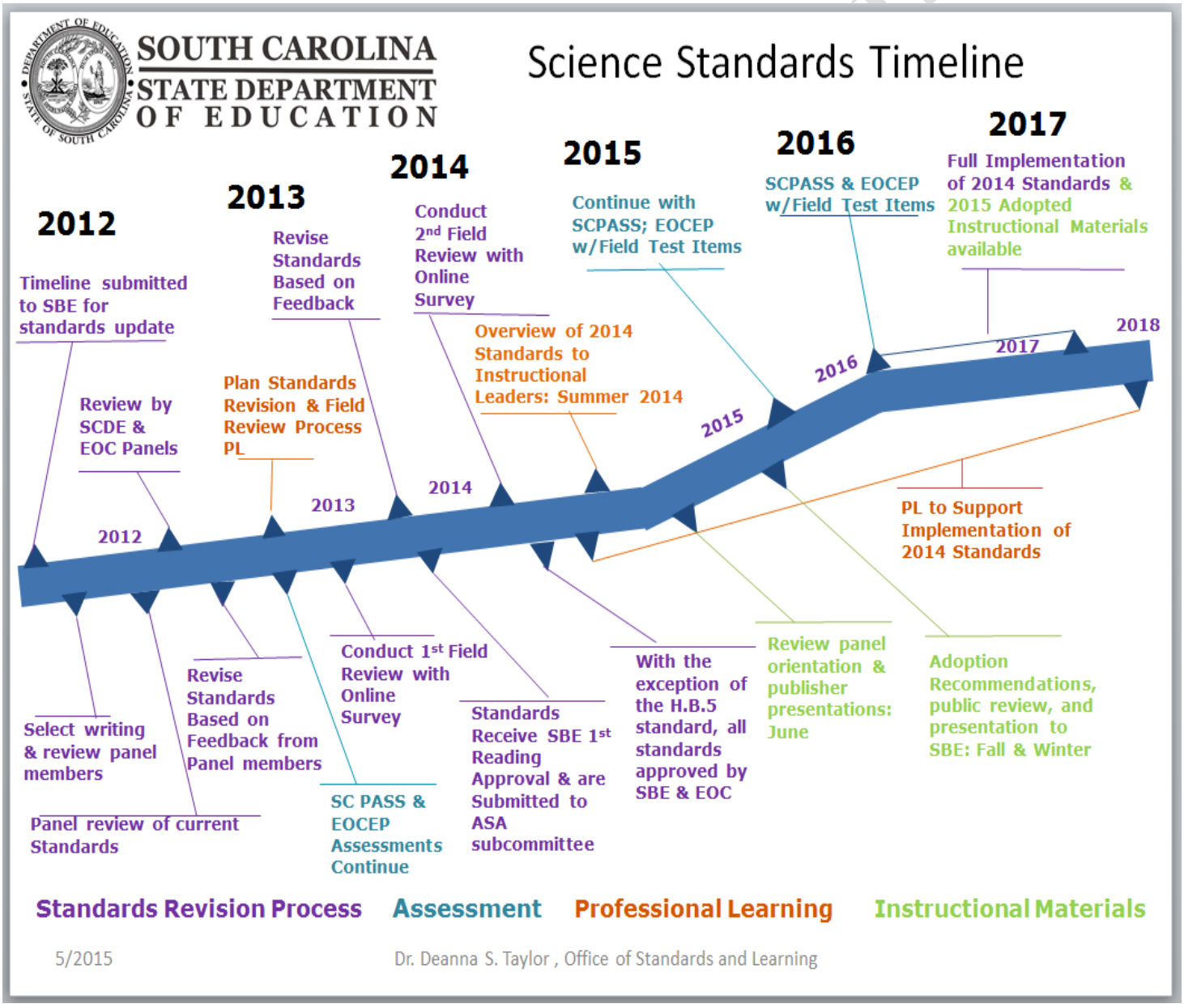
transformSC
tomorrow won't wait for our students

AN INITIATIVE OF SOUTH CAROLINA COUNCIL ON COMPETITIVENESS

SCIENCE STANDARDS TIMELINE

This timeline is used to illustrate the timeline for the standards revisions process, student assessment administration, provision of professional learning and the review and adoption of instructional materials. This timeline may be used with the science academic standards, science and engineering support document, and grade/content support documents to assist local districts, schools and teachers as they 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 timeline in this document does not offer a sequence for instruction and do not prescribe classroom activities; materials; or instructional strategies, approaches, or practices. The *Science Standards Timeline*, is not a curriculum.



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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.

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--- http://tinyurl.com/2014SCScience.

DECIPHERING THE STANDARDS

KINDERGARTEN
LIFE SCIENCE: EXPLORING ORGANISMS AND THE ENVIRONMENT

Standard K.L.2: The student will demonstrate an understanding of organisms found in the environment and how these organisms depend on the environment to meet those needs.

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).

K.L.2A.2 Conduct structured investigations to determine what plants need to live and grow (including water and light).

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 1
  H.C: High School Chemistry 1
  H.P: High School Physics 1
  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

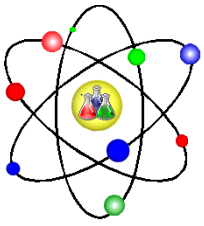
- **2: The number following the content area denotes the specific academic standard.** In the example, the 2 in the indicator means that it is within the second academic standard with the Kindergarten science content.

- **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 KINDERGARTEN

- Exploring Organisms and the Environment
- Exploring Weather Patterns
- Exploring Properties of Objects and Materials



KINDERGARTEN
SCIENCE AND ENGINEERING PRACTICES

NOTE: Scientific investigations should always be done in the context of content knowledge expected at this grade level. The standard describes how students should learn and demonstrate knowledge of the content outlined in the other standards.

Standard K.S.1: The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.

K.S.1A. Conceptual Understanding: The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers.

Performance Indicators: Students who demonstrate this understanding can:

K.S.1A.1 Ask and answer questions about the natural world using explorations, observations, or structured investigations.

K.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.

K.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 make qualitative observations and take nonstandard measurements, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.

K.S.1A.4 Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.

K.S.1A.5 Use mathematical thinking to (1) recognize and express quantitative observations, (2) collect and analyze data, or (3) understand patterns and relationships.

K.S.1A.6 Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of investigations, or (3) data communicated in graphs, tables, or diagrams.

K.S.1A.7 Construct scientific arguments to support explanations using evidence from observations or data collected.

K.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.

K.S.1B. Conceptual Understanding: Technology is any modification to the natural world created to fulfill the wants and needs of humans. The engineering design process involves a series of iterative steps used to solve a problem and often leads to the development of a new or improved technology.

Performance Indicators: Students who demonstrate this understanding can:

K.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.

LIFE SCIENCE: EXPLORING ORGANISMS AND THE ENVIRONMENT

Standard K.L.2: The student will demonstrate an understanding of organisms found in the environment and how these organisms depend on the environment to meet those needs.

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).

K.L.2A.2 Conduct structured investigations to determine what plants need to live and grow (including water and light).

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.

K.L.2A.4 Analyze and interpret data to describe how humans use their senses to learn about the world around them.

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.

EARTH SCIENCE: EXPLORING WEATHER PATTERNS

Standard K.E.3: The student will demonstrate an understanding of daily and seasonal weather patterns.

K.E.3A. Conceptual Understanding: Weather is a combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. Scientists measure weather conditions to describe and record the weather and to notice patterns over time. Plants and animals (including humans) respond to different weather conditions in different ways.

Performance Indicators: Students who demonstrate this understanding can:

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.

K.E.3A.2 Develop and use models to predict seasonal weather patterns and changes.

K.E.3A.3 Obtain and communicate information to support claims about how changes in seasons affect plants and animals.

K.E.3A.4 Define problems caused by the effects of weather on human activities and design solutions or devices to solve the problem.

PHYSICAL SCIENCE: EXPLORING PROPERTIES OF OBJECTS AND MATERIALS

Standard K.P.4: The student will demonstrate an understanding of the observable properties of matter.

K.P.4A. Conceptual Understanding: Objects can be described and classified by their observable properties, by their uses, and by whether they occur naturally or are manufactured (human-made). Different properties of objects are suited for different purposes.

Performance Indicators: Students who demonstrate this understanding can:

K.P.4A.1 Analyze and interpret data to compare the qualitative properties of objects (such as size, shape, color, texture, weight, flexibility, attraction to magnets, or ability to sink or float) and classify objects based on similar properties.

K.P.4A.2 Develop and use models to describe and compare the properties of different materials (including wood, plastic, metal, cloth, and paper) and classify materials by their observable properties, by their uses, and by whether they are natural or human-made.

K.P.4A.3 Conduct structured investigations to answer questions about which materials have the properties that are best suited to solve a problem or need.

KINDERGARTEN CROSSWALK FOR THE 2005 SOUTH CAROLINA SCIENCE ACADEMIC STANDARDS AND THE 2014 SOUTH CAROLINA ACADEMIC STANDARDS AND PERFORMANCE INDICATORS FOR SCIENCE

ACKNOWLEDGEMENTS

SOUTH CAROLINA DEPARTMENT OF EDUCATION

The *Crosswalks for the South Carolina Academic Standards and Performance Indicators for Science* included in this document were developed under the direction of Dr. Julie Fowler, Deputy Superintendent, Division of College and Career Readiness and Cathy Jones Stork, Interim Director, Office of Standards and Learning.

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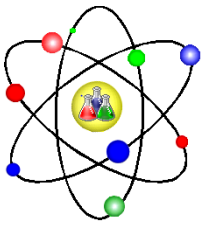
INTRODUCTION

This document, *Crosswalks for the 2005 South Carolina Science Academic Standards and the 2014 South Carolina Academic Standards and Performance Indicators for Science,* contains a comparison of the academic standards in science for the state's students in kindergarten through grade twelve.

HOW TO USE THE CROSSWALKS

This document may be used with the science academic standards, science and engineering support document, and grade/content support documents to assist local districts, schools and teachers as they 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. 2005 and 2014 performance indicators that share similar content knowledge and skills that students should demonstrate to meet the grade level or high school course standards have been paired. These pairings have been organized into tables and are sequenced by the 2014 academic standards. The 2005 content indicators that do not match 2014 content have been placed at the end of each table.

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 *Crosswalks for the 2005 South Carolina Science Academic Standards and the 2014 South Carolina Academic Standards and Performance Indicators for Science,* is not a curriculum.



KINDERGARTEN SCIENCE CROSSWALK DOCUMENT

(***** The 2005 content indicators that do not match 2014 content have been placed at the end of each table.)

2005	2014	Comments
Standard (Science & Engineering Practices)		
K-1: The student will demonstrate an understanding of scientific inquiry, including the processes, skills, and mathematical thinking necessary to conduct a simple scientific investigation.	**K.S.1:** The student will use the science and engineering practices, including the processes and skills of scientific inquiry, to develop understandings of science content.	
Conceptual Understanding		
	K.S.1A. The practices of science and engineering support the development of science concepts, develop the habits of mind that are necessary for scientific thinking, and allow students to engage in science in ways that are similar to those used by scientists and engineers.	
Performance Indicators		
K-1.3 Predict and explain information or events based on observation or previous experience.	**K.S.1A.1** Ask and answer questions about the natural world using explorations, observations, or structured investigations.	This is a new expectation in 2014 standards
	K.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.	This is a new expectation in 2014 standards
K-1.2 Use tools (including magnifiers and eyedroppers) safely, accurately, and appropriately when gathering specific data. K-1.3 Predict and explain information or events based on observation or previous experience. K-1.5 Use appropriate safety procedures when conducting investigations.	**K.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 make qualitative observations and take nonstandard measurements, and (4) record and represent data in an appropriate form. Use appropriate safety procedures.	Record and represent data in an appropriate form is a new expectation in 2014 standards

K-1.1 Identify observed objects or events by using the senses. K-1.4 Compare objects by using nonstandard units of measurement.	**K.S.1A.4** Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.	
	K.S.1A.5 Use mathematical thinking to (1) recognize and express quantitative observations, (2) collect and analyze data, or (3) understand patterns and relationships.	This is a new expectation in 2014 standards
	K.S.1A.6 Construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of investigations, or (3) data communicated in graphs, tables, or diagrams.	This is a new expectation in 2014 standards
	K.S.1A.7 Construct scientific arguments to support explanations using evidence from observations or data collected.	This is a new expectation in 2014 standards
	K.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.	This is a new expectation in 2014 standards
	Conceptual Understanding	
	K.S.1B. Technology is any modification to the natural world created to fulfill the wants and needs of humans. The engineering design process involves a series of iterative steps used to solve a problem and often leads to the development of a new or improved technology.	
	Performance Indicators	
	K.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	This is a new expectation in 2014 standards

	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.

2005	2014	Comments
	Standard (Life Science)	
K-2: The student will demonstrate an understanding of the characteristics of organisms. K-3: The student will demonstrate an understanding of the distinct structures of human body and the different functions they serve.	**K.L.2:** The student will demonstrate an understanding of organisms found in the environment and how these organisms depend on the environment to meet those needs.	
	Conceptual Understanding	
	K.L.2A. 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	
K-2.2 Identify examples of organisms and nonliving things.	**K.L.2A.1** Obtain information to answer questions about different organisms found in the environment (such as plants, animals, or fungi).	
K-2.1 Recognize what organisms need to stay alive (including air, water, food, and shelter).	**K.L.2A.2** Conduct structured investigations to determine what plants need to live and grow (including water and light).	
K-3.1 Identify the distinct structures in the human body that are for walking, holding, touching, seeing, smelling, hearing, talking, and tasting.	**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.	
K-3.2 Identify the functions of the sensory organs (including the eyes, nose, ears, tongue, and skin).	**K.L.2A.4** Analyze and interpret data to describe how humans use their senses to learn about the world	

	around them.	
K-2.1 Recognize what organisms need to stay alive (including air, water, food, and shelter).	**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.	This is a new expectation in 2014 standards

*****K-2.3 Match parents with their offspring to show that plants and animals closely resemble their parents.
*K-2.4 Compare individual examples of a particular type of plant or animal to determine that there are differences among individuals.
*K-2.5 Recognize that all organisms go through stages of growth and change called life cycles.

2005	2014	Comments
	Standard (Earth Science)	
K-4: The student will demonstrate an understanding of seasonal weather changes.	K.E.3: The student will demonstrate an understanding of daily and seasonal weather patterns.	
	Conceptual Understanding	
	K.E.3A. Weather is a combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. Scientists measure weather conditions to describe and record the weather and to notice patterns over time. Plants and animals (including humans) respond to different weather conditions in different ways.	
	Performance Indicators	
K-4.1 Identify weather changes that occur from day to day.	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.	
K-4.2 Compare the weather patterns that occur from season to season.	K.E.3A.2 Develop and use models to predict seasonal weather patterns and changes.	
K-4.3 Summarize ways that the seasons affect plants and animals.	K.E.3A.3 Obtain and communicate information to support claims about how changes in seasons affect plants and animals.	
	K.E.3A.4 Define problems caused by the effects of weather on human activities and design solutions or devices to solve the problem.	This is a new expectation in 2014 standards

2005	2014	Comments
	Standard (Physical Science)	
K-5: The student will demonstrate the understanding that objects can be described by their observable properties.	**K.P.4:** The student will demonstrate an understanding of the observable properties of matter.	
	Conceptual Understanding	
	K.P.4A. Objects can be described and classified by their observable properties, by their uses, and by whether they occur naturally or are manufactured (human-made). Different properties of objects are suited for different purposes.	
	Performance Indicators	
K-5.1 Classify objects by observable properties (including size, color, shape, magnetic attraction, heaviness, texture, and the ability to float in water).	**K.P.4A.1** Analyze and interpret data to compare the qualitative properties of objects (such as size, shape, color, texture, weight, flexibility, attraction to magnets, or ability to sink or float) and classify objects based on similar properties.	
K-5.2 Compare the properties of different types of materials (including wood, plastic, metal, cloth, and paper) from which objects are made.	**K.P.4A.2** Develop and use models to describe and compare the properties of different materials (including wood, plastic, metal, cloth, and paper) and classify materials by their observable properties, by their uses, and by whether they are natural or human-made.	
	K.P.4A.3 Conduct structured investigations to answer questions about which materials have the properties that are best suited to solve a problem or need.	This is a new expectation in 2014 standards

CONTENT SUPPORT GUIDE FOR KINDERGARTEN 2014 SOUTH CAROLINA ACADEMIC STANDARDS AND PERFORMANCE INDICATORS FOR SCIENCE

ACKNOWLEDGEMENTS

South Carolina owes a debt of gratitude to the following individuals for their assistance in the development of the Kindergarten Content Support Guide for the *South Carolina Academic Standards and Performance Indicators for Science.*

SOUTH CAROLINA DEPARTMENT OF EDUCATION

The explication of the standards and performance indicators included in this document were developed under the direction of Dr. Julie Fowler, Deputy Superintendent, Division of College and Career Readiness and Cathy Jones Stork, Interim Director, Office of Standards and Learning.

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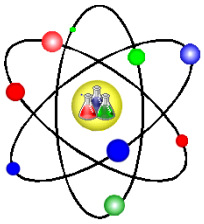

INTRODUCTION

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 essential knowledge, extended knowledge, connections to previous and future knowledge, and assessment recommendations.

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.
- **Assessment Guidance**
  - This section provides guidelines for educators and assessors to check for student mastery of content utilizing interrelated science and engineering practices.
- **Previous and Future Knowledge**
  - 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. Please note that the kindergarten curriculum support document does not contain previous knowledge. Additionally, although the high school support document may not contain future knowledge, this section may list overlapping concepts from other high school science content areas.
- **Essential Knowledge**
  - This section illustrates the knowledge of the content contained in the performance indicator for which it is fundamental for students to demonstrate mastery. Mastery of the information in the Essential Knowledge section is measured by state-wide assessments in grades four-eight and high school biology 1.
- **Extended Knowledge**
  - This section provides educators with topics that will enrich students' knowledge related to topics learned with the explicated performance indicator.
- **Science and Engineering Practices**
  - This section lists the specific science and engineering practice that is 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.*

KINDERGARTEN SCIENCE CONTENT SUPPORT GUIDE

Standard
K.L.2 The student will demonstrate an understanding of organisms found in the environment and how these organisms depend on the environment to meet those needs.

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

Assessment Guidance
The objective of this indicator is to *obtain information* to answer questions about different organisms found in the environment. Therefore, the primary focus of assessment should be for students to *obtain and evaluate* informational texts, observations, data collected or discussions regarding what animals, plants, and fungi need to live and grow. This could include, but is not limited to students surveying their schoolyard environment and generating questions about the organisms they find. With teacher guidance, they will research the answers to their questions.

In addition to *obtaining information*, students should *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models*; and *construct devices or design solutions.*

Future Knowledge
- 5.L.4B.1, 6.L.4A.2 Fungi

Essential Knowledge
There are many types of organisms found in the world around us. An organism is something that is alive. Animals are organisms that cannot make their own food but are able to move from place to place to find food from other sources. Plants are organisms that use light and water to make their own food, but cannot move. Fungi are organisms that cannot make their own food, can move around, and get their food by eating dead or decaying plants or animals.

Extended Knowledge
Construct explanations that explain why organisms can be classified as plants, animals, or fungi

Science and Engineering Practices
S.1A.8

Standard
K.L.2 The student will demonstrate an understanding of organisms found in the environment and how these organisms depend on the environment to meet those needs.

Conceptual Understanding
K.L.2A 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 Indicator
K.L.2A.2 Conduct structured investigations to determine what plants need to live and grow (including water and light).

Assessment Guidance
The objective of this indicator is for students to *conduct structured investigations* to determine what plants need to live and grow. Therefore, the primary focus of assessment should be for students to *conduct structured investigations with teacher guidance in order 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 make qualitative observations and take nonstandard measurements,* and *(4) record and represent data in an appropriate form.* This could include but is not limited to having students plant several seeds and provide some seeds with different things that they need, while withholding specific needs from other seeds.

In addition to *conducting structured investigations*, students should *ask questions; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models; obtain, evaluate, and communicate information;* and *construct devices or design solutions.*

Future Knowledge
- 1.L.5B.1 Basic needs of plants (air, water, sunlight, minerals, space)

Essential Knowledge
Plants need water and light, along with the basic needs of all living things, to stay alive. Living things need food, water, air, shelter or space to survive. Living things can make a new living thing like itself. Living things grow and change during their life.

NOTE: There are many misconceptions concerning living and nonliving things at this developmental level. To assist students in their understanding whether something is an organism, they should ask one of these five essential questions:
- Does it need air?
- Does it need water?
- Does it need food?
- Does it need shelter/space?
- Is it able to make another living thing like itself?

Extended Knowledge
Understanding how plants make food and/or air

Science and Engineering Practices
S.1A.3

Standard
K.L.2 The student will demonstrate an understanding of organisms found in the environment and how these organisms depend on the environment to meet those needs.

Conceptual Understanding
K.L.2A 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 Indicator
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.

Assessment Guidance
The objective of this indicator is for students to *develop and use models* to exemplify how animals use their body parts to obtain food and other resources, protect themselves, and move from place to place. Therefore, the primary focus of assessment should be for students to develop and use models that include but are not limited developing various models that demonstrate how different types of body parts allow animals to move in different ways.

In addition to *developing and using models*, students should *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; obtain, evaluate, and communicate information*; and *construct devices or design solutions.*

Future Knowledge
- 2.L.5A.2 Animal structures for survival (for seeing, hearing, grasping objects, obtain food and other resources, protecting themselves, and moving from place to place)

Essential Knowledge
Animals use body parts to meet their needs for obtaining food, water, air, and shelter.
- Mouths/beaks
- Noses/Gills
- Tongues
- Shells

Protecting themselves
- Claws
- Teeth
- Scales

- Shells
- Tails

Moving themselves

- Wings
- Fins
- Legs
- Tails

Extended Knowledge

- Conduct structured investigations with teacher guidance to determine how the body parts of various animals help the animal obtain food or other resources, protect themselves, or move from place to place.

Science and Engineering Practices

S.1A.2

Standard

K.L.2 The student will demonstrate an understanding of organisms found in the environment and how these organisms depend on the environment to meet those needs.

Conceptual Understanding

K.L.2A 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 Indicator

K.L.2A.4 Analyze and interpret data to describe how humans use their senses to learn about the world around them.

Assessment Guidance

The objective of this indicator is for students to *analyze and interpret data* to describe how humans use their senses to learn about the world around them. Therefore, the primary focus of assessment should be for students to *analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings* regarding the five senses. This could include but is not limited to, making direct observations using the senses and recording the data on a chart.

In addition to *analyzing and interpreting data*, students should *ask questions; plan and carry out investigations; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models; obtain, evaluate, and communicate information*; and *construct devices or design solutions.*

Future Knowledge

- 2.L.5A.2 Structures of different animals help them survive including structures for seeing and hearing
- 4.L.5B.1 Sensory organs, senses

Essential Knowledge
There are five senses, each with specific parts of the body (sensory organs) responsible for each of the five senses.
Eyes
- The sensory organs that see.
- They take in information (for example, shapes, colors, size or movements) about the world.

Nose
- The sensory organ that smells odors and is a big part of why a person is able to taste things.

Ears
- The sensory organs that collect sounds.
- The part of the ear that can be seen collects the sounds a person hears. There are other parts inside the ear that help with hearing.

Tongue
- The sensory organ responsible for taste.

Skin
- The sensory organ that is responsible for the sense of touch (including shape, texture, and hardness). It covers and protects everything inside the body.
- The skin holds everything together.
- It also helps keep the body at just the right temperature.

NOTE TO TEACHER: This may be an appropriate opportunity for students to represent data using object and picture graphs and draw conclusions from the graphs, or sort and classify data into 2 or 3 categories with data not to exceed 20 items in each category

Extended Knowledge
Conduct structured investigations with teacher guidance to determine how the tongue recognizes different types of taste – sour, bitter, sweet, and salty.

Science and Engineering Practices
S.1A.4

Standard
K.L.2 The student will demonstrate an understanding of organisms found in the environment and how these organisms depend on the environment to meet those needs.

Conceptual Understanding
K.L.2A 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 Indicator
K.L.2A.5 Construct explanations from observations of what animals need to survive and grow (including air, water, nutrients, and shelter).

Assessment Guidance
The objective of this indicator is for students to *construct explanations* from observations of what animals need to survive and grow (including air, water, nutrients, and shelter). Therefore, the primary focus of assessment should be for students to *construct explanations of phenomena using (1) student-generated observations and measurements, (2) results of investigations, or (3) data communicated in graphs, tables, or diagrams.* This could include but is not limited to, examining primary sources to determine what animals need to survive and grow. Students could use the information they obtain to construct explanations related to what happens to animals when they do not have air, water, nutrients, or shelter.

In addition to *constructing explanations,* students should *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; obtain, evaluate, and communicate information; develop and use models;* and *construct devices or design solutions.*

Future Knowledge
- 2.L.5A.2 Structures of different animals help them survive

Essential Knowledge
Organisms, or living things, have basic needs to stay alive. Organisms depend on the land, water, and air to live and grow. Animals need air, water, food, and shelter for protection.

Extended Knowledge
- Conduct structured investigations with teacher guidance to determine what happens to animals when one or more of their basic needs are not met.
- Develop a model depicting what various animals need to survive.

Science and Engineering Practices
S.1A.6

Standard
K.L.2 The student will demonstrate an understanding of organisms found in the environment and how these organisms depend on the environment to meet those needs.

Conceptual Understanding
K.L.2A 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 Indicator
K.L.2A.6 Obtain and communicate information about the needs of organisms to explain why they live in particular areas.

Assessment Guidance
The objective of this indicator is for students to *obtain and communicate information* about the needs of organisms to explain why they live in particular areas. Therefore, the primary focus of assessment should be for students to *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. Students should also communicate observations and explanations using oral and written language. This could include but is not limited to, researching informational texts and developing a model habitat where organisms' needs are met and they can live. Then students can give an oral presentation to explain why a particular organism can survive in the model habitat they created, but cannot survive in a different type of habitat (i.e. frog can survive in pond, but not in the artic).

In addition to *obtaining and communicating information*, students should be asked to *ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models*; and *construct devices or design solutions.*

Future Knowledge

- 1.L.5B.2 Characteristics of plants for distinct environments (deserts, forests, and grasslands)
- 2.L.5B.2 Characteristics of animals for distinct environments (salt and freshwater, deserts, forests, wetlands, or polar lands)
- 3.L.5A.1 Physical factors (light, temperature, water, soil, and space for shelter and reproduction) of environments (salt water, fresh water, deserts, grasslands, forests, rainforests, polar regions)

Essential Knowledge

Organisms live in areas where their needs for air, water, nutrients, and shelter are met. For example, fish do not breathe air, so they must live in water. Frogs need water in which to lay their eggs, but most can live on land. A cactus can live in a dry area because it stores water.

Extended Knowledge

- Develop a model depicting how distinct body features of particular animals allow them to survive in particular areas.

Science and Engineering Practices

S.1A.8

Standard

K.E.3 The student will demonstrate an understanding of daily and seasonal weather patterns.

Conceptual Understanding

K.E.3A. Weather is a combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. Scientists measure weather conditions to describe and record the weather and to notice patterns over time. Plants and animals (including humans) respond to different weather conditions in different ways.

Performance Indicator

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.

Assessment Guidance

The objective of this indicator is to *analyze and interpret* local weather condition data. Therefore, the primary focus of assessment should be for students to *analyze and interpret data from observations, measurements, or*

investigations to understand patterns and meanings in local weather conditions and patterns. This could include but is not limited to students developing a simple graph using pictorial weather symbols after observing weather conditions over a period of time.

In addition to *analyzing and interpreting data*, students should *ask questions; develop and use models; plan and carryout investigations; use mathematical and computational thinking; engage in scientific argument from evidence; obtain, evaluate, and communicate information; construct devices or design solutions.*

Future Knowledge

As with other indicators at this grade level, students will experience their first formal introduction to important science concepts.

- 1.E.3 Earth & Light
- 2.E.2, 4.E.2, 6.E.2 Weather, H.E.4, & H.E.5 – Seasonal and Daily patterns
- 4.E.3, 8.E.4 Light
- 8.E.4, 8.E.5 Earth

Essential Knowledge

Recognize weather changes on a daily basis. There are many different types of weather conditions, for example, sunny, rainy, stormy, snowy, cloudy, windy, hot, wet, or cold.
NOTE TO TEACHER: This may be an appropriate opportunity for students to represent data using object and picture graphs and draw conclusions from the graphs.

Extended Knowledge

- Weather conditions may vary in other parts of the country or world.
- General weather patterns for specific regions in the United States (I.E. longer winter weather in northern states; drier weather conditions in mid-west states, etc.)

Science and Engineering Practices

S.1A.4

Standard

K.E.3 The student will demonstrate an understanding of daily and seasonal weather patterns.

Conceptual Understanding

K.E.3A Weather is a combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. Scientists measure weather conditions to describe and record the weather and to notice patterns over time. Plants and animals (including humans) respond to different weather conditions in different ways.

Performance Indicator

K.E.3A.2 Develop and use models to predict seasonal weather patterns and changes.

Assessment Guidance:

The objective of this indicator is to *develop and use models* to predict seasonal weather patterns and changes. Therefore, the primary focus of assessment should be for students to *develop and use models* to understand and represent seasonal weather patterns and changes. This can include but is not limited to students applying the model to explain the differences in characteristics of the seasons.

In addition to *develop and use models;*, students should *ask questions; plan and carryout investigations; use mathematical and computational thinking; engage in scientific argument from evidence; obtain, evaluate, and communicate information; construct devices or design solutions.*

Future Knowledge
As with other indicators at this grade level, student will experience their first formal introduction to important science concepts.

- 1.E.3, 4.E.3, 8.E.4 Sunlight
- 2.E.2 Sunlight & Weather patterns and climate
- 4.E.2, 6.E.2, H.E.5 Weather patterns and climate
- H.E.2 Sunlight & Solar Energy

Essential Knowledge
There are patterns that are obvious, such as the seasons. Know that weather changes follow a pattern called seasons. There are four different seasons that occur in a repeating pattern. The seasons are fall (autumn), winter, spring, and summer.

Extended Knowledge

- Collect formal data such as amount of rainfall or temperature.

Science and Engineering Practices
S.1A.4

Standard
K.E.3 The student will demonstrate an understanding of daily and seasonal weather patterns.

Conceptual Understanding
K.E.3A Weather is a combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. Scientists measure weather conditions to describe and record the weather and to notice patterns over time. Plants and animals (including humans) respond to different weather conditions in different ways.

Performance Indicator
K.E.3A.3 Obtain and communicate information to support claims about how changes in seasons affect plants and animals.

Assessment Guidance
The objective of this indicator is to *construct explanations* to support claims about how changes in seasons affect plants and animals. Therefore, the primary focus of assessment should be for students to *construct explanations* of changes in seasons and its effect on plants and animals using student-generated observations and measurements, results of investigations, or data communicated in graphs, tables, and diagrams. This can include but is not limited to observing and communicating how seasons affect plants and animals (i.e. hibernation, leaves falling off trees in the Fall).

In addition to construct explanations, students should *ask questions; develop and use models; plan and carryout investigations; analyze and interpret data; use mathematical and computational thinking; engage in scientific argument from evidence; obtain, evaluate, and communicate information; construct devices or design solutions.*

Future Knowledge

- 1.E.3, 2.E.2, H.E.4, H.E.5 Weather Patterns & Sunlight
- 4.E.2, 6.E.4 Weather Patterns
- 4.E.3, 8.E.4 Sunlight

Essential Knowledge

It is essential for students to know that the seasons affect plant and animals.
Examples of ways seasons affect plants are as follows:

- Some trees will stay green all year (evergreens) and some trees lose their leaves each autumn/fall and grow them back in the spring.
- Some leaves change color and fall off during the autumn/fall season.
- Some plants form leaf buds and flower buds and bloom in the spring season.
- Some plants, like trees, have full grown green leaves during the summer.

Examples of ways seasons affect animals are as follows:

- Some animals, like squirrels, store food for the winter season.
- Some animals grow warm winter coats and shed that fur when the temperatures warm up.
- Some birds fly to a warmer place before the winter season and return in the spring.
- Some animals, like bears, go to sleep for a long time during winter (hibernation)

Extended Knowledge

- Classify deciduous and evergreen trees. Evergreens do shed (for example, pine trees are evergreens that shed needles but constantly grow new ones that stay green all year long). It is the deciduous trees that lose their leaves each autumn (fall) and grow them back in the spring.
- Determine which animals hibernate.

Science and Engineering Practices

S.1A.8

Standard

K.E.3 The student will demonstrate an understanding of daily and seasonal weather patterns.

Conceptual Understanding

K.E.3A Weather is a combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. Scientists measure weather conditions to describe and record the weather and to notice patterns over time. Plants and animals (including humans) respond to different weather conditions in different ways.

Performance Indicator

K.E.3A.4 Define problems caused by the effects of weather on human activities and design solutions or devices to solve the problem.

Assessment Guidance

The objective of this indicator is to *construct a device or design a solution* to solve problems caused by the effects of weather on human activity. Therefore, the primary focus of assessment should be for students to *construct devices or design solutions to solve problems*; generate ideas; test solutions to determine if the problem is solved, and communicate the results of effects of weather on human activities. This may include, but is not limited to students designing a solution to avoid getting wet while walking to the bus.

In addition to *constructing a device or designing a solution*, students should *ask questions; develop and use models; plan and carryout investigations; analyze and interpret data; use mathematical and computational thinking; engage in scientific argument from evidence; construct explanations; obtain, evaluate, and communicate information.*

Future Knowledge

- 1.E.3, 2.E.2, 4.E.3, 8.E.4 - Sunlight
- 2.E.2, 4.E.2, 6.E.2, H.E.5 - Weather
- 2.E.2, H.E.3, H.E.5, H.E.6 - Safety

Essential Knowledge

Weather has an effect on human activities…
Examples:

- Farming (lack of/surplus of rain affects crops)
- selecting clothes (shorts or pants, short sleeve shirt or long sleeve shirt, coats, hat; thinner fabrics {t-shirt} or thicker fabrics {sweater})
- rain/storms (use of umbrella, rain coat, rain boots)
- vacations (planning for the appropriate seasons)

Extended Knowledge

- Safety precautions for severe weather

Science and Engineering Practices

S.1A.2

Standard

K.P.4 The student will demonstrate an understanding of the observable properties of matter.

Conceptual Understanding

K.P.4A Objects can be described and classified by their observable properties, by their uses, and by whether they occur naturally or are manufactured (human-made). Different properties of objects are suited for different purposes.

Performance Indicator

K.P.4A.1 Analyze and interpret data to compare the qualitative properties of objects (such as size, shape, color, texture, weight, flexibility, attraction to magnets, or ability to sink or float) and classify objects based on similar properties.

Assessment Guidance

The objective of this indicator is to *analyze and interpret* data to compare the qualitative properties of objects and classify objects based on similar properties. Therefore, the primary focus of assessment should be for students to analyze and interpret data from observations, measurements, or investigations to describe, compare, and classify objects by their qualitative (observable) properties. This could include but is not limited to students observing, investigating, and collecting data about the qualitative properties of a given set of items in order to group the objects according to similar properties of color, size, flexibility, or attraction to magnets.

In addition to *analyzing and interpreting* data, students should *ask questions; plan and carry out investigations; use mathematics and computational thinking; engage in argument from evidence; construct explanations; develop and use models; obtain, evaluate, and communicate information; and construct devices or design solutions.*

Future Knowledge

- 2.P.3 Solid, liquid, gas
- 3.P.2 Properties of matter; solid, liquid, gas
- 5.P.2 Properties of matter

Essential Knowledge

Making observations is a way of learning about the world around us.

- A *scientific observation* is one that anyone can make and the result will always be the same. For example, the plant is green, has three leaves, and is smooth.
- An *observation that is not scientific*, or an opinion, is one that not everyone may agree on. For example, the flower is pretty.
- Observing does not mean just looking at something. It involves the use of one or more of the five senses (seeing, hearing, smelling, touching, and tasting) using appropriate observation methods for each sense, such as wafting an odor so that its smell can be described or gently touching the edges of seashells to determine their textures.
- Tasting in science should only be done with the permission of the teacher under controlled conditions.
- Observing helps to find out about objects (their characteristics, properties, differences, similarities) and events (what comes first or last, or what is happening at a particular moment).

Data about the qualitative properties of a collection of objects can be analyzed in order to look for patterns, common characteristics, and differences. *Qualitative (observable) properties* are properties that can be distinguished through observing with the senses, including:

Size

- Objects can be classified by size when compared with other objects.

Shape

- Objects can be classified according to their basic shape.

Color

- Objects can be classified by their color.

Texture

- *Texture* describes the way something feels to the touch.
- Objects can be classified by texture. Examples of texture words include soft, hard, rough, and smooth.

Weight

- At this level, students can compare the weight (quantity of mass) of one object to another by using a pan balance They are not required to actually measure the weight of the objects, but can explain that one object is heavier/lighter than another.

Flexibility

- Flexibility is the ability of an object to bend, especially without breaking.
- Objects can be classified by their flexibility.

Magnetic attraction

- Magnets are attracted to objects that contain iron.
- Magnets ARE NOT attracted to all metallic-looking objects.

- Objects can be classified as magnetic or not magnetic based on whether or not a magnet is attracted (sticks) to it.

Sinking

- Sinking means to stay near the bottom of a liquid.

Floating

- Floating means to stay near the top of a liquid.

*SCIENTIFIC TOOLS used to describe observable properties include a hand lens, a balance, and magnets.
NOTE TO TEACHER: This may be an appropriate opportunity for students to sort and classify data into 2 or 3 categories with data not to exceed 20 items in each category

Extended Knowledge

- Quantitative observations are measureable properties that can be distinguished by measuring and/or counting, such as length, width, and height.

Science and Engineering Practices
S.1A.4

Standard
K.P.4 The student will demonstrate an understanding of the observable properties of matter.

Conceptual Understanding
K.P.4A Objects can be described and classified by their observable properties, by their uses, and by whether they occur naturally or are manufactured (human-made). Different properties of objects are suited for different purposes.

Performance Indicator
K.P.4A.2 Develop and use models to describe and compare the properties of different materials (including wood, plastic, metal, cloth, and paper) and classify materials by their observable properties, by their uses, and by whether they are natural or human-made.

Assessment Guidance
The objective of this indicator is to *develop and use models* to describe and compare the properties of different materials and classify materials by their observable properties, by their uses, and by whether they are natural or human-made. Therefore, the primary focus of assessment should be for students to use information from observations and investigations to construct simple models (e.g. diagrams, charts) that can be used to organize and classify materials based on their physical properties, their possible uses, and whether they are man-made or natural. This could include but is not limited to students using information from investigations to develop illustrations that compare various uses of wood, such as building homes, making furniture, and making paper.

In addition to *developing and using models*, students should be asked to ask questions; plan and carry out investigations; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; construct explanations; obtain, evaluate, and communicate information; and construct devices or design solutions.

Future Knowledge

- 2.P.3 Solid, liquid, gas
- 3.P.2 Properties of matter; solid, liquid, gas

- 5.P.2 Properties of matter

Essential Understanding
Objects are made of different materials. These materials have different properties.

- Properties that can be used to describe, compare, and classify objects are size, shape, color, texture, weight, flexibility, attraction to magnets, or the ability to sink or float in water.
- Materials from which objects are made can include wood, plastic, metal, cloth, and paper.
- Similarities and differences between these materials can be made based on their properties, uses, and how they are made (i.e. made naturally or made by humans).
- Materials can be natural (like, sticks or twigs) or human-made (like, plastic bottles).
- Materials have a variety of uses (Ex. wood---furniture, toys, pencils)

*SCIENTIFIC TOOLS used to describe observable properties include a magnifier, ruler, balance, and magnets.

Extended Knowledge

- Solids and liquids are two types of matter that have distinct observable properties. Some matter can be mixed together and then separated again. Solids and liquids can change from one form to another when heat is added or removed.

Science and Engineering Practices
S.1A.2

Standard
K.P.4 Conduct structured investigations to answer questions about which materials have the properties that are best suited to solve a problem or need.

Conceptual Understanding
K.P.4A Objects can be described and classified by their observable properties, by their uses, and by whether they occur naturally or are manufactured (human-made). Different properties of objects are suited for different purposes.

Performance Indicator
K.P.4A.3 Conduct structured investigations to answer questions about which materials have the properties that are best suited to solve a problem or need.

Assessment Guidance
The objective of this indicator is to *conduct structured investigations* to answer questions about which materials have the properties that are best suited to solve a problem or need. Therefore, the primary focus of assessment should be for students to 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 with teacher assistance to determine which materials are best suited to solve a problem or need based on the observable properties of the materials. This could include but is not limited to students *defining a problem*, such as selecting materials to use when building a boat for a field day competition, and carrying out an investigation to determine which materials have the properties (from indicators K.P.4A.1 and K.P.4A.2) best suited for building a boat.

In addition to *conducting structured investigations*, students should *ask questions; analyze and interpret data; use mathematics and computational thinking; engage in argument from evidence; develop and use models; obtain, evaluate, and communicate information; and construct devices or design solutions.*

Future Knowledge

- 2.P.3 Properties of matter
- 3.P.2 Properties of matter
- 5.P.2 Properties of matter

Essential Knowledge

Clear directions for a scientific investigation may include instructions to:

- Develop a testable question.
- Predict possible outcomes.
- Identify appropriate tools, instruments, materials, and procedures.
- Make quantitative observations (see K.P.4A.1).
- Record and represent data and observations
- Communicate observations (for example through verbal discussion, pictures, diagrams, note-booking, etc.)

To make a *prediction*:

- Make observations and think about what is known about the object or event.
- Tell what will happen next.

For example, using processes described above, have students determine which material would best keep your head dry when it is raining outside (i.e. size, shape, and composition).

Extended Knowledge

- It is not essential for students to go beyond this level of knowledge at this time.

Science and Engineering Practices

S.1A.3