DoDEA College and Career Ready Standards for Science

CCRSS Grade Two

COLLEGE AND CAREER READY

A WORLD-CLASS EDUCATION FOR MILITARY-CONNECTED STUDENTS

dodea

DEPARTMENT OF DEFENSE EDUCATION ACTIVITY

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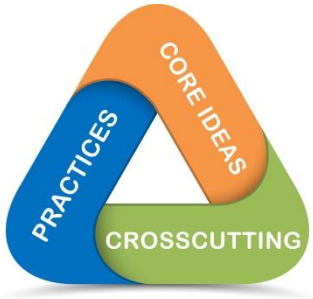
Introduction

The goals for science education in DoDEA are that all students will become critical consumers of scientific information related to their everyday lives and they will be prepared to pursue careers in science and engineering. Students' science education experience will be the foundation for continuing to learn about science throughout their lives as science helps to advance our understanding of the world.



The vision for science education is that students will be actively engaged in scientific and engineering practices and apply crosscutting concepts to deepen their understanding of core ideas in science and engineering. This creates a three dimensional learning experience of Disciplinary Core Ideas, Science and Engineering Practices, and Crosscutting Concepts. Through their science educational experiences, students will actively engage in the scientific and engineering practices and apply the crosscutting concepts to deepen their understanding of the core ideas. The learning experience will engage students in investigating phenomena and solving problems through the use of the engineering design process (NGSS Executive Summary, 2013).

Students in kindergarten through fifth grade begin to develop an understanding of the four disciplinary core areas:

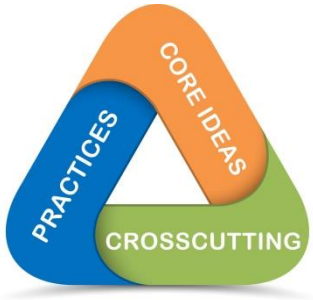
- Physical sciences;
- Life sciences;
- Earth and space sciences; and
- Engineering, technology, and applications of science.

In the earlier grades, students begin by recognizing patterns and formulating answers to questions about the world around them. By the end of fifth grade, students are able to demonstrate grade-appropriate proficiency in gathering, describing, and using information about the natural and designed world(s).

The performance expectations in elementary school grade bands develop ideas and skills that will allow students to explain more complex phenomena in the four disciplines as they progress to middle school and high school. While the performance expectations shown in kindergarten through fifth grade couple particular practices with specific disciplinary core ideas, instructional decisions should include use of many practices that lead to the performance expectations (NGSS Executive Summary, 2013).

Three Dimensional Learning

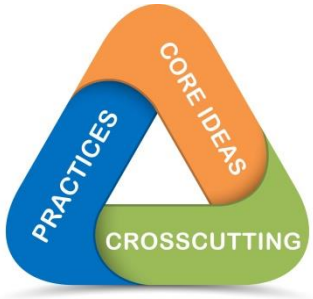
The National Research Council's (NRC) *A Framework for K-12 Science Education* describes a vision of what it means to be proficient in science; it rests on a view of science as both a body of knowledge and an evidence-based, model and theory building enterprise that continually extends, refines, and revises knowledge. It presents the following three dimensions: practices, crosscutting concepts, and disciplinary core ideas (DCIs) that will be combined to form each standard:



DIMENSION 1: PRACTICES	The practices describe behaviors that scientists engage in as they investigate and build models and theories about the natural world and the key set of engineering practices that engineers use as they design and build models and systems. The NRC uses the term practices instead of a term like "skills" to emphasize that engaging in scientific investigation requires not only skill but also knowledge that is specific to each practice. Part of the NRC's intent is to better explain and extend what is meant by "inquiry" in science and the range of cognitive, social, and physical practices that it requires. Although engineering design is similar to scientific inquiry, there are significant differences. For example, scientific inquiry involves the formulation of a question that can be answered through investigation, while engineering design involves the formulation of a problem that can be solved through design. Strengthening the engineering aspects of the Next Generation Science Standards will clarify for students the relevance of science, technology, engineering and mathematics (the four STEM fields) to everyday life.
DIMENSION 2: CROSSCUTTING CONCEPTS	Crosscutting concepts have application across all domains of science. As such, they are a way of linking the different domains of science. They include: Patterns; Cause and Effect; Scale, Proportion and Quantity; Systems and System Models; Energy and Matter; Structure and Function; Stability and Change. The NRC Framework emphasizes that these concepts need to be made explicit for students because they provide an organizational schema for interrelating knowledge from various science fields into a coherent and scientifically-based view of the world.
DIMENSION 3: DISCIPLINARY CORE IDEAS (DCIs)	Disciplinary core ideas have the power to focus K–12 science curriculum, instruction and assessments on the most important aspects of science. To be considered core, the ideas should meet at least two of the following criteria and ideally all four: ▪ Have broad importance across multiple sciences or engineering disciplines or be a key organizing concept of a single discipline; ▪ Provide a key tool for understanding or investigating more complex ideas and solving problems; ▪ Relate to the interests and life experiences of students or be connected to societal or personal concerns that require scientific or technological knowledge; ▪ Be teachable and learnable over multiple grades at increasing levels of depth and sophistication. Disciplinary ideas are grouped in four domains: the physical sciences; the life sciences; the earth and space sciences; and engineering, technology and applications of science.

How To Read The Standards

Performance Expectation
The DoDEA College and Career Ready Standards for Science (CCRSS) are written as a set of performance expectations that are assessable statements of what students should know and be able to do. An underlying assumption of these standards is that all students should be held accountable for demonstrating their achievement of all performance expectations. A coherent and complete view of what students should be able to do comes when the performance expectations are viewed in tandem with the contents of the foundation boxes that lie just below the performance expectations. These three boxes include the practices, disciplinary core ideas, and crosscutting concepts, derived from the National Research Council's Framework for K12 Science Education that were used to construct this set of performance expectations.



Science and Engineering Practices (SEPs)	Disciplinary Core Ideas (DCIs)	Crosscutting Concepts (CCCs)
The blue box on the left includes the science and engineering practices used to construct the performance expectations in the box above. These statements are derived from and grouped by the eight categories detailed in the NRC Framework to further explain the science and engineering practices important to emphasize in each grade band. Most sets of performance expectations emphasize only a few of the practice categories; however, all practices are emphasized within a grade band.	The orange box in the middle includes statements that are taken from the NRC Framework about the most essential ideas in the major science disciplines that all students should understand during 13 years of school. Including these detailed statements was very helpful to the writing team as they analyzed and "unpacked" the disciplinary core ideas and sub-ideas to reach a level that is helpful in describing what each student should understand about each sub-idea at the end of grades 2, 5, 8, and 12. Although they appear in paragraph form in the NRC Framework, here they are bulleted to be certain that each statement is distinct.	The green box on the right includes statements derived from the NRC Framework's list of crosscutting concepts, which apply to one or more of the performance expectations in the box above. Most sets of performance expectations limit the number of crosscutting concepts so as focus on those that are readily apparent when considering the DCIs; however, all are emphasized within a grade band. Aspects of the Nature of Science relevant to the standard are also listed in this box, as are the interdependence of science and engineering, and the influence of engineering, technology, and science on society and the natural world.

CONNECTION BOXES

Three Connection Boxes are designed to support a coherent vision of the standards by showing how the performance expectations in each standard connect to other performance expectations in science, as well as to the DoDEA College and Career Ready Standards for English/Language Arts (CCRSL) and Mathematics (CCRSM).

The three boxes include:

Connections to other DCIs in this grade level or band. This box contains the names of science topics in other disciplines that have related disciplinary core ideas at the same grade level. For example, both Physical Science and Life Science performance expectations contain core ideas related to photosynthesis, and could be taught in relation to one another

Articulation of DCIs across grade levels. This box contains the names of other science topics that either:
1) provide a foundation for student understanding of the core ideas in this set of performance expectations (usually at prior grade levels) or
2) build on the foundation provided by the core ideas in this set of performance expectations (usually at subsequent grade levels).

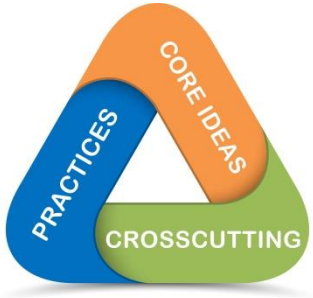
DoDEA College and Career Ready Standards
This box contains the connections to ELA/Literacy (CCRSL) and Mathematics (CCRSM) as shown below.

ELA/Literacy (CCRSL) Connections	
SCIENCE	ELA/LITERACY
Performance Expectation	Standard Connection

Mathematics (CCRSM) Connections	
SCIENCE	MATHEMATICS
Performance Expectation	Standard Connection

Elementary Introduction

Students in kindergarten through fifth grade begin to develop an understanding of the four disciplinary core ideas: physical sciences; life sciences; earth and space sciences; and engineering, technology, and applications of science. In the earlier grades, students begin by recognizing patterns and formulating answers to questions about the world around them. By the end of fifth grade, students are able to demonstrate grade-appropriate proficiency in gathering, describing, and using information about the natural and designed world(s). The performance expectations in elementary school grade bands develop ideas and skills that will allow students to explain more complex phenomena in the four disciplines as they progress to middle school and high school. While the performance expectations shown in kindergarten through fifth grade couple particular practices with specific disciplinary core ideas, instructional decisions should include use of many practices that lead to the performance expectations.



Physical Sciences	Earth & Space Sciences	Life Sciences	Engineering, Technology, & Applications of Sciences

Second Grade Storyline

The performance expectations in second grade help students formulate answers to questions such as: "How does land change and what are some things that cause it to change? What are the different kinds of land and bodies of water? How are materials similar and different from one another, and how do the properties of the materials relate to their use? What do plants need to grow? How many types of living things live in a place?" Second grade performance expectations include PS1, LS2, LS4, ESS1, ESS2, and ETS1 Disciplinary Core Ideas from the *NRC Framework*. Students are expected to develop an understanding of what plants need to grow and how plants depend on animals for seed dispersal and pollination. Students are also expected to compare the diversity of life in different habitats. An understanding of observable properties of materials is developed by students at this level through analysis and classification of different materials. Students are able to apply their understanding of the idea that wind and water can change the shape of the land to compare design solutions to slow or prevent such change. Students are able to use information and models to identify and represent the shapes and kinds of land and bodies of water in an area and where water is found on Earth. The crosscutting concepts of patterns; cause and effect; energy and matter; structure and function; stability and change; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. In the second grade performance expectations, students are expected to demonstrate grade appropriate proficiency in developing and using models, planning and carrying out investigations, analyzing and interpreting data, constructing explanations and designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas.

2. Structure and Properties of Matter

2. Structure and Properties of Matter

Students who demonstrate understanding can:

2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
[Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]

2-PS1-2. Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.*
[Clarification Statement: Examples of properties could include: strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]

2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled & made into a new object.
[Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]

2-PS1-4. Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.
[Clarification Statement: Examples of reversible changes could include materials such as water and butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]

The performance expectations above were developed using the following elements from the NRC document A Framework for K-12 Science Education:

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. ▪ Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-PS1-1) **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. (2-PS1-2)	**PS1.A: Structure and Properties of Matter** ▪ Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1) ▪ Different properties are suited to different purposes. (2- PS1-2), (2-PS1-3) ▪ A great variety of objects can be built up from a small set of pieces. (2-PS1-3) **PS1.B: Chemical Reactions** ▪ Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)	**Patterns** ▪ Patterns in the natural and human designed world can be observed. (2-PS1-1) **Cause and Effect** ▪ Events have causes that generate observable patterns. (2-PS1-4) ▪ Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2) **Energy and Matter** ▪ Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3)

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. ▪ Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3) **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. (2- PS1-4) ---------- **Connections to Nature of Science** **Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena** ▪ Scientists search for cause and effect relationships to explain natural events. (2-PS1-4)		---------- **Connections to Engineering, Technology, and Applications of Science** **Influence of Engineering, Technology, and Science on Society and the Natural World** ▪ Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (2-PS1-2)

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea. The section entitled "Disciplinary Core Ideas" is reproduced verbatim from A Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas.

Connections

CONNECTIONS
Connections to other DCIs in second grade: N/A
Articulation of DCIs across grade-levels: 4.ESS2.A (2-PS1-3); 5.PS1.A (2-PS1-1), (2-PS1-2), (2-PS1-3); 5.PS1.B (2-PS1-4); 5.LS2.A (2-PS1-3)

DODEA COLLEGE AND CAREER READY STANDARDS

ELA/Literacy (CCRSL) Connections	
SCIENCE	ELA/LITERACY
(2-PS1-4)	**RI.2.1:** Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.
(2-PS1-4)	**RI.2.3:** Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.
(2-PS1-2) (2-PS1-4)	**RI.2.8:** Describe how reasons support specific points the author makes in a text.
(2-PS1-4)	**W.2.1:** Write opinion pieces in which they introduce the topic or book they are writing about, state an opinion, supply reasons that support the opinion, use linking words (e.g., because, and, also) to connect opinion and reasons, and provide a concluding statement or section.
(2-PS1-1) (2-PS1-2) (2-PS1-3)	**W.2.7:** Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).
(2-PS1-1) (2-PS1-2) (2-PS1-3)	**W.2.8:** Recall information from experiences or gather information from provided sources to answer a question.

Mathematics (CCRSM) Connections	
SCIENCE	MATHEMATICS
(2-PS1-2)	**MP.2:** Reason abstractly and quantitatively.
(2-PS1-1) (2-PS1-2)	**MP.4:** Model with mathematics.
(2-PS1-2)	**MP.5:** Use appropriate tools strategically.
(2-PS1-1) (2-PS1-2)	**2.MD.10:** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

2. Earth's Systems: Processes that Shape the Earth

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Students who demonstrate understanding can:

2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
[Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.] [Assessment Boundary: Assessment does not include quantitative measurements of timescales.]

2-ESS2-1. Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*
[Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.]

2-ESS2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area.
[Assessment Boundary: Assessment does not include quantitative scaling in models.]

2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid.

The performance expectations above were developed using the following elements from the NRC document A Framework for K-12 Science Education:

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, or storyboard) that represent concrete events or design solutions. ▪ Develop a model to represent patterns in the natural world. (2-ESS2-2) **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. ▪ Make observations from several sources to construct an evidence-based account for natural phenomena. (2-ESS1-1) ▪ Compare multiple solutions to a problem. (2-ESS2-1)	**ESS1.C: The History of Planet Earth** ▪ Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1) **ESS2.A: Earth Materials and Systems** ▪ Wind and water can change the shape of the land. (2- ESS2-1) **ESS2.B: Plate Tectonics and Large-Scale System Interactions** ▪ Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2) **ESS2.C: The Roles of Water in Earth's Surface Processes** ▪ Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3) **ETS1.C: Optimizing the Design Solution** ▪ Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (secondary to 2-ESS2-1)	**Patterns** ▪ Patterns in the natural world can be observed. (2-ESS2-2), (2-ESS2-3) **Stability and Change** ▪ Things may change slowly or rapidly. (2- ESS1-1), (2-ESS2-1) ---------- **Connections to Engineering, Technology, and Applications of Science** **Influence of Engineering, Technology, and Science on Society and the Natural World** ▪ Developing and using technology has impacts on the natural world. (2-ESS2-1) ---------- **Connections to Nature of Science** **Science Addresses Questions About the Natural and Material World** ▪ Scientists study the natural and material world. (2-ESS2-1)

Obtaining, Evaluating, & Communicating Information Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information. ▪ Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3)		

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea. The section entitled "Disciplinary Core Ideas" is reproduced verbatim from A Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas.

Connections

CONNECTIONS
Connections to other DCIs in second grade: 2.PS1.A (2-ESS2-3)
Articulation of DCIs across grade-levels: K.ETS1.A (2-ESS2-1); 3.LS2.C (2-ESS1-1); 4.ESS1.C (2-ESS1-1); 4.ESS2.A (2-ESS1-1), (2-ESS2-1); 4.ESS2.B (2-ESS2-2); 4.ETS1.A (2- ESS2-1); 4.ETS1.B (2-ESS2-1); 4.ETS1.C (2-ESS2-1); 5.ESS2.A (2-ESS2-1); 5.ESS2.C (2-ESS2-2), (2-ESS2-3)

DODEA COLLEGE AND CAREER READY STANDARDS

ELA/Literacy (CCRSL) Connections	
SCIENCE	ELA/LITERACY
(2-ESS1-1)	**RI.2.1:** Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.
(2-ESS1-1) (2-ESS2-1)	**RI.2.3:** Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.
(2-ESS2-1)	**RI.2.9:** Compare and contrast the most important points presented by two texts on the same topic.
(2-ESS1-1) (2-ESS2-3)	**W.2.6:** With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.
(2-ESS1-1)	**W.2.7:** Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).
(2-ESS1-1) (2-ESS2-3)	**W.2.8:** Recall information from experiences or gather information from provided sources to answer a question.
(2-ESS1-1)	**SL.2.2:** Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.
(2-ESS2-2)	**SL.2.5:** Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.

Mathematics (CCRSM) Connections	
SCIENCE	**MATHEMATICS**
(2-ESS2-1) (2-ESS2-1) (2-ESS2-2)	**MP.2:** Reason abstractly and quantitatively.
(2-ESS1-1) (2-ESS2-1) (2-ESS2-2)	**MP.4:** Model with mathematics.
(2-ESS2-1)	**MP.5:** Use appropriate tools strategically.
(2-ESS1-1)	**2.NBT:** Understand place value.
(2-ESS2-2)	**2.NBT.3:** Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
(2-ESS2-1)	**2.MD.5:** Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.

2. Interdependent Relationships in Ecosystems

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Students who demonstrate understanding can: **2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.** [Assessment Boundary: Assessment is limited to testing one variable at a time.] **2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.** **2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.** [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]		
The performance expectations above were developed using the following elements from the NRC document A Framework for K-12 Science Education:		
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, or storyboard) that represent concrete events or design solutions. ▪ Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2) **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. ▪ Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1) ▪ Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1) ---------- **Connections to Nature of Science** **Scientific Knowledge is Based on Empirical Evidence** ▪ Scientists look for patterns and order when making observations about the world. (2-LS4-1)	LS2.A: Interdependent Relationships in Ecosystems ▪ Plants depend on water and light to grow. (2-LS2-1) ▪ Plants depend on animals for pollination or to move their seeds around. (2-LS2-2) **LS4.D: Biodiversity and Humans** ▪ There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1) **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. (secondary to 2-LS2-2)	**Cause and Effect** ▪ Events have causes that generate observable patterns. (2-LS2-1) **Structure and Function** ▪ The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)

Connections

CONNECTIONS
Connections to other DCIs in second grade: N/A
Articulation of DCIs across grade-levels: K.LS1.C (2-LS2-1); K-ESS3.A (2-LS2-1); K.ETS1.A (2-LS2-2); 3.LS4.C (2-LS4-1); 3.LS4.D (2-LS4-1); 5.LS1.C (2-LS2-1); 5.LS2.A (2-LS2-2), (2-LS4-1)

DODEA COLLEGE AND CAREER READY STANDARDS

ELA/Literacy (CCRSL) Connections	
SCIENCE	ELA/LITERACY
(2-LS2-1) (2-LS4-1)	**W.2.7:** Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).
(2-LS2-1) (2-LS4-1)	**W.2.8:** Recall information from experiences or gather information from provided sources to answer a question.
(2-LS2-2)	**SL.2.5:** Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.
(2-LS2-1) (2-LS4-1)	**W.2.7:** Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).

Mathematics (CCRSM) Connections	
SCIENCE	MATHEMATICS
(2-LS2-1) (2-LS4-1)	**MP.2:** Reason abstractly and quantitatively.
(2-LS2-1) (2-LS2-2) (2-LS4-1)	**MP.4:** Model with mathematics.
(2-LS2-1)	**MP.5:** Use appropriate tools strategically.
(2-LS2-2) (2-LS4-1)	**2.MD.10:** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems.

K-2. Engineering Design

K-2. Engineering Design		
Students who demonstrate understanding can: **K-2-ETS1-1.** Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. **K-2-ETS1-2.** Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. **K-2-ETS1-3.** Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.		
The performance expectations above were developed using the following elements from the NRC document A Framework for K-12 Science Education:		
Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**
Asking Questions and Defining Problems ▪ Asking questions and defining problems in K–2 builds on prior experiences and progresses to simple descriptive questions. ▪ Ask questions based on observations to find more information about the natural and/or designed world. (K-2- ETS1-1) ▪ Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1) **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, or storyboard) that represent concrete events or design solutions. ▪ Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2) **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. (K-2-ETS1-3)	**ETS1.A: Defining and Delimiting Engineering Problems** ▪ A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2- ETS1-1) ▪ Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1) ▪ Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1) **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. (K-2-ETS1-2) **ETS1.C: Optimizing the Design Solution** ▪ Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)	**Structure and Function** ▪ The shape and stability of structures of natural and designed objects are related to their function(s). (K-2- ETS1-2)

Connections

CONNECTIONS
Connections to K-2-ETS1.A: Defining and Delimiting Engineering Problems include: Kindergarten: K-PS2-2, K-ESS3-2 Connections to K-2-ETS1.B: Developing Possible Solutions to Problems include: Kindergarten: K-ESS3-3, First Grade: 1-PS4-4, Second Grade: 2-LS2-2 Connections to K-2-ETS1.C: Optimizing the Design Solution include: Second Grade: 2-ESS2-1
Articulation of DCIs across grade-bands: 3-5.ETS1.A (K-2-ETS1-1), (K-2-ETS1-2), (K-2 -ETS1-3); 3-5.ETS1.B (K-2-ETS1-2), (K-2-ETS1-3); 3-5.ETS1.C (K-2-ETS1-1), (K-2-ETS1-2), (K-2-ETS1-3)

DODEA COLLEGE AND CAREER READY STANDARDS

ELA/Literacy (CCRSL) Connections	
SCIENCE	ELA/LITERACY
(K-2-ETS1-1)	**RI.2.1:** Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.
(K-2-ETS1-1) (K-2-ETS1-3)	**W.2.6:** With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers.
(K-2-ETS1-1) (K-2-ETS1-3)	**W.2.8:** Recall information from experiences or gather information from provided sources to answer a question. (K-2-ETS1-1),(K-2-ETS1-3)
(K-2-ETS1-2)	**SL.2.5:** Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.

Mathematics (CCRSM) Connections	
SCIENCE	MATHEMATICS
(K-2-ETS1-1) (K-2-ETS1-3)	**MP.2:** Reason abstractly and quantitatively.
(K-2-ETS1-1) (K-2-ETS1-3)	**MP.4:** Model with mathematics.
(K-2-ETS1-1) (K-2-ETS1-3)	**MP.5:** Use appropriate tools strategically.
(K-2-ETS1-1) (K-2-ETS1-3)	**2.MD.10:** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

Acronyms

List of Common Acronyms used by DoDEA College and Career Ready Standards for Science (CCRSS).

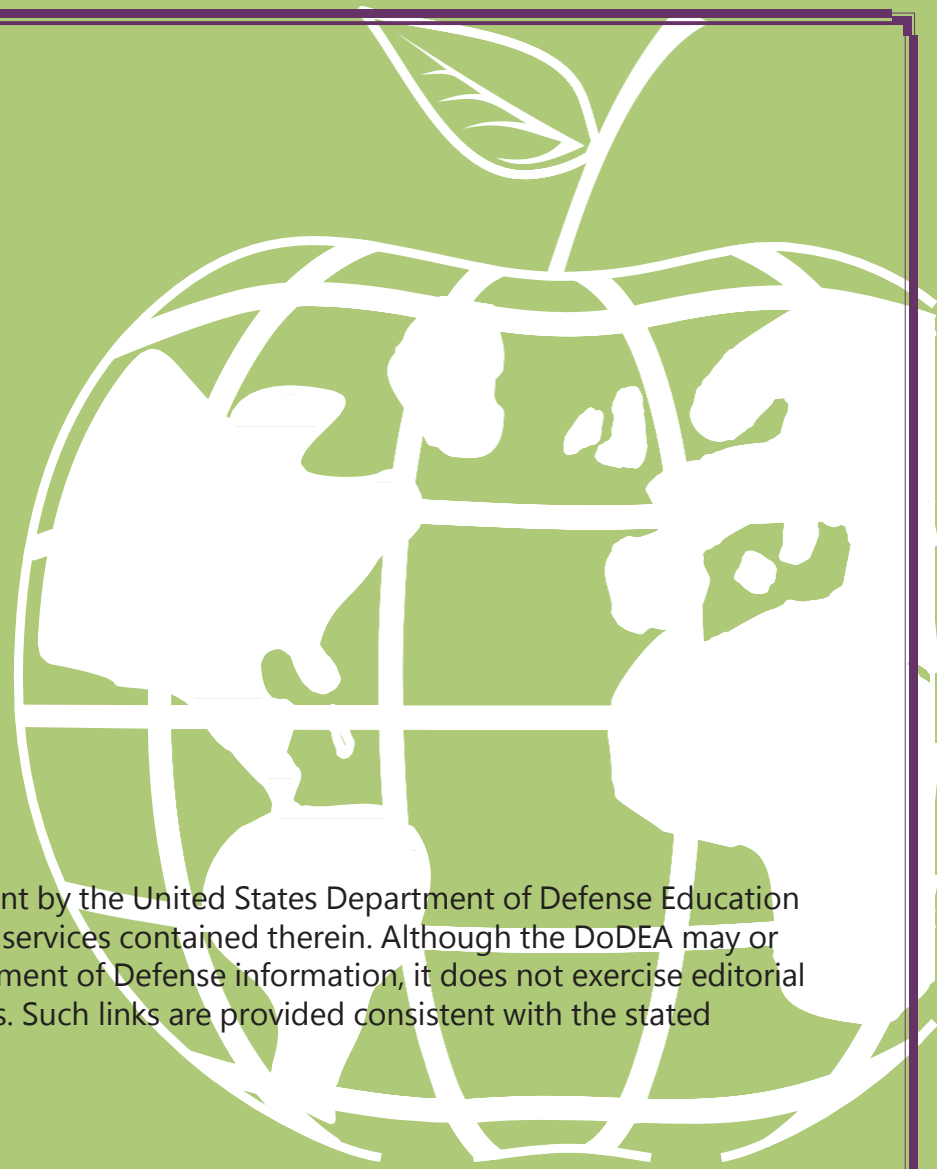
AAAS:	American Association for the Advancement of Science
AYP:	Annual Yearly Progress
BF:	Building Functions (CCRSM Connection)
CC:	Counting & Cardinality (CCRSM Connection)
CED:	Creating Equations (CCRSM Connection)
CR:	Chemical Reactions (Topic Name)
CCR:	College and Career Ready
CCRSL:	College and Career Ready Standards for ELA/Literacy (CCRSL Connection)
CCRSM:	College and Career Ready Standards for ELA/Literacy (CCRSM Connection)
CCC:	Crosscutting Concept
DCI:	Disciplinary Core Idea
ELL:	English Language Learner
E:	Energy (Topic Name)
EE:	Expressions & Equations (CCRSM Connection)
ELA:	English Language Arts
ED:	Engineering Design (Topic Name)
ES:	Earth's Systems (Topic Name)
ESEA:	Elementary and Secondary Education Act
ESS:	Earth and Space Science
ETS:	Engineering, Technology, and Applications of Science
F:	Functions (CCRSM Connection)
FI:	Forces and Interactions (Topic Name)
FB:	Foundation Box
G:	Geometry (CCRSM Connection)
GBE:	Grade Band Endpoint
GDRO:	Growth, Development, and Reproduction of Organisms (Topic Name)
HI:	Human Impacts (Topic Name)
HS:	High School
ID:	Interpret Data (CCRSM Connection)
IDEA:	Individuals with Disabilities Education Act
IEP:	Individualized Education Program
IF:	Interpreting Functions (CCRSM Connection)

IRE:	Interdependent Relationships in Ecosystems (Topic Name)
IVT:	Inheritance and Variation of Traits (Topic Name)
K:	Kindergarten
LEP:	Limited English Proficiency
LS:	Life Science
MD:	Measurement & Data (CCRSM Connection)
MEOE:	Matter and Energy in Organisms and Ecosystems (Topic Name)
MP:	Math Practice-Standard of Mathematical Practice (CCRSM Connection)
MS:	Middle School
NAEP:	National Assessment of Educational Progress
NAGC:	National Association for Gifted Children
NBT:	Number & Operations in Base Ten (CCRSM Connection)
NCLB:	No Child Left Behind Act
NF:	Number & Operations— Fractions (CCRSM Connection)
NGSS:	Next Generation Science Standards
NOS:	Nature of Science
NSTA:	National Science Teachers Association
NRC:	National Research Council
NS:	The Number System (CCRSM Connection)
NSA:	Natural Selection and Adaptations (Topic Name)
NSE:	Natural Selection and Evolution (Topic Name)
NSF:	National Science Foundation
OA:	Operations & Algebraic Thinking (CCRSM Connection)
PE:	Performance Expectation
PISA:	Program for International Student Assessment
PS:	Physical Sciences
Q:	Quantities (CCRSM Connection)
RI:	Reading Informational Text (CCRSL Connection)
RL:	Reading Literature (CCRSL Connection)
RP:	Ratios and Proportional Relationships (CCRSM Connection)
RST:	Reading in Science & Technical Subjects (CCRSL Connection)
SEP:	Science and Engineering Practices
SF:	Structure and Function (Topic Name)
SFIP:	Structure, Function, and Information Processing (Topic Name)
SL:	Speaking & Listening (CCRSL Connection)

SP:	Statistics & Probability (CCRSM Connection)
SPM:	Structures and Properties of Matter (Topic Name)
SS:	Space Systems (Topic Name)
SSE:	Seeing Structure in Expressions (CCRSM Connection)
STEM:	Science, Technology, Engineering, and Mathematics
STS:	Science, Technology, and Society
TELA:	Technology and Engineering Literacy Assessment
TIMSS:	Trends in International Mathematics and Science Study
W:	Waves (Topic Name)
W:	Writing (CCRSL Connection)
WHST:	Writing in History/Social Studies, Science, & Technical Subjects (CCRSL Connection)
WC:	Weather and Climate (Topic Name)
WER:	Waves and Electromagnetic Radiation (Topic Name)

CCRSS Appendices

	Appendices	Description
A.	Conceptual Shifts	Appendix A addresses the seven conceptual shifts that science educators and stakeholders need to make to effectively use the College and Career Ready Standards for Science.
B.	Responses to Public Drafts	Appendix B shows the results of public feedback and the responses to the standards.
C.	College and Career Readiness	Appendix C describes how the vision for K-12 science education and the content of the standards will properly prepare students for their college and careers.
D.	All Standards, All Students: Case Studies	Appendix D emphasizes that these standards require instructional shifts to enable all students to meet the requirements for college and career readiness and highlights implementation strategies.
E.	Disciplinary Core Idea Progressions	Appendix E presents the DCI learning progressions which demonstrate how each disciplinary core idea develops across the grade bands to ensure students achieve the depth of understanding expected before leaving high school.
F.	Science and Engineering Practices	Appendix F presents the eight Science and Engineering Practices. These mirror the practices of professional scientists and engineers. The SEP progressions illustrate how the SEPs are developed throughout students' K-12 science education.
G.	Crosscutting Concepts	Appendix G presents the seven Crosscutting Concepts. These crosscutting concepts give students an organizational structure to understand the world and help students make sense of and connect DCIs across disciplines and grade bands. The CCC progressions illustrate how the CCC are developed throughout students' K-12 science education.
H.	Nature of Science	Appendix H presents the eight basic understandings about the nature of science. This appendix explains the perspectives, rationale, and research supporting the importance of nature of science in the standards.
I.	Engineering Design in the NGSS	Appendix I describes engineering design and the way it allows students to engage in and aspire to solve major societal and environmental challenges they will face in the decades ahead.
J.	Science, Technology, Society, and the Environment	Appendix J describes the importance of students learning about the relationship between science, technology, society, and the environment.
K.	Model Course Mapping in Middle and High School	Appendix K supports school systems in their decision-making about how to organize science courses to address the MS and HS science standards to prepare students for post-secondary success.
L.	Connections to CCSS-Mathematics	Appendix L highlights the relationship between mathematics and science.
M.	Connections to CCSS-Literacy in Science and Technical Subjects	Appendix M highlights the relationship between literacy and science.



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