**K-2 Teacher’s Guide to Nebraska’s College and**

**Career Ready Standards for Science**

**2017**

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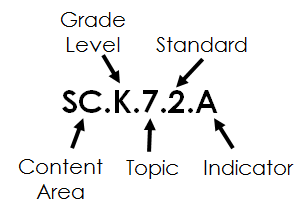
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**Content Area Standards Structure**

The overall structure of Nebraska’s College and Career Ready Standards for Science (CCR-Science) reflects the two-tier structure common across all Nebraska content area standards. The two levels within the structure include **standards** and **indicators**. At the broadest level, **standards** include broad, overarching content-based statements that describe the basic cognitive, affective, or psychomotor indicators of student learning. The standards, across all grade levels, reflect long-term goals for learning. **Indicators** further describe what students must know and be able to do to meet the standard. These performance-based statements provide clear indicators related to student learning in each content area. Additionally, indicators provide guidance related to the assessment of student learning. This guidance is articulated by including assessment boundary statements.

The CCR-Science standards describe the knowledge and skills that students should learn, but they do not prescribe particular curriculum, lessons, teaching techniques, or activities. Standards describe what students are expected to know and be able to do, while the local curriculum describes how teachers will help students master the standards. A wide variety of instructional resources may be used to meet the state content area standards. Decisions about curriculum and instruction are made locally by individual school districts and classroom teachers. The Nebraska Department of Education does not mandate the curriculum used within a local school.

In addition to a common structure for content area standards, a consistent numbering system is used for content area standards. The CCR-Science standards numbering system is as follows:

**Organization and Structure of CCR-Science Standards**

Nebraska’s College and Career Ready Standards for Science (CCR-Science) are organized by grade level for grades K-8 and by grade span in high school. K-5 standards are organized to reflect the developmental nature of learning for elementary students and attend to the learning progressions that build foundational understandings of science. By the time students reach middle school (Grades 6-8), they build on this foundation in order to develop more sophisticated understandings of science concepts through high school. The topic progression for the CCR-Science standards is included in Appendix A.

Within each grade level/span the standards are organized around topics, and each standard addresses one topic. Each CCR-Science standard begins with the common stem: “Gather, analyze, and communicate…” This stem highlights long-term learning goals associated with rigorous science standards and provides guidance for high quality classroom instruction. To facilitate high-quality instruction, students actively gather evidence from multiple sources related to the science topics. This evidence is carefully analyzed in order to describe and explain natural phenomena, and then, students communicate their understanding of the content using a variety of tools and strategies. It is important to note that while topics are introduced in a spiraled model, they are connected; and deeper understanding at subsequent grade levels and spans requires foundational understanding of multiple topics.

The indicators reflect the three dimensions of science learning outlined in *A Framework for K-12 Science Education1.* Each CCR-Science indicator includes a disciplinary core idea, a crosscutting concept (underline), and a **science and engineering practice** (**bold**).

The disciplinary core ideas are the focused, limited set of science ideas identified in the *Framework* as necessary for ALL students throughout their education and beyond their K-12 school years to achieve scientific literacy. The limited number of disciplinary core ideas allows more time for students and teachers to engage in the science and engineering practices as they deeply explore science ideas. To allow students to continually build on and revise their knowledge and abilities, the disciplinary core ideas are built on developmental learning progressions (Appendix A).

The crosscutting concepts are used to organize and make sense of disciplinary core ideas. They serve as tools that bridge disciplinary boundaries and deepen understanding of science content. With grade-appropriate proficiency, students are expected to use patterns; cause and effect; scale, proportion, and quantity; systems and system models; energy and matter; structure and function; and stability and change as they gather, analyze, and communicate scientific understanding. These crosscutting concepts provide structure for synthesizing knowledge from various fields into a coherent and scientifically based view of the world.

The **science and engineering practices** are used by students to demonstrate understanding of the disciplinary core ideas and crosscutting concepts. Engaging in the practices of science and engineering helps students understand the wide range of approaches used to investigate natural phenomena and develop solutions to challenges. Students are expected to demonstrate grade-appropriate proficiency in asking questions and defining problems; developing and using models; planning and carrying out investigations; analyzing and interpreting data; using mathematics and computational thinking; constructing explanations and designing solutions; engaging in argument from evidence; and obtaining, evaluating, and communicating information as they gather, analyze, and communicate scientific information.

Each science indicator focuses on one crosscutting concept and one **science and engineering practice** as an *example* to guide assessment. Instruction aimed toward preparing students should use crosscutting concepts and **science and engineering practices** that go beyond what is stated in the indicator to better reflect authentic science practice.

The following table lists the disciplinary core ideas, crosscutting concepts, and **science and engineering practices**:

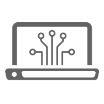
|  |  |  |
| --- | --- | --- |
| [**Science and Engineering Practices**](https://www.nap.edu/read/13165/chapter/7)   * **[Asking Questions and Defining Problems](https://www.nap.edu/read/13165/chapter/7" \l "54)** * **[Developing and Using Models](https://www.nap.edu/read/13165/chapter/7" \l "56)** * **[Planning and Carrying Out Investigations](https://www.nap.edu/read/13165/chapter/7" \l "59)** * [**Analyzing and Interpreting Data**](https://www.nap.edu/read/13165/chapter/7#61) * **[Using Mathematics and Computational Thinking](https://www.nap.edu/read/13165/chapter/7" \l "64)** * **[Constructing Explanations and Designing Solutions](https://www.nap.edu/read/13165/chapter/7" \l "67)** * **[Engaging in Argument from Evidence](https://www.nap.edu/read/13165/chapter/7" \l "71)** * [**Obtaining, Evaluating, and Communicating Information**](https://www.nap.edu/read/13165/chapter/7#74) | **Disciplinary Core Ideas**  [**LS1**](https://www.nap.edu/read/13165/chapter/10#143)**: From Molecules to Organisms:   Structures and Processes** [**LS2**](https://www.nap.edu/read/13165/chapter/10#150)**: Ecosystems: Interactions, Energy,   and Dynamics** [**LS3**](https://www.nap.edu/read/13165/chapter/10#157)**: Heredity: Inheritance and of Traits** [**LS4**](https://www.nap.edu/read/13165/chapter/10#161)**: Biological Evolution: Unity & Diversity** [**PS1**](https://www.nap.edu/read/13165/chapter/9#106)**: Matter and Its Interactions** [**PS2**](https://www.nap.edu/read/13165/chapter/9#113)**: Motion and Stability: Forces and   Interactions** [**PS3**](https://www.nap.edu/read/13165/chapter/9#120)**: Energy** [**PS4**](https://www.nap.edu/read/13165/chapter/9#130)**: Waves and Their Applications in   Technologies for Information Transfer** [**ESS1**](https://www.nap.edu/read/13165/chapter/11#173)**: Earth’s Place in the Universe** [**ESS2**](https://www.nap.edu/read/13165/chapter/11#179)**: Earth’s Systems** [**ESS3**](https://www.nap.edu/read/13165/chapter/11#190)**: Earth and Human Activity** [**ETS1**](https://www.nap.edu/read/13165/chapter/12#204)**: Engineering Design** | C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.png[**Crosscutting Concepts**](https://www.nap.edu/read/13165/chapter/8)  [C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png**Patterns**](https://www.nap.edu/read/13165/chapter/8#85) [**Cause and Effect**](https://www.nap.edu/read/13165/chapter/8#87)  [**Scale, Proportion, and Quantity**](https://www.nap.edu/read/13165/chapter/8#89)C:\Users\sara.cooper.NDE\Desktop\Standards\ScaleProportionQuantity.png  C:\Users\sara.cooper.NDE\Desktop\Standards\Systems.png[**Systems and System Models**](https://www.nap.edu/read/13165/chapter/8#91)  C:\Users\sara.cooper.NDE\Desktop\Standards\EnergyMatter.png  [**Energy and Matter**](https://www.nap.edu/read/13165/chapter/8#94)  C:\Users\sara.cooper.NDE\Desktop\Standards\StructureFunction.png[**Structure and Function**](https://www.nap.edu/read/13165/chapter/8#96)  C:\Users\sara.cooper.NDE\Desktop\Standards\StabilityChange.png  [**Stability and Change**](https://www.nap.edu/read/13165/chapter/8#98) |



**Nebraska Connections**

Opportunities to teach science using topics directly relevant to our state (e.g. Ogallala Aquifer, agriculture, Nebraska-specific flora and fauna, Nebraska’s rich geologic history, etc.) are listed throughout the CCR-Science standards as “Nebraska Connections.” These connections allow educators to use local, regional, and state-specific contexts for teaching, learning, and assessment. Educators should use these as recommendations for investigation with students. Additionally, assessment developers have the opportunity to use the Nebraska contexts to develop Nebraska-specific examples or scenarios from which students would demonstrate their general understanding. This approach provides the opportunity for educators to draw upon Nebraska’s natural environment and rich history and resources in engineering design and scientific research to support student learning.

**Civic Science Connections**

****Within the CCR-Science standards, opportunities to create civic science connections have been identified. These connections are designed to call-out the importance for students to engage in the study of civic ideals, principles, and practices through participation in the act of “citizen science.” Citizen science is the public involvement in inquiry and discovery of new scientific knowledge. This engagement helps students build science knowledge and skills while improving social behavior, increasing student engagement, and strengthening community partnerships. Citizen science projects enlist K-12 students to collect or analyze data for real-world research studies. Citizen science in conjunction with the CCR-Science standards help bridge our K-12 students with stakeholders in the community, both locally and globally.

**Computer Science Connections**Natural connections between science and computer science have been identified throughout the standards, especially in the middle level and in high school as students expand their ability to use computational thinking to develop complex models and simulations of natural and designed systems. Computers and other digital tools allow students to collect, record, organize, analyze, and communicate data as they engage in science learning.

**Engineering, Technology, and Applications of Science Connections**Connections to engineering, technology, and applications of science are included at all grade levels and in all domains. These connections highlight the interdependence of science, engineering, and technology that drives the research, innovation, and development cycle where discoveries in science lead to new technologies developed using the engineering design process. Additionally, these connections call attention to the effects of scientific and technological advances on society and the environment.

** Engineering Design**Performance indicators for the engineering design process are intentionally embedded in all grade levels. These indicators allow students to demonstrate their ability to define problems, develop possible solutions, and improve designs. ***These indicators should be reinforced whenever students are engaged in practicing engineering design during instruction.*** Having students engage in the engineering design process will prepare them to solve challenges both in and out of the classroom.

**Instructional Shifts**While each indicator incorporates the three dimensions, this alone does not drive student outcomes; ultimately, student learning depends on how the standards are translated to instructional practices.

*3-Dimensional teaching and learning:* Effective science teaching, learning, and assessment should integrate disciplinary core ideas, crosscutting concepts, and **science and engineering** **practices**. Integration of the three dimensions will allow students to explain scientific phenomena, design solutions to real-world challenges, and build a foundation upon which they can continue to learn and to apply science knowledge and skills within and outside the K-12 education arena.

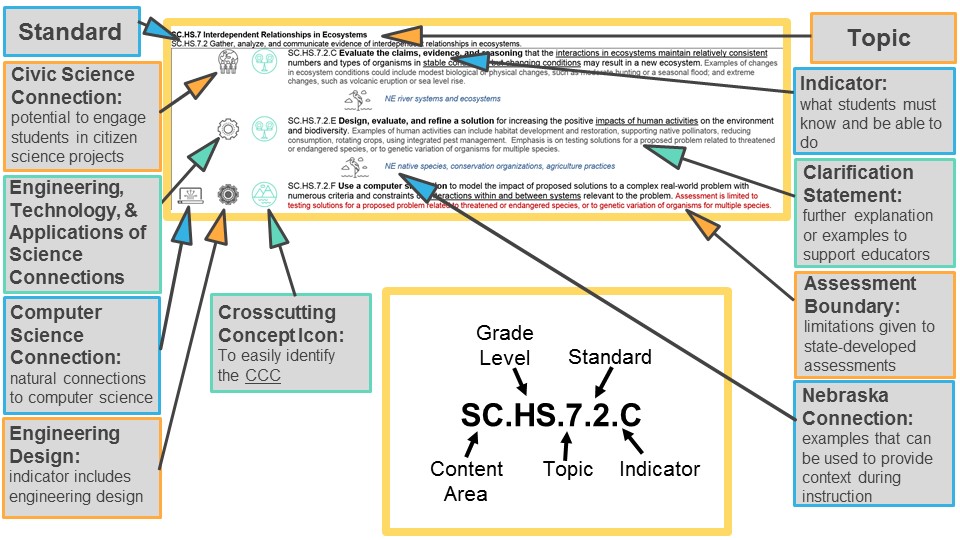
*Integrated science:* Natural phenomena serve as the context for the work of both scientists and engineers. As students explain natural phenomena and design solutions to real-world challenges they connect ideas across science domains. The crosscutting concepts serve as tools that bridge domain boundaries and allow students to deepen their understanding of disciplinary core ideas while using **science and engineering practices** as they explore natural phenomena.

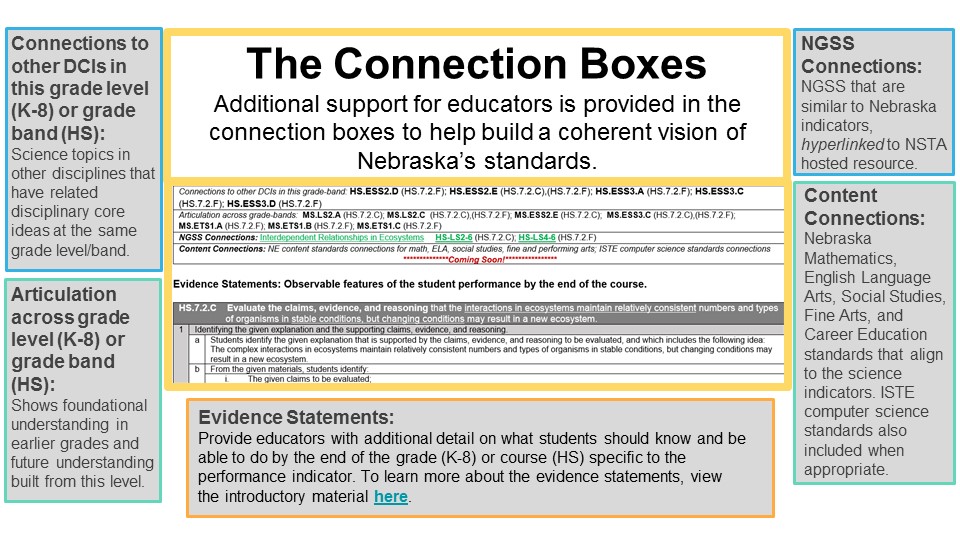
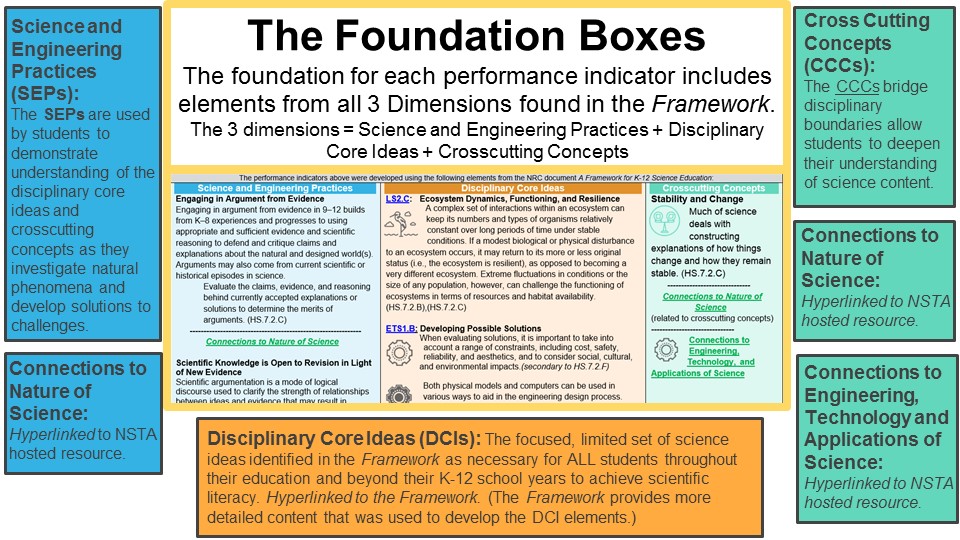
*Interdisciplinary approaches:* The overlapping skills included in the **science and engineering practices** and the intellectual tools provided by the crosscutting concepts build meaningfuland substantive connections to interdisciplinary knowledge and skills in all content areas(English Language Arts, mathematics, social studies, fine arts, career/technical education,etc.) This affords all student equitable access to learning and ensures all students are preparedfor college, career, and citizenship.

**Implementation**Effective science teaching, learning, and assessments should integrate disciplinary core ideas, crosscutting concepts, and **science and engineering practices**. Integration of the three dimensions will allow students to explain scientific phenomena, design solutions to problems, and build a foundation upon which they can continue to learn and be able to apply science knowledge and skills within and outside the K-12 education arena. While each indicator incorporates the three dimensions, this alone does not drive student outcomes. Ultimately, student learning depends on how the standards are translated to instructional practices.

1 *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press, 2012

**How to Read the Teacher’s Guide**

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[**here**](https://www.nextgenscience.org/sites/default/files/Front%20Matter%20Evidence%20Statements%20PDF%20Jan%202015_1.pdf).

**KINDERGARTEN**

The Kindergarten standards and indicators help students gather, analyze, and communicate evidence as they formulate answers to questions tailored to student interest and current topics that may include but are not limited to:

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

Students are able to apply an understanding of the effects of different strengths or different directions of pushes and pulls on the motion of an object to analyze a design solution.

**Where do animals live and why do they live there?**Students are also expected to develop understanding of what plants and animals (including humans) need to survive and the relationship between their needs and where they live

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

Students are expected to develop understanding of patterns and variations in local weather and the purpose of weather forecasting to prepare for and respond to, severe weather.

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**SC.K.1 Forces and Interactions: Pushes and Pulls**

SC.K.1.1 Gather, analyze, and communicate evidence of forces and their interactions.

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|  |  | C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png | SC.K.1.1.A **Plan and conduct an investigation to compare** the effects of different strengths or different directions of pushes and pulls on the motion of an object. Examples of pushes or pulls could include a string attached to an object being pulled, a person pushing an object, a person stopping a rolling ball, and two objects colliding and pushing on each other. Assessment is limited to different relative strengths or different directions, but not both at the same time. Assessment does not include non-contact pushes or pulls such as those produced by magnets. |
|  | C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png | C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png | SC.K.1.1.B **Analyze data to determine if a** **design solution** works as intended to change the speed or direction of an object with a push or a pull. Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, and knock down other objects. Examples of solutions could include tools such as a ramp to increase the speed of the object and a structure that would cause an object such as a marble or ball to turn. Assessment does not include friction as a mechanism for change in speed. |

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| The example indicators above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*: | | | NOTES |
| **Science and Engineering Practices**  **Planning and Carrying Out Investigations**  Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.   * With guidance, plan and conduct an investigation in collaboration with peers. (K.1.1.A)   **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.1.1.B)   **-----------------------------------------------------**  [***Connections to Nature of Science***](http://nstahosted.org/pdfs/ngss/AppendixH-TheNatureOfScienceInTheNextGenerationScienceStandards-4.9.13.pdf)  **Scientific Investigations Use a Variety of Methods**   * Scientists use different ways to study the world. (K.1.1.A) | **Disciplinary Core Ideas**  [**PS2.A**](https://www.nap.edu/read/13165/chapter/9#114)**: Forces and Motion**   * Pushes and pulls can have different strengths and directions. (K.1.1.A),(K.1.1.B) * Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (K.1.1.A),(K.1.1.B)   [**PS2.B**](https://www.nap.edu/read/13165/chapter/9#116)**: Types of Interactions**   * When objects touch or collide, they push on one another and can change motion. (K.1.1.A)   [**PS3.C**](https://www.nap.edu/read/13165/chapter/9#126)**: Relationship Between Energy and Forces**   * A bigger push or pull makes things speed up or slow down more quickly. *(secondary to K.1.1.A)*   [**ETS1.A**](https://www.nap.edu/read/13165/chapter/12#204)**: Defining Engineering Problems**  C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable   solutions. *(secondary to K.1.1.B)* | **Crosscutting Concepts**  **Cause and Effect**  C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.pngSimple tests can be designed to gather evidence to support or refute student ideas about  causes. (K.1.1.A),(K.1.1.B)  **-------------------------------------------------**  *C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png*[***Connections to Engineering, Technology,******and Applications of Science***](http://nstahosted.org/pdfs/ngss/20130509/AppendixJ-ScienceTechnologySocietyAndTheEnvironment_0.pdf)   * Scientists and engineers use appropriate mathematical concepts and processes to model and solve problems. (K.1.1.B) |
| *Connections to other DCIS in Kindergarten:* **K.ETS1.A** (K.1.1.B); **K.ETS1.B** (K.1.1.B) | | |
| *Articulation of DCIs across grade-levels:***2.ETS1.B** (K.1.1.A); **3.PS2.A** (K.1.1.A),( K.1.1.B); **3.PS2.B** (K.1.1.A); **4.PS3.A** (K.1.1.A); **4.ETS1.A** (K.1.1.B) | | |
| ***NGSS Connections:***[Forces and Interactions: Pushes and Pulls](http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=1) [**K-PS2-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=23) **(**K.1.1.A); [**K-PS2-2**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=26) (K.1.1.B) | | |
| ***ELA Connections:***  0.1.6.e With adult guidance, retell main ideas from informational text and/or media. *(K.1.1.B)*  0.3.1.e Ask pertinent questions to acquire or confirm information. (K.1.1.B)  0.3.3.d Listen, ask clarifying questions, and respond to information being communicated about a topic, text, or issue under study. (K.1.1.B)  0.4.1.a With guidance, use provided print and digital resources to gather information, answer questions, and demonstrate understanding of valid information (e.g., fiction vs.   nonfiction, real vs. not real). (K.1.1.A)  0.3.3.c Apply conversation strategies to recognize new information presented by others in relationship to one's own ideas. (K.1.1.B) | | |
| ***Mathematics Connections:***  MP.2 Communicates mathematical ideas effectively. (K.1.1.A)  MA 0.3.3.a Describe measurable attributes of real-world objects (e.g., length or weight). (K.1.1.A)  MA 0.3.3.b Compare length and weight of two objects (e.g., longer/shorter, heavier/lighter). (K.1.1.A) | | |
| ***Social Studies Connections:*** | | |
| ***Fine and Performing Arts Connections:*** | | |

**Evidence Statements: Observable features of the student performance by the end of the grade.**

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| **K.1.1.A Plan and conduct an investigation to compare** the effects of different strengths or different directions of pushes and pulls on the motion of an   object. | | |
| 1 | Identifying the phenomenon to be investigated | |
| a | With guidance, students collaboratively identify the phenomenon under investigation, which includes the following idea: the effect caused by different strengths and directions of pushes and pulls on the motion of an object. |
| b | With guidance, students collaboratively identify the purpose of the investigation, which includes gathering evidence to support or refute student ideas about causes of the phenomenon by comparing the effects of different strengths of pushes and pulls on the motion of an object. |
| 2 | Identifying the evidence to address this purpose of the investigation | |
| a | With guidance, students collaboratively develop an investigation plan to investigate the relationship between the strength and direction of pushes and pulls and the motion of an object (i.e., qualitative measures or expressions of strength and direction; e.g., harder, softer, descriptions\* of “which way”). |
| b | Students describe\* how the observations they make connect to the purpose of the investigation, including how the observations of the effects on object motion allow causal relationships between pushes and pulls and object motion to be determined |
| c | Students predict the effect of the push of pull on the motion of the object, based on prior experiences. |
| 3 | Planning the investigation | |
| a | In the collaboratively developed investigation plan, students describe\*: |
| 1. The object whose motion will be investigated. |
| 1. What will be in contact with the object to cause the push or pull. |
| 1. The relative strengths of the push or pull that will be applied to the object to start or stop its motion or change its speed. |
| 1. The relative directions of the push or pull that will be applied to the object. |
| 1. How the motion of the object will be observed and recorded. |
| 1. How the push or pull will be applied to vary strength or direction. |
| 4 | Collecting the data | |
| a | According to the investigation plan they developed, and with guidance, students collaboratively make observations that would allow them to compare the effect on the motion of the object caused by changes in the strength or direction of the pushes and pulls and record their data. |

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| **K.1.1.B Analyze data to determine if a design solution** works as intended to change the speed or direction of an object with a push or a pull. | | |
| 1 | Organizing data | |
| a | With guidance, students organize given information using graphical or visual displays (e.g., pictures, pictographs, drawings, written observations, tables, charts). The given information students organize includes: |
| 1. The relative speed or direction of the object before a push or pull is applied (i.e., qualitative measures and expressions of speed and direction; e.g., faster, slower, descriptions\* of “which way”). |
| 1. The relative speed or direction of the object after a push or pull is applied. |
| 1. How the relative strength of a push or pull affects the speed or direction of an object (i.e., qualitative measures or expressions of strength; e.g., harder, softer). |
| 2 | Identifying relationships | |
| a | Using their organization of the given information, students describe\* relative changes in the speed or direction of the object caused by pushes or pulls from the design solution. |
| 3 | Interpreting data | |
| a | Students describe\* the goal of the design solution. |
| b | Students describe\* their ideas about how the push or pull from the design solution causes the change in the object’s motion. |
| c | Based on the relationships they observed in the data, students describe\* whether the push or pull from the design solution causes the intended change in speed or direction of motion of the object. |

**SC.K.7 Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment**SC.K.7.2 Gather, analyze, and communicate evidence of interdependent relationships in ecosystems.

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|  | C:\Users\sara.cooper.NDE\Desktop\Standards\CivicConnection.png | C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.png | SC.K.7.2.A **Use observations to describe** patterns of what plants and animals (including humans) need to survive. Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and that all living things need water. | |
|  | C:\Users\sara.cooper.NDE\Desktop\Standards\CivicConnection.png | C:\Users\sara.cooper.NDE\Desktop\Standards\Systems.png | SC.K.7.2.B **Construct an argument supported by evidence** **for how** plants and animals (including humans) can change the environment to meet their needs. Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete. | |
|  | C:\Users\sara.cooper.NDE\Desktop\Standards\CivicConnection.png | C:\Users\sara.cooper.NDE\Desktop\Standards\Systems.png | SC.K.7.2.C **Use a model** **to represent** the relationship between the needs of different plants or animals (including humans) and the places they live. Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas, and grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system. | |
| C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png | *NE plants and animals* |
| C:\Users\sara.cooper.NDE\Desktop\Standards\CivicConnection.png | C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png | C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png | SC.K.7.2.D **Communicate solutions** that will increase the positive impact of humans on the land, water, air, and/or other living things in the local environment. Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles. | |
| C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png | *NE conservation organizations and agricultural practices* |

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| The example indicators above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*: | | | NOTES |
| **Science and Engineering Practices**  **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.   * Use a model to represent relationships in the natural world. (K.7.2.C)   **Analyzing and Interpreting Data**  Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.   * Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K.7.2.A )   **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. (K.7.2.B)   **Obtaining, Evaluating, and Communicating Information**  Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.   * Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K.7.2.D)   **-----------------------------------------------**  [***Connections to Nature of Science***](http://nstahosted.org/pdfs/ngss/AppendixH-TheNatureOfScienceInTheNextGenerationScienceStandards-4.9.13.pdf)  **Scientific Knowledge is Based on Empirical Evidence**   * Scientists look for patterns and order when making observations about the world. (K.7.2.A ) | **Disciplinary Core Ideas**  [**LS1.C**](https://www.nap.edu/read/13165/chapter/10#147)**: Organization for Matter and Energy Flow in Organisms**   * All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K.7.2.A)   [**ESS2.E**](https://www.nap.edu/read/13165/chapter/11#189)**: Biogeology**   * Plants and animals can change their environment. (K.7.2.B)   [**ESS3.A**](https://www.nap.edu/read/13165/chapter/11#190)**: Natural Resources**  Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything   they do. (K.7.2.C)  [**ESS3.C**](https://www.nap.edu/read/13165/chapter/11#194)**: Human Impacts on Earth Systems**  Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. *(secondary to K.7.2.B)*, (K.7.2.D)  C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png[**ETS1.B**](https://www.nap.edu/read/13165/chapter/12#206)**: 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 K.7.2.D)* | **Crosscutting Concepts**  C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.png**Patterns**  Patterns in the natural and human designed world can be observed and used as evidence. (K.7.2.A  **Cause and Effect**  C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.pngEvents have causes that generate observable patterns. (K.7.2.D)  **Systems and System Models**  C:\Users\sara.cooper.NDE\Desktop\Standards\Systems.pngSystems in the natural and designed world have parts that work together. (K.7.2.B),   (K.7.2.C) |
| *Connections to other DCIs in kindergarten:* **K.ETS1.A** (K.7.2.D) | | |
| *Articulation of DCIs across grade-levels:***1.LS1.A** (K.7.2.A),(K.7.2.C); **2.LS2.A** (K.7.2.A); **2.ETS1.B** (K.7.2.D); **3.LS2.C** (K.7.2.A); **3.LS4.B** (K.7.2.A); **4.ESS2.E** (K.7.2.B); **4.ESS3.A** (K.7.2.D); **5.LS1.C** (K.7.2.A); **5.LS2.A** (K.7.2.A),(K.7.2.C); **5.ESS2.A** (K.7.2.B),(K.7.2.C); **5.ESS3.C** (K.7.2.D) | | |
| ***NGSS Connections:***  [Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment](http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=2) [**K-LS1-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=29) **(**K.7.2.A); [**K-ESS2-2**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=32)(K.7.2.B); [**K-ESS3-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=33)(K.7.2.C);   [**K-ESS3-3**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=36) (K.7.2.D) | | |
| ***ELA Connections:***  0.1.6.e With adult guidance, retell main ideas from informational text and/or media. (K.7.2.B)  0.1.6.o Respond to text (e.g., verbally, in writing, or artistically). (K.7.2.B), (K.7.2.D)  0.2.1.b Generate representations of ideas (e.g., pictures, labels, letter strings, words, simple sentences) and organize ideas relevant to a topic. (K.7.2.B), (K.7.2.D)  0.2.2.a Communicate information and ideas effectively in analytic, descriptive, informative, narrative, poetic, persuasive, and reflective modes to multiple audiences using a variety of media and formats. (K.7.2.B), (K.7.2.D)  0.3.1.c Utilize appropriate visual and/or digital tools to support verbal communication. (K.7.2.C)  0.4.1.a With guidance, use provided print and digital resources to gather information, answer questions, and demonstrate understanding of valid information (e.g., fiction vs. nonfiction, real vs. not real). (K.7.2.A)  0.4.1.c Use or decipher multiple formats of print and digital text (e.g., manuscript, font, graphics, symbols). (K.7.2.C) | | |
| ***Mathematics Connections:***  MP.2 Communicates mathematical ideas effectively. *(K.7.2.C)*  MP.4 Models and represents math problems *(K.7.2.C)*  **K.CC** Counting and Cardinality *(K.7.2.C)*  MA 0.3.3.b Compare length and weight of two objects (e.g., longer/shorter, heavier/lighter). *(K.7.2.A )* | | |
| ***Social Studies Connections:*** | | |
| ***Fine and Performing Arts Connections:*** | | |

**Evidence Statements: Observable features of the student performance by the end of the grade.**

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| **K.7.2.A Use observations to describe** patterns of what plants and animals (including humans) need to survive. | | |
| 1 | Organizing data | |
| a | With guidance, students organize the given data from observations (firsthand or from media) using graphical displays (e.g., pictures, charts), including: |
| 1. Different types of animals (including humans). |
| 1. Data about the foods different animals eat. |
| 1. Data about animals drinking water. |
| 1. Data about plants’ need for water (e.g., observations of the effects on plants in a classroom or school when they are not watered, observations of natural areas that are very dry). |
| 1. Data about plants’ need for light (e.g., observations of the effect on plants in a classroom when they are kept in the dark for a long time; observations about the presence or absence of plants in very dark places, such as under rocks or porches). |
| 2 | Identifying relationships | |
| a | Students identify patterns in the organized data, including that: |
| 1. All animals eat food. |
| 1. Some animals eat plants. |
| 1. Some animals eat other animals. |
| 1. Some animals eat both plants and animals. |
| 1. No animals do not eat food. |
| 1. All animals drink water. |
| 1. Plants cannot live or grow if there is no water. |
| 1. Plants cannot live or grow if there is no light. |
| 3 | Interpreting data | |
| a | Students describe\* that the patterns they identified in the data provide evidence that: |
| 1. Plants need light and water to live and grow. |
| 1. Animals need food and water to live and grow. |
| 1. Animals get their food from plants, other animals, or both. |

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| **K.7.2.B Construct an argument supported by evidence** **for how** plants and animals (including humans) can change the environment to meet their needs. | | |
| 1 | Supported claims | |
| a | Students make a claim to be supported about a phenomenon. In their claim, students include the idea that plants and animals (including humans) can change the environment to meet their needs. |
| 2 | Identifying scientific evidence | |
| a | Students identify and describe\* the given evidence to support the claim, including: |
| 1. Examples of plants changing their environments (e.g., plant roots lifting sidewalks). |
| 1. Examples of animals (including humans) changing their environments (e.g., ants building an ant hill, humans clearing land to build houses, birds building a nest, squirrels digging holes to hide food). |
| 1. Examples of plant and animal needs (e.g., shelter, food, room to grow). |
| 3 | Evaluating and critiquing evidence | |
| a | Students describe\* how the examples do or do not support the claim. |
| 4 | Reasoning and synthesis | |
| a | Students support the claim and present an argument by logically connecting various needs of plants and animals to evidence about how plants/animals change their environments to meet their needs. Students include: |
| 1. Examples of how plants affect other parts of their systems by changing their environments to meet their needs (e.g., roots push soil aside as they grow to better absorb water). |
| 1. Examples of how animals affect other parts of their systems by changing their environments to meet their needs (e.g., ants, birds, rabbits, and humans use natural materials to build shelter; some animals store food for winter). |

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| **K.7.2.C Use a model** **to represent** the relationship between the needs of different plants or animals (including humans) and the places they live. | | |
| 1 | Components of the model | |
| a | From the given model (e.g., representation, diagram, drawing, physical replica, diorama, dramatization, storyboard) of a phenomenon involving the needs of living things and their environments, students identify and describe\* the components that are relevant to their representations, including: |
| 1. Different plants and animals (including humans). |
| 1. The places where the different plants and animals live. |
| 1. The things that plants and animals need (e.g., water, air, and land resources such as wood, soil, and rocks). |
| 2 | Relationships | |
| a | Students use the given model to represent and describe\* relationships between the components, including: |
| 1. The relationships between the different plants and animals and the materials they need to survive (e.g., fish need water to swim, deer need buds and leaves to eat, plants need water and sunlight to grow). |
| 1. The relationships between places where different plants and animals live and the resources those places provide. |
| 1. The relationships between specific plants and animals and where they live (e.g., fish live in water environments, deer live in forests where there are buds and leaves, rabbits live in fields and woods where there is grass to eat and space for burrows for homes, plants live in sunny and moist areas, humans get resources from nature [e.g., building materials from trees to help them live where they want to live]). |
| 3 | Connections | |
| a | Students use the given model to represent and describe\*, including: |
| 1. Students use the given model to describe\* the pattern of how the needs of different plants and animals are met by the various places in which they live (e.g., plants need sunlight so they are found in places that have sunlight; fish swim in water so they live in lakes, rivers, ponds, and oceans; deer eat buds and leaves so they live in the forest). |
| 1. Students use the given model to describe\* that plants and animals, the places in which they live, and the resources found in those places are each part of a system, and that these parts of systems work together and allow living things to meet their needs. |

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| **K.7.2.D Communicate solutions** that will increase the positive impact of humans on the land, water, air, and/or other living things in the local environment. | | |
| 1 | Communicating information | |
| a | Students use prior experiences and observations to describe\* information about: |
| 1. How people affect the land, water, air, and/or other living things in the local environment in positive and negative ways. |
| 1. Solutions that reduce the negative effects of humans on the local environment. |
| b | Students communicate information about solutions that reduce the negative effects of humans on the local environment, including: |
| 1. Examples of things that people do to live comfortably and how those things can cause changes to the land, water, air, and/or living things in the local environment. |
| 1. Examples of choices that people can make to reduce negative impacts and the effect those choices have on the local environment. |
| b | Students communicate the information about solutions with others in oral and/or written form (which include using models and/or drawings. |

**SC.K.12 Weather and Climate**

SC.K.12.3 Gather, analyze, and communicate evidence of weather and climate.

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| **C:\Users\sara.cooper.NDE\Desktop\Standards\ComputerScienceConnection.png** | C:\Users\sara.cooper.NDE\Desktop\Standards\CivicConnection.png | C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.png | SC.K.12.3.A **Use and share observations** of local weather conditions to describe patterns over time. Examples of qualitative observations could include descriptions of the weather (such as sunny, cloudy, rainy, and warm); examples of quantitative observations could include numbers of sunny, windy, and rainy days in a month. Examples of patterns could include that it is usually cooler in the morning than in the afternoon and the number of sunny days versus cloudy days in different months. Assessment of quantitative observations limited to whole numbers and relative measures such as warmer/cooler. | |
|  | C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png | C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png | SC.K.12.3.B **Ask questions to obtain information** about the purpose of weather forecasting to prepare for, and respond to, severe weather. Emphasis is on local forms of severe weather. | |
| C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png | *emphasis on blizzards, tornadoes, drought, and floods* |
|  |  | C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png | SC.K.12.3.C **Make observations to determine** the effect of sunlight on Earth's surface. Examples of Earth’s surface could include sand, soil, rocks, and water. Assessment of temperature is limited to relative measures such as warmer/cooler. | |
| C:\Users\sara.cooper.NDE\Desktop\Standards\CivicConnection.png | C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png | C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png | SC.K.12.3.D **Use tools and materials to design and build** **a structure** that will reduce the warming effect of sunlight on an area. Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun. | |
|  | C:\Users\sara.cooper.NDE\Desktop\Standards\CivicConnection.png |  | SC.K.12.3.E **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. | |

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| The example indicators above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*: | | | NOTES |
| **Science and Engineering Practices**  **Asking Questions and Defining Problems**  Asking questions and defining problems in grades K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested.   * Ask questions based on observations to find more information about the designed world. (K.12.3.B), (K.12.E) * Define a simple problem that can be solved through the development of a new or improved object or tool. (K.12.3.E)   **Planning and Carrying Out Investigations**  Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.   * Make observations (firsthand or from media) to collect data that can be used to make comparisons. (K.12.3.C)   **Analyzing and Interpreting Data**  Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.   * Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K.12.3.A)   **Constructing Explanations and Designing Solutions**  Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.   * Use tools and materials provided to design and build a device that solves a specific problem or a solution to a specific problem. (K.12.3.D)   **Obtaining, Evaluating, and Communicating Information**  Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.   * Read grade-appropriate texts and/or use media to obtain scientific information to describe patterns in the natural world. (K.12.3.B)   **-----------------------------------------------------------------------------------**  ***Connections to Nature of Science***  **Scientific Investigations Use a Variety of Methods**   * Scientists use different ways to study the world. (K.12.3.C)   **Science Knowledge is Based on Empirical Evidence**   * Scientists look for patterns and order when making observations about the world. (K.12.3.A) | **Disciplinary Core Ideas**  [**PS3.B**](https://www.nap.edu/read/13165/chapter/9#105)**: Conservation of Energy and Energy  Transfer**   * Sunlight warms Earth’s surface. (K.12.3.C),(K.12.3.D)   [**ESS2.D**](https://www.nap.edu/read/13165/chapter/11#186)**: Weather and Climate**   * Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. (K.12.3.A)   [**ESS3.B**](https://www.nap.edu/read/13165/chapter/11#192)**: Natural Hazards**  C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events. (K.12.3.B)  [**ETS1.A**](https://www.nap.edu/read/13165/chapter/12#204)**: Defining and Delimiting an Engineering Problem**  Asking questions, making observations, and gathering information are helpful in thinking about problems. (K.12.3.E) | **Crosscutting Concepts**  **Patterns**  C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.pngPatterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K.12.3.A)  **Cause and Effect**  C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.pngEvents have causes that generate observable patterns. (K.12.3.C),(K.12.3.D),(K.12.3.B)  C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png **---------------------------------------**  [***Connections to Engineering, Technology,******and Applications of  Science***](http://nstahosted.org/pdfs/ngss/20130509/AppendixJ-ScienceTechnologySocietyAndTheEnvironment_0.pdf)  [**Interdependence of Science, Engineering, and Technology**](https://www.nap.edu/read/13165/chapter/12#210)   * People encounter questions about the natural world every day. (K.12.3.B)   [**Influence of Engineering, Technology, and Science on Society and the Natural World**](https://www.nap.edu/read/13165/chapter/12#212)   * People depend on various technologies in their lives; human life would be very different without technology. (K.12.3.B) |
| *Connections to other DCIs in kindergarten:* **K.ETS1.A** (K.12.3.D),(K.12.3.B); **K.ETS1.B** (K.12.3.D) | | |
| *Articulation of DCIs across grade-levels:* **1.PS4.B** (K.12.3.C),(K.12.3.D); **2.ESS1.C** (K.12.3.B); **2.ESS2.A** (K.12.3.A); **2.ETS1.B** (K.12.3.D); **3.ESS2.D** (K.12.3.C),( K.12.3.A); **3.ESS3.B** (K.12.3.E); **4.ESS2.A** (K.12.3.A); **4.ESS3.B** (K.12.3.B); **4.ETS1.A** (K.12.3.D), (K.12.3.E); **4**.**ETS1.C** (K.12.3.E); **5.ETS1.A** (K.12.3.E) | | |
| ***NGSS Connections:***[Weather and Climate](http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=3) [**K-ESS2-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=31) (K.12.3.A); [**K-ESS3-2**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=34) (K.12.3.B); [**K-PS3-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=27) (K.12.3.C); [**K-PS3-2**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=28) (K.12.3.D); [Engineering Design](http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=10) [**K-2ETS1-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=39) (K.12.3.E) | | |
| ***ELA Connections:***  0.1.6.d With adult guidance, retell major events and key details from a literary text and/or media. (K.12.3.B)  0.2.1.i Use own words to relate information. (K.12.3.E)  0.2.2.a Communicate information and ideas effectively in analytic, descriptive, informative, narrative, poetic, persuasive, and reflective modes to multiple audiences using a variety of media and formats. (K.12.3.E)  0.2.2.b With adult guidance, provide evidence from literary or informational text to support ideas or opinions. (K.12.3.E)  0.3.1.e Ask pertinent questions to acquire or confirm information. (K.12.3.B),(K.12.3.E)  0.3.3.c Apply conversation strategies to recognize new information presented by others in relationship to one's own ideas. (K.12.3.B), (K.12.3.E)  0.4.1.a With guidance, use provided print and digital resources to gather information, answer questions, and demonstrate understanding of valid information (e.g., fiction vs. nonfiction, real vs. not real). (K.12.3.A),(K.12.3.C)*,(K.12.3.D)*,(K.12.3.E)  0.4.2.b Use appropriate digital tools (e.g., social media, online collaborative tools, apps) to communicate with others for conveying information, gathering opinions, and solving problems. (K.12.3.E) | | |
| ***Mathematics Connections:***  MP.2 Communicates mathematical ideas effectively. (K.12.3.A), (K.12.3.E)  MP.4 Models and represents math problems (K.12.3.A),*(K.12.3.B) (K.12.3.E)*  MP.1 Solves mathematical problems. (K.12.3.E)  **K.CC** Counting and Cardinality *(K.12.3.B)*  MA 0.1.1.a Perform the counting sequence by counting forward from any given number to 100, by ones. Count by tens to 100 starting at any decade number. (K.12.3.A)  MA 0.3.3.a Describe measurable attributes of real-world objects (e.g., length or weight). (K.12.3.A)  MA 0.3.3.b Compare length and weight of two objects (e.g., longer/shorter, heavier/lighter). (K.12.3.C),(K.12.3.D)  MA 0.4.2.a Identify, sort, and classify objects by size, shape, color, and other attributes. Identify objects that do not belong to a particular group and explain the reasoning used. (K.12.3.A) | | |
| *Social Studies Connections:* | | |
| *Fine and Performing Arts Connections:* | | |

**Evidence Statements: Observable features of the student performance by the end of the grade.**

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| **K.12.3.A Use and share observations** of local weather conditions to describe patterns over time. | | |
| 1 | Organizing data | |
| a | With guidance, students organize data from given observations (firsthand or from media) about local weather conditions using graphical displays (e.g., pictures, charts). The weather condition data include: |
| 1. The number of sunny, cloudy, rainy, windy, cool, or warm days. |
| 1. The relative temperature at various times of the day (e.g., cooler in the morning, warmer during the day, cooler at night). |
| 2 | Identifying relationships | |
| a | Students identify and describe\* patterns in the organized data, including: |
| 1. The relative number of days of different types of weather conditions in a month. |
| 1. The change in the relative temperature over the course of a day. |
| 3 | Interpreting data | |
| a | Students describe\* and share that: |
| i. Certain months have more days of some kinds of weather than do other months (e.g., some months have more hot days, some have more rainy days). |
| ii. The differences in relative temperature over the course of a day (e.g., between early morning and the afternoon, between one day and another) are directly related to the time of day. |

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| **K.12.3.B Ask questions to obtain information** about the purpose of weather forecasting to prepare for, and respond to, severe weather. | | |
| 1 | Addressing phenomena of the natural world | |
| a | Students formulate questions about local severe weather, the answers to which would clarify how weather forecasting can help people avoid the most serious impacts of severe weather events. |
| 2 | Identifying the scientific nature of the question | |
| a | Students’ questions are based on their observations. |
| 3 | Obtaining information | |
| a | Students collect information (e.g., from questions, grade appropriate texts, media) about local severe weather warnings (e.g., tornado alerts, hurricane warnings, major thunderstorm warnings, winter storm warnings, severe drought alerts, heat wave alerts), including that:. |
| * 1. There are patterns related to local severe weather that can be observed (e.g., certain types of severe weather happen more in certain places). |
| * 1. Weather patterns (e.g., some events are more likely in certain regions) help scientists predict severe weather before it happens. |
| * 1. Severe weather warnings are used to communicate predictions about severe weather. |
| * 1. Weather forecasting can help people plan for, and respond to, specific types of local weather (e.g., responses: stay indoors during severe weather, go to cooling centers during heat waves; preparations: evacuate coastal areas before a hurricane, cover windows before storms). |

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| **K.12.3.C Make observations to determine** the effect of sunlight on Earth's surface. | | |
| 1 | Identifying the phenomenon to be investigated | |
| a | From the given investigation plan, students describe\* (with guidance) the phenomenon under investigation, which includes the following idea: sunlight warms the Earth’s surface. |
| b | Students describe\* (with guidance) the purpose of the investigation, which includes determining the effect of sunlight on Earth materials by identifying patterns of relative warmth of materials in sunlight and shade (e.g., sand, soil, rocks, water). |
| 2 | Identifying the evidence to address the purpose of the investigation | |
| a | Based on the given investigation plan, students describe\* (with guidance) the evidence that will result from the investigation, including observations of the relative warmth of materials in the presence and absence of sunlight (i.e., qualitative measures of temperature; e.g., hotter, warmer, colder). |
| b | Students describe\* how the observations they make connect to the purpose of the investigation. |
| 3 | Planning the investigation | |
| a | Based on the given investigation plan, students describe\* (with guidance): |
| 1. The materials on the Earth’s surface to be investigated (e.g., dirt, sand, rocks, water, grass). |
| 1. How the relative warmth of the materials will be observed and recorded. |
| 4 | Collecting the data | |
| a | According to the given investigation plan and with guidance, students collect and record data that will allow them to: |
|  | 1. Compare the warmth of Earth materials placed in sunlight and the same Earth materials placed in shade. |
|  | 1. Identify patterns of relative warmth of materials in sunlight and in shade (i.e., qualitative measures of temperature; e.g., hotter, warmer, colder). |
|  | 1. Describe\* that sunlight warms the Earth’s surface. |

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| **K.12.3.D Use tools and materials to design and build** **a structure** that will reduce the warming effect of sunlight on an area. | | |
| 1 | Using scientific knowledge to generate design solutions | |
| a | Students use given scientific information about sunlight’s warming effect on the Earth’s surface to collaboratively design and build a structure that reduces warming caused by the sun. |
| b | With support, students individually describe\*: |
| * 1. The problem. |
| * 1. The design solution. |
| * 1. In what way the design solution uses the given scientific information. |
| 2 | Describing\* specific features of the design solution, including quantification when appropriate | |
| a | Students describe\* that the structure is expected to reduce warming for a designated area by providing shade. |
| b | Students use only the given materials and tools when building the structure. |
| 3 | Evaluating potential solutions | |
| a | Students describe\* whether the structure meets the indicators in terms of cause (structure blocks sunlight) and effect (less warming of the surface). |

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| **K.12.3.E 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. |

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| 1 | Addressing phenomena of the natural or designed world | |
| a | Students ask questions and make observations to gather information about a situation that people want to change. Students’ questions, observations, and information gathering are focused on: |
| 1. A given situation that people wish to change. |
| 1. Why people want the situation to change. |
| 1. The desired outcome of changing the situation. |
| 2 | Identifying the scientific nature of the question | |
| a | Students’ questions are based on observations and information gathered about scientific phenomena that are important to the situation. |
| 3 | Identifying the problem to be solved | |
| a | Students use the information they have gathered, including the answers to their questions, observations they have made, and scientific information, to describe\* the situation people want to change in terms of a simple problem that can be solved with the development of a new or improved object or tool. |
| 4 | Defining the features of the solution | |
| a | With guidance, students describe\* the desired features of the tool or object that would solve the problem, based on scientific information, materials available, and potential related benefits to people and other living things. |

**FIRST GRADE**

The first grade standards and indicators help students gather, analyze, and communicate evidence as they formulate answers to questions tailored to student interest and current topics that may include but are not limited to:

**What happens when materials vibrate?**

Students are expected to develop understanding of the relationship between sound and vibrating materials.

**What happens when there is no light?**

Students are expected to develop understanding of the relationship between the availability of light and the ability to see objects. The idea that light travels from place to place can be understood by students at this level through determining the effect of placing objects made with different materials in the path of a beam of light.

**What are some ways plants and animals meet their needs so they can survive and grow?**

Students are also expected to develop understanding of how plants and animals use their external parts to help them survive, grow, and meet their needs as well as how the behaviors of parents and offspring help offspring survive.

**How are parents and their children similar and different?**

The understanding is developed that young plants and animals are like, but not exactly the same as, their parents.

**What objects are in the sky and how do they seem to move?**

Students are able to observe, describe, and predict some patterns of the movement of objects in the sky.

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**SC.1.2 Waves: Light and Sound**SC.1.2.1 Gather, analyze, and communicate evidence of light and sound waves.

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|  |  | C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png | SC.1.2.1.A **Plan and conduct investigations** to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork. |
|  |  | C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png | SC.1.2.1.B **Make observations to construct** an evidence-based account that objects can be seen only when illuminated. Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light. |
|  |  | C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png | SC.1.2.1.C **Plan and conduct an investigation** to determine the effect of placing objects made with different materials in the path of a beam of light. Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror). Assessment does not include the speed of light. |
|  | C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png | C:\Users\sara.cooper.NDE\Desktop\Standards\Systems.png | SC.1.2.1.D **Use tools and materials to design and build** a device that uses light or sound to solve the problem of communicating over a distance. Examples of devices could include a light source to send signals, paper cup and string “telephones,” and a pattern of drum beats. Assessment does not include technological details for how communication devices work. |

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| The example indicators above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*: | | | NOTES |
| **Science and Engineering Practices**  **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 investigations collaboratively to produce data to serve as the basis for evidence to answer a question. (1.2.1.A),(1.2.1.C)   **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 (1.2.1.B) * Use tools and materials provided to design a device that solves a specific problem. (1.2.1.D)   **---------------------------------------------------------------------------**  [***Connections to Nature of Science***](http://nstahosted.org/pdfs/ngss/AppendixH-TheNatureOfScienceInTheNextGenerationScienceStandards-4.9.13.pdf)  **Scientific Investigations Use a Variety of Methods**   * Science investigations begin with a question. (1.2.1.A) * Scientists use different ways to study the world. (1.2.1.A) | **Disciplinary Core Ideas**  [**PS4.A**](https://www.nap.edu/read/13165/chapter/9?term=PS4.A#131)**: Wave Properties**   * Sound can make matter vibrate, and vibrating matter can make sound. (1.2.1.A)   [**PS4.B**](https://www.nap.edu/read/13165/chapter/9?term=PS4.A#133)**: Electromagnetic Radiation**   * Objects can be seen if light is available to illuminate them or if they give off their own light. (1.2.1.B) * Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1.2.1.C)   [**PS4.C**](https://www.nap.edu/read/13165/chapter/9?term=PS4.A#136)**: Information Technologies and Instrumentation**   * People also use a variety of devices to communicate (send and receive information) over long distances. (1.2.1.D) | **Crosscutting Concepts**  C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png**Cause and Effect**  Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1.2.1.A),(1.2.1.B),(1.2.1.C)  **Systems and System Models**  C:\Users\sara.cooper.NDE\Desktop\Standards\Systems.png[Systems in the natural and designed world have parts that work together.](http://www.nap.edu/openbook.php?record_id=13165&page=91)(1.2.1.D)  C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png**----------------------------------------------------**[***Connections to Engineering, Technology,******and Applications of Science***](http://nstahosted.org/pdfs/ngss/20130509/AppendixJ-ScienceTechnologySocietyAndTheEnvironment_0.pdf)  [**Influence of Engineering, Technology, and Science, on Society and the Natural World**](https://www.nap.edu/read/13165/chapter/12#212)   * People depend on various technologies in their lives; human life would be very different without technology. (1.2.1.D) |
| *Connections to other DCIs in first grade:* N/A | | |
| *Articulation of DCIs across grade-levels****:*** **K.ETS1.A** (1.2.1.D); **2.PS1.A** (1.2.1.C); **2.ETS1.B** (1.2.1.D); **4.PS4.C** (1.2.1.D); **4.PS4.B** (1.2.1.B); **4.ETS1.A** (1.2.1.D) | | |
| ***NGSS Connections:***[Waves: Light and Sound](http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=4) [**1-PS4-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=42) (1.2.1.A); [**1-PS4-2**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=43) (1.2.1.B); [**1-PS4-3**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=44) (1.2.1.C); [**1-PS4-4**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=45) (1.2.1.D) | | |
| ***ELA Connections:***  1.2.1.a Use prewriting activities and inquiry tools to generate ideas.  1.2.1.b Generate a draft that selects and organizes ideas relevant to topic, purpose, and audience, including a clear beginning, middle, and end.  1.2.1.c Gather and use relevant information and evidence to support ideas.  1.2.1.d Compose simple paragraphs with grammatically correct sentences of varying length, complexity, and type.W.1.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1.2.1.A),(1.2.1.B),(1.2.1.C)  1.3.1.b Demonstrate appropriate speaking techniques (e.g., appropriate eye contact, adequate volume, clear pronunciation) for a variety of purposes and situations, including  interpreting text. *(1.2.1.A),(1.2.1.B),(1.2.1.C)*  1.3.2.a Develop active and attentive listening skills (e.g., eye contact, nonverbal cues, recalling) for multiple situations and modalities.  1.3.3.e Collaboratively converse with peers and adults on grade-appropriate topics and texts, building on others' ideas to clearly express  one's own views while respecting diverse perspectives. *(1.2.1.A),(1.2.1.B),(1.2.1.C)* | | |
| ***Mathematics Connections:***  MP.1 Solves mathematical problems. *(1.2.1.D)*  MA 1.3.3.d Order three objects by directly comparing their lengths, or indirectly by using a third object. *(1.2.1.D)*  MA 1.3.3.c Measure objects by using a shorter object end-to-end and know that the length of the object is the amount of same-size objects that span it lined up end-to-end. *(1.2.1.D)* | | |
| ***Social Studies Connections:*** | | |

**Evidence Statements: Observable features of the student performance by the end of the grade.**

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| **1.2.1.A Plan and conduct investigations** to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. | | |
| 1 | Identifying the phenomenon under investigation | |
| a | Students identify and describe\* the phenomenon and purpose of the investigation, which include providing evidence to answer questions about the relationship between vibrating materials and sound. |
| 2 | Identifying the evidence to address the purpose of the investigation | |
| a | Students collaboratively develop an investigation plan and describe\* the evidence that will result from the investigation, including: |
| * + 1. Observations that sounds can cause materials to vibrate. |
| * + 1. Observations that vibrating materials can cause sounds. |
| * + 1. How the data will provide evidence to support or refute ideas about the relationship between vibrating materials and sound. |
| b | Students individually describe\* (with support) how the evidence will address the purpose of the investigation. |
| 3 | Planning the investigation | |
| a | In the collaboratively developed investigation plan, students individually identify and describe\*: |
| 1. The materials to be used. |
| 1. How the materials will be made to vibrate to make sound. |
| 1. How resulting sounds will be observed and described\*. |
| 1. What sounds will be used to make materials vibrate. |
| 1. How it will be determined that a material is vibrating. |
| 4 | Collecting the data | |
| a | According to the investigation plan they develop, students collaboratively collect and record observations about: |
| 1. Sounds causing materials to vibrate. |
| 1. Vibrating materials causing sounds. |

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| **1.2.1.B Make observations to construct** an evidence-based account that objects can be seen only when illuminated. | | |
| 1 | Articulating the explanation of phenomena | |
| a | Students articulate a statement that relates the given phenomenon to a scientific idea, including that when an object in the dark is lit (e.g., turning on a light in the dark space or from light the object itself gives off), it can be seen. |
| b | Students use evidence and reasoning to construct an evidence-based account of the phenomenon. |
| 2 | Evidence | |
| a | Students make observations (firsthand or from media) to serve as the basis for evidence, including: |
| 1. The appearance (e.g., visible, not visible, somewhat visible but difficult to see) of objects in a space with no light. |
| 1. The appearance (e.g., visible, not visible, somewhat visible but difficult to see) of objects in a space with light. |
| 1. The appearance (e.g., visible, not visible, somewhat visible but difficult to see) of objects (e.g., light bulbs, glow sticks) that give off light in a space with no other light. |
| b | Students describe\* how their observations provide evidence to support their explanation. |
| 3 | Reasoning | |
| a | Students logically connect the evidence to support the evidence-based account of the phenomenon. Students describe\* lines of reasoning that include: |
| 1. The presence of light in a space causes objects to be able to be seen in that space. |
| 1. Objects cannot be seen if there is no light to illuminate them, but the same object in the same space can be seen if a light source is introduced. |
| 1. The ability of an object to give off its own light causes the object to be seen in a space where there is no other light. |

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| **1.2.1.C Plan and conduct an investigation** to determine the effect of placing objects made with different materials in the path of a beam of light. | | |
| 1 | Identifying the phenomenon under investigation | |
| a | Students identify and describe\* the phenomenon and purpose of the investigation, which include: |
| 1. Answering a question about what happens when objects made of different materials (that allow light to pass through them in different ways) are placed in the path of a beam of light. |
| 1. Designing and conducting an investigation to gather evidence to support or refute student ideas about putting objects made of different materials in the path of a beam of light. |
| 2 | Identifying evidence to address the purpose of the investigation | |
| a | Students collaboratively develop an investigation plan and describe\* the data that will result from the investigation, including: |
| 1. Observations of the effect of placing objects made of different materials in a beam of light, including: |
| 1. A material that allows all light through results in the background lighting up. |
| 1. A material that allows only some light through results in the background lighting up, but looking darker than when the material allows all light in. |
| 1. A material that blocks all of the light will create a shadow. |
| 1. A material that changes the direction of the light will light up the surrounding space in a different direction. |
| b | Students individually describe\* how these observations provide evidence to answer the question under investigation. |
| 3 | Planning the investigation | |
| a | In the collaboratively developed investigation plan, students individually describe\* (with support): |
| 1. The materials to be placed in the beam of light, including: |
| 1. A material that allows all light through (e.g., clear plastic, clear glass). |
| 1. A material that allows only some light through (e.g., clouded plastic, wax paper). |
| 1. A material that blocks all of the light (e.g., cardboard, wood). |
| 1. A material that changes the direction of the light (e.g., mirror, aluminum foil). |
| 1. How the effect of placing different materials in the beam of light will be observed and recorded. |
| 1. The light source used to produce the beam of light. |
| 4 | Collecting the data | |
| a | Students collaboratively collect and record observations about what happens when objects made of materials that allow light to pass through them in different ways are placed in the path of a beam of light, according to the developed investigation plan. |

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| **1.2.1.D Use tools and materials to design and build** a device that uses light or sound to solve the problem of communicating over a distance. | | |
| 1 | Using scientific knowledge to generate design solutions | |
| a | Students describe\* a given problem involving people communicating over long distances. |
| b | With guidance, students design and build a device that uses light or sound to solve the given problem. |
| c | With guidance, students describe\* the scientific information they use to design the solution. |
| 2 | Describing\* specific features of the design solution, including quantification when appropriate | |
| a | Students describe\* that specific expected or required features of the design solution should include: |
| 1. The device is able to send or receive information over a given distance. |
| 1. The device must use light or sound to communicate. |
| b | Students use only the materials provided when building the device. |
| 3 | Evaluating potential solutions | |
| a | Students describe\* whether the device: |
| 1. Has the expected or required features of the design solution, |
| 1. Provides a solution to the problem involving people communicating over a distance by using light or sound. |
| b | Students describe\* how communicating over long distances helps people. |

**SC.1.6 Structure, Function, and Information Processing**SC.1.6.2 Gather, analyze, and communicate evidence to show the relationship between structure and function in living things.

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|  | C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png | C:\Users\sara.cooper.NDE\Desktop\Standards\StructureFunction.png | SC.1.6.2.A **Use materials to design a solution** to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears. | |
| C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png | *NE plants and animals* |
| **C:\Users\sara.cooper.NDE\Desktop\Standards\ComputerScienceConnection.png** |  | C:\Users\sara.cooper.NDE\Desktop\Standards\StructureFunction.png | SC.1.6.2.B **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. | |
|  |  | C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.png | SC.1.6.2.C **Read texts and use media to determine** patterns in a behavior of parents and offspring that help offspring survive. Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring). | |
| C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png | *NE plants and animals* |
|  |  | C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.png | SC.1.6.2.D **Make observations to construct an evidence-based account** that young plants and animals are like, but not exactly like, their parents. Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same. Assessment does not include inheritance or animals that undergo metamorphosis or hybrids. | |
| C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png | *NE plants and animals* |

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| The example indicators above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*: | | | NOTES |
| **Science and Engineering Practices**  **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. (1.6.2.D) * Use materials to design a device that solves a specific problem or a solution to a specific problem. (1.6.2.A)   **Obtaining, Evaluating, and Communicating Information**  Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.   * Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1.6.2.C)   **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. (1.6.2.B)   **-------------------------------------------------------------**  [***Connections to Nature of Science***](http://nstahosted.org/pdfs/ngss/AppendixH-TheNatureOfScienceInTheNextGenerationScienceStandards-4.9.13.pdf)  **Scientific Knowledge is Based on Empirical Evidence**   * Scientists look for patterns and order when making observations about the world. (1.6.2.C) | **Disciplinary Core Ideas**  [**LS1.A**](https://www.nap.edu/read/13165/chapter/10#143)**: Structure and Function**  C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.pngAll organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1.6.2.A)  [**LS1.B**](https://www.nap.edu/read/13165/chapter/10#145)**: Growth and Development of Organisms**  C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1.6.2.C)  C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png[**LS1.D**](https://www.nap.edu/read/13165/chapter/10#148)**: Information Processing**  Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1.6.2.A)  [**LS3.A**](https://www.nap.edu/read/13165/chapter/10#158)**: Inheritance of Traits**  C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.pngYoung animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents. (1.6.2.D)  C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png[**LS3.B**](https://www.nap.edu/read/13165/chapter/10#160)**: Variation of Traits**  Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1.6.2.D)  [**ETS1.B**](https://www.nap.edu/read/13165/chapter/12#206)**: 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. (1.6.2.B) | **Crosscutting Concepts**  **Patterns**  C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.pngPatterns in the natural world can be observed, used to describe phenomena, and used as  evidence. (1.6.2.C),(1.6.2.D)  **Structure and Function**  C:\Users\sara.cooper.NDE\Desktop\Standards\StructureFunction.pngThe shape and stability of structures of natural and designed objects are related to their function(s). (1.6.2.A) (1.6.2.B)  **----------------------------------------------**  C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png[***Connections to Engineering, Technology,******and Applications of Science***](http://nstahosted.org/pdfs/ngss/20130509/AppendixJ-ScienceTechnologySocietyAndTheEnvironment_0.pdf)  [**Influence of Engineering, Technology, and Science on Society and the Natural World**](https://www.nap.edu/read/13165/chapter/12#212)   * Every human-made product is designed by applying some knowledge of the natural world and is built by built using materials derived from the natural world. (1.6.2.A) |
| *Connections to other DCIs in first grade:* N/A | | |
| *Articulation of DCIs across grade-levels:***K.ETS1.A** (1.6.2.A); **3.LS2.D** (1.6.2.C) **3.LS3.A** (1.6.2.D); **3.LS3.B** (1.6.2.D); **4.LS1.A** (1.6.2.A); **4.LS1.D** (1.6.2.A); **4.ETS1.A** (1.6.2.A) | | |
| ***NGSS Connections:***[Structure, Function and Information Processing](http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=5) [**1-LS1-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=49) (1.6.2.A); [**1-LS1-2**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=51) (1.6.2.C); [**1-LS3-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=52)(1.6.2.D) [Engineering Design](http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=10) [**K-2ETS1-2**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=40) (1.6.2.B) | | |
| C:\Users\sara.cooper.NDE\Desktop\Standards\ComputerScienceConnection.png*Computer Science Connections:* | | |
| ***ELA Connections:***  1.1.6.d Retell major events and key details from a literary text and/or media. (1.6.2.C)  1.1.6.g Identify the basic characteristics of a variety of literary and informational texts. (1.6.2.C)  1.1.6.i Construct and/or answer clarifying questions (who, what, when, where, why, how) and support answers with evidence from the text or additional sources. (1.6.2.C),(1.6.2.D)  1.2.2.c With adult guidance, conduct and publish research to answer questions or solve problems using resource (1.6.2.D)  1.3.1.c Utilize appropriate visual and/or digital tools to support verbal communication. (1.6.2.B)  1.4.1.a Use provided print and digital resources to gather information, answer questions, and demonstrate understanding of valid information (e.g., fiction vs. nonfiction, real vs. not real). (1.6.2.A),(1.6.2.D) | | |
| ***Mathematics Connections:***  MP.2 Communicates mathematical ideas effectively. (1.6.2.D)  MP.1 Solves mathematical problems. (1.6.2.D)  MA 1.1.1.f Compare two two-digit numbers by using symbols <, =, and > and justify the comparison based on the number of tens and ones (1.6.2.C)  MA 1.1.2.e Add within 100, which may include adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of ten using concrete models,   drawings, and strategies which reflect understanding of place value. (1.6.2.C)  MA 1.1.2.d Mentally find 10 more or 10 less than a two-digit number without having to count and explain the reasoning used (e.g., 33 is 10 less than 43). (1.6.2.C)  MA 1.1.2.c Find the difference between two numbers that are multiples of 10, ranging from 10 - 90 using concrete models, drawings or strategies, and write the corresponding   equation (e.g., 90 - 70 = 20). (1.6.2.C)  MA 1.3.3.d Order three objects by directly comparing their lengths, or indirectly by using a third object. (1.6.2.D) | | |
| ***Social Studies Connections:*** | | |
| ***Fine Arts Connections:*** | | |

**Evidence Statements: Observable features of the student performance by the end of the grade.**

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| **1.6.2.A Use materials to design a solution** to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow,   and meet their needs. | | |
| 1 | Using scientific knowledge to generate design solutions | |
| a | Students describe\* the given human problem to be solved by the design. |
| b | With guidance, students use given scientific information about plants and/or animals to design the solution, including: |
| 1. How external structures are used to help the plant and/or animal grow and/or survive. |
| 1. How animals use external structures to capture and convey different kinds of information they need. |
| 1. How plants and/or animals respond to information they receive from the environment. |
| c | Students design a device (using student-suggested materials) that provides a solution to the given human problem by mimicking how plants and/or animals use external structures to survive, grow, and/or meet their needs. This may include: |
| 1. Mimicking the way a plant and/or animal uses an external structure to help it survive, grow, and/or meet its needs. |
| 1. Mimicking the way an external structure of an animal captures and conveys information. |
| 1. Mimicking the way an animal and/or plant responds to information from the environment. |
| 2 | Describing\* specific features of the design solution, including quantification when appropriate | |
| a | Students describe\* the specific expected or required features in their designs and devices, including: |
| 1. The device provides a solution to the given human problem. |
| 1. The device mimic plant and/or animal external parts, and/or animal information-processing |
| 1. The device use the provided materials to develop solutions. |
| 3 | Evaluating potential solutions | |
| a | Students describe\* how the design solution is expected to solve the human problem. |
| b | Students determine and describe\* whether their device meets the specific required features. |

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| **1.6.2.B 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. | | |
| 1 | Components of the model | |
| a | Students develop a representation of an object and the problem it is intended to solve. In their representation, students include the following components: |
| 1. The object. |
| 1. The relevant shape(s) of the object. |
| 1. The function of the object. |
| b | Students use sketches, drawings, or physical models to convey their representations. |
| 2 | Relationships | |
| a | Students identify relationships between the components in their representation, including: |
| 1. The shape(s) of the object and the object’s function. |
| 1. The object and the problem is it designed to solve. |
| 3 | Connections | |
| a | Students use their representation (simple sketch, drawing, or physical model) to communicate the connections between the shape(s) of an object, and how the object could solve the problem. |

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| **1.6.2.C Read texts and use media to determine** patterns in a behavior of parents and offspring that help offspring survive. | | |
| 1 | Obtaining information | |
| a | Students use grade-appropriate books and other reliable media to obtain the following scientific information: |
| 1. Information about the idea that both plants and animals can have offspring. |
| 1. Information about behaviors of animal parents that help offspring survive (e.g., keeping offspring safe from predators by circling the young, feeding offspring). |
| 1. Information about behaviors of animal offspring that help the offspring survive (e.g., crying, chirping, nuzzling for food). |
| 2 | Evaluating information | |
| a | Students evaluate the information to determine and describe\* the patterns of what animal parents and offspring do to help offspring survive (e.g., when a baby cries, the mother feeds it; when danger is present, parents protect offspring; some young animals become silent to avoid predators). |

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| **1.6.2.D Make observations to construct an evidence-based account** that young plants and animals are like, but not exactly like, their parents. | | |
| 1 | Articulating the explanation of phenomena | |
| a | Students articulate a statement that relates a given phenomenon to a scientific idea, including the idea that young plants and animals are like, but not exactly like, their parents (not to include animals that undergo complete metamorphoses, such as insects or frogs). |
| b | Students use evidence and reasoning to construct an evidence-based account of the phenomenon. |
| 2 | Evidence | |
| a | Students describe\* evidence from observations (firsthand or from media) about patterns of features in plants and animals, including: |
| 1. Key differences between different types of plants and animals (e.g., features that distinguish dogs versus those that distinguish fish, oak trees vs. bean plants). |
| 1. Young plants and animals of the same type have similar, but not identical features (e.g., size and shape of body parts, color and/or type of any hair, leaf shape, stem rigidity). |
| 1. Adult plants and animals (i.e., parents) of the same type have similar, but not identical features (e.g., size and shape of body parts, color and/or type of any hair, leaf shape, stem rigidity). |
| 1. Patterns of similarities and differences in features between parents and offspring. |
| 3 | Reasoning | |
| a | Students logically connect the evidence of observed patterns in features to support the evidence-based account by describing\* chains of reasoning that include: |
| 1. Young plants and animals are very similar to their parents. |
| 1. Young plants and animals are not exactly the same as their parents. |
| 1. Similarities and differences in features are evidence that young plants and animals are very much, but not exactly, like their parents. |
| 1. Similarities and differences in features are evidence that although individuals of the same type of animal or plant are recognizable as similar, they can also vary in many ways. |

**SC.1.11 Space Systems: Patterns and Cycles**SC.1.11.3 Gather, analyze, and communicate evidence of patterns and cycles of space systems.

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| **C:\Users\sara.cooper.NDE\Desktop\Standards\ComputerScienceConnection.png** | C:\Users\sara.cooper.NDE\Desktop\Standards\CivicConnection.png | C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.png | SC.1.11.3.A **Use observations** of the sun, moon, and stars to describe patterns that can be predicted. Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day. Assessment of star patterns is limited to stars being seen at night and not during the day. |
|  | C:\Users\sara.cooper.NDE\Desktop\Standards\CivicConnection.png | C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.png | SC.1.11.3.B **Make observations** at different times of the year to relate the amount of daylight to the time of year. Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall. Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight. |

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| The example indicators above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*: | | | NOTES |
| **Science and Engineering Practices**  **Planning and Carrying Out Investigations**  Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.   * Make observations (firsthand or from media) to collect data that can be used to make comparisons. (1.11.3.B)   **Analyzing and Interpreting Data**  Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.   * Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (1.11.3.A) | **Disciplinary Core Ideas**  [**ESS1.A**](https://www.nap.edu/read/13165/chapter/11#173)**: The Universe and its Stars**   * Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1.11.3.A)   [**ESS1.B**](https://www.nap.edu/read/13165/chapter/11#175)**: Earth and the Solar System**   * Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1.11.3.B) | **Crosscutting Concepts**  **Patterns**  C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.pngPatterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1.11.3.A),(1.11.3.B)  **-----------------------------------------------**  [***Connections to Nature of Science***](http://nstahosted.org/pdfs/ngss/AppendixH-TheNatureOfScienceInTheNextGenerationScienceStandards-4.9.13.pdf)  **Scientific Knowledge Assumes an Order and Consistency in Natural Systems**   * Science assumes natural events happen today as they happened in the past. (1.11.3.A) * Many events are repeated. (1.11.3.A) |
| *Connections to other DCIs in first grade:* N/A | | |
| *Articulation of DCIs across grade-levels:***3.PS2.A** (1.11.3.A); **5.PS2.B** (1.11.3.A),(1.11.3.B) **5.ESS1.B** (1.11.3.A),(1.11.3.B) | | |
| ***NGSS Connections:*** [Space Systems: Patterns and Cycles](http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=6)  [**1-ESS1-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=54) (1.11.3.A); [**1-ESS1-2**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=56) (1.11.3.B) | | |
| **C:\Users\sara.cooper.NDE\Desktop\Standards\ComputerScienceConnection.png*Computer Science Connections:*** | | |
| ***ELA Connections:***  1.2.1.c Gather and use relevant information and evidence to support ideas. (1.11.3.A),(1.11.3.B)  1.2.1.e With adult guidance, revise to improve and clarify writing through self-monitoring strategies and feedback from others. (1.11.3.A),(1.11.3.B)  1.2.1.f Provide oral descriptive feedback to other writers. (1.11.3.A),(1.11.3.B)  1.2.1.i Use own words to relate information. (1.11.3.A),(1.11.3.B)  1.2.2.c With adult guidance, conduct and publish research to answer questions or solve problems using resources. (1.11.3.A),(1.11.3.B)  1.4.1.a Use provided print and digital resources to gather information, answer questions, and demonstrate understanding of valid information (e.g., fiction vs. nonfiction, real vs. not real). (1.11.3.A),(1.11.3.B) | | |
| ***Mathematics Connections:***  MP.2 Communicates mathematical ideas effectively. *(1.11.3.B)*  MP.4 Models and represents math problems *(1.11.3.B)*  MP.1 Solves mathematical problems. *(1.11.3.B)*  MA 1.2.3.a Solve real-world problems involving addition and subtraction within 20 in situations of adding to, taking from, putting together, taking apart, and comparing, with   unknowns in all parts of the addition or subtraction problem (e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the   problem). *(1.11.3.B)*  MA 1.4.1.a Organize and represent a data set with up to three categories using a picture graph. *(1.11.3.B)*  MA 1.4.2.a Ask and answer questions about the total number of data points, how many in each category, and compare categories by identifying how many more or less   are in a particular category using a picture graph. *(1.11.3.B)* | | |
| ***Social Studies Connections:*** | | |

**Evidence Statements: Observable features of the student performance by the end of the grade.**

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| **1.11.3.A Use observations** of the sun, moon, and stars to describe patterns that can be predicted. | | |
| 1 | Organizing data | |
| a | With guidance, students use graphical displays (e.g., picture, chart) to organize data from given observations (firsthand or from media), including: |
| 1. Objects (i.e., sun, moon, stars) visible in the sky during the day. |
| 1. Objects (i.e., sun, moon, stars) visible in the sky during the night. |
| 1. The position of the sun in the sky at various times during the day. |
| 1. The position of the moon in the sky at various times during the day or night. |
| 2 | Identifying relationships | |
| a | Students identify and describe\* patterns in the organized data, including: |
| 1. Stars are not seen in the sky during the day, but they are seen in the sky during the night. |
| 1. The sun is at different positions in the sky at different times of the day, appearing to rise in one part of the sky in the morning and appearing to set in another part of the sky in the evening. |
| 1. The moon can be seen during the day and at night, but the sun can only be seen during the day. |
| * + 1. The moon is at different positions in the sky at different times of the day or night, appearing to rise in one part of the sky and appearing to set in another part of the sky. |
| 3 | Interpreting data | |
| a | Students use the identified patterns of the motions of objects in the sky to provide evidence that future appearances of those objects can be predicted (e.g., if the moon is observed to rise in one part of the sky, a prediction can be made that the moon will move across the sky and appear to set in a different portion of the sky; if the sun is observed to rise in one part of the sky, a prediction can be made about approximately where the sun will be at different times of day). |
| b | Students use patterns related to the appearance of objects in the sky to provide evidence that future appearances of those objects can be predicted (e.g., when the sun sets and can no longer be seen, a prediction can be made that the sun will rise again in the morning; a prediction can be made that stars will only be seen at night). |

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| **1.11.3.B Make observations** at different times of the year to relate the amount of daylight to the time of year. | | |
| 1 | Identifying the phenomenon under investigation | |
| a | Students identify and describe\* the phenomenon and purpose of the investigation, which include the following idea: the relationship between the amount of daylight and the time of year. |
| 2 | Identifying evidence to address the purpose of the investigation | |
| a | Based on the given plan for the investigation, students (with support) describe\* the data and evidence that will result from the investigation, including observations (firsthand or from media) of relative length of the day (sunrise to sunset) throughout the year. |
| b | Students individually describe\* how these observations could reveal the pattern between the amount of daylight and the time of year (i.e., relative lightness and darkness at different relative times of the day and throughout the year). |
| 3 | Planning the investigation | |
| a | Based on the given investigation plan, students describe\* (with support): |
| 1. How the relative length of the day will be determined (e.g., whether it will be light or dark when waking in the morning, at breakfast, when having dinner, or going to bed at night). |
| 1. When observations will be made and how they will be recorded, both within a day and across the year. |
| 4 | Collecting the data | |
| a | According to the given investigation plan, students collaboratively make and record observations about the relative length of the day in different seasons to make relative comparisons between the amount of daylight at different times of the year (e.g., summer, winter, fall, spring). |

**SECOND GRADE**

The second grade standards and indicators help students gather, analyze, and communicate evidence as they formulate answers to questions tailored to student interest and current topics that may include but are not limited to:

**How are materials similar and different from one another and how do the properties of the materials relate to their use?**

An understanding of observable properties of materials is developed by students at this level through analysis and classification of different materials.

**What do plants need to grow?**

Students are expected to develop an understanding of what plants need to grow and how plants depend on animals for seed dispersal and pollination.

**How many types of living things live in a place?**

Students are expected to compare the diversity of life in different habitats.

**How does land change and what causes it to change?**

Students are able to apply their understanding of the idea that wind and water can change the shape of land to compare design solutions to slow or prevent such change.

**What are the different kinds of land and bodies of water?**

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.

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**SC.2.3 Structure and Properties of Matter**

SC.2.3.1 Gather, analyze, and communicate evidence of the structure, properties, and interactions of matter.

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|  |  | C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.png | SC.2.3.1.A **Plan and conduct an investigation** to describe and classify different kinds of materials by their observable properties. Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share. | |
|  |  |  | C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png | *Soil properties* |
|  | C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png | C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png | SC.2.3.1.B **Analyze data obtained from testing different materials** to determine which materials have the properties that are best suited for an intended purpose. Examples of properties could include, strength, flexibility, hardness, texture, and absorbency. Assessment of quantitative measurements is limited to length and weight. | |
|  |  |  | SC.2.3.1.C **Analyze data** from tests of two objects **designed to solve the same problem** to compare the strengths and weaknesses of how each performs. | |
|  |  | C:\Users\sara.cooper.NDE\Desktop\Standards\EnergyMatter.png | SC.2.3.1.D **Make observations to construct an evidence-based account** of how an object made of a small set of pieces can be disassembled and made into a new object. Examples of pieces could include blocks, building bricks, or other assorted small objects. | |
|  |  | C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png | SC.2.3.1.E **Construct an argument with evidence** that some changes caused by heating or cooling can be reversed and some cannot. Examples of pieces could include blocks, building bricks, or other assorted small objects. | |

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| The example indicators above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*: | | | NOTES |
| **Science and Engineering Practices**  **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. (2.3.1.A)   **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. (2.3.1.B) (2.3.1.C)  **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. (2.3.1.D)   **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. (2.3.1.E)   **------------------------------------------------------------**  [***Connections to Nature of Science***](http://nstahosted.org/pdfs/ngss/AppendixH-TheNatureOfScienceInTheNextGenerationScienceStandards-4.9.13.pdf)  **Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena**   * Scientists search for cause and effect relationships to explain natural events. (2.3.1.E) | **Disciplinary Core Ideas**  [**PS1.A**](https://www.nap.edu/read/13165/chapter/9#106)**: Structure and Properties of Matter**  C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png 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. (2.3.1.A)   * Different properties are suited to different purposes. (2.3.1.B),(2.3.1.D) * A great variety of objects can be built up from a small set of pieces. (2.3.1.D)   [**PS1.B**](https://www.nap.edu/read/13165/chapter/9#109)**: Chemical Reactions**   * Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2.3.1.E)   [**ETS1.C**](https://www.nap.edu/read/13165/chapter/12#208)**: Optimizing the Design Solution**  Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (2.3.1.C) | **Crosscutting Concepts**  **Patterns**  C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.pngPatterns in the natural and human designed world can be observed. (2.3.1.A)  C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png**Cause and Effect**  Events have causes that generate observable patterns. (2.3.1.E)  Simple tests can be designed to   gather evidence to support or refute   student ideas about causes.   (2.3.1.B)  **Energy and Matter**  C:\Users\sara.cooper.NDE\Desktop\Standards\EnergyMatter.pngObjects may break into smaller pieces and be put together into larger pieces, or change shapes. (2.3.1.D)  **----------------------------------------------**  C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png[***Connections to Engineering, Technology,******and Applications of Science***](http://nstahosted.org/pdfs/ngss/20130509/AppendixJ-ScienceTechnologySocietyAndTheEnvironment_0.pdf)  [**Influence of Engineering, Technology, and Science on Society and the Natural World**](https://www.nap.edu/read/13165/chapter/12#212)   * Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived  from the natural world. (2.3.1.B) |
| *Connections to other DCIs in second grade:* N/A | | |
| *Articulation of DCIs across grade-levels:***4.ESS2.A** (2.3.1.D); **5.PS1.A** (2.3.1.A),(2.3.1.B),(2.3.1.D); **5.PS1.B** (2.3.1.E); **5.LS2.A** (2.3.1.D) | | |
| ***NGSS Connections:*** [Structure and Properties of Matter](http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=7) [**2-PS1-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=59) (2.3.1.A); [**2-PS1-2**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=60)(2.3.1.B); [**2-PS1-3**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=61) (2.3.1.D); [**2-PS1-4**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=62) (2.3.1.E) [Engineering Design](http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=10) [**K-2ETS1-3**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=41) (2.3.1.C) | | |
| ***ELA Connections:***  2.1.6.d Retell major events and key details from a literary text and/or media and support a prompted theme. (2.3.1.E)  *2.1.6.i* Construct and/or answer literal and inferential questions and support answers with specific evidence from the text or additional sources. *(2.3.1.E)*  2.2.1.j Display academic honesty and integrity by avoiding plagiarism and providing a list of sources.(2.3.1.A),(2.3.1.B),(2.3.1.C),(2.3.1.D)  2.2.2.a Communicate information and ideas effectively in analytic, descriptive, informative, narrative, poetic, persuasive, and reflective modes to multiple audiences using a variety of media and formats. (2.3.1.E)  2.2.2.b Provide evidence from literary or informational text to support ideas or opinions. (2.3.1.A),(2.3.1.B),(2.3.1.C),(2.3.1.D)  2.2.2.c Conduct and publish research to answer questions or solve problems using resources. (2.3.1.A),(2.3.1.B),(2.3.1.C),(2.3.1.D)  2.4.1.a With guidance, locate, organize, and evaluate information from print and digital resources to generate and answer questions and create new understandings.   (2.3.1.A),(2.3.1.B),(2.3.1.C),(2.3.1.D)  2.4.1.b With guidance, demonstrate ethical use of information and copyright guidelines by appropriately quoting or paraphrasing from a text and citing the source using   available resources (e.g., online citation tools). (2.3.1.A),(2.3.1.B),(2.3.1.C),(2.3.1.D)  2.4.2.b Use appropriate digital tools (e.g., social media, online collaborative tools, apps) to communicate with others for conveying information, gathering opinions, and solving problems. (2.3.1.A),(2.3.1.B),(2.3.1.C),(2.3.1.D) | | |
| ***Mathematics Connections:***  MP.2 Communicates mathematical ideas effectively. (2.3.1.B)  MP.4 Models and represents math problems (2.3.1.A),(2.3.1.B)  MP.1 Solves mathematical problems. (2.3.1.B)  MA 2.4.1.a Create and represent a data set using pictographs and bar graphs to represent a data set with up to four categories. (2.3.1.A),(2.3.1.B)  MA 2.4.1.b Create and represent a data set by making a line plot. (2.3.1.A),(2.3.1.B)  MA 2.4.2.a Interpret data using bar graphs with up to four categories. Solve simple comparison problems using information from the graphs. (2.3.1.A),(2.3.1.B) | | |
| ***Social Studies Connections:*** | | |
| ***Fine Arts Connections:*** | | |

**Evidence Statements: Observable features of the student performance by the end of the grade.**

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| **2.3.1.A Plan and conduct an investigation** to describe and classify different kinds of materials by their observable properties. | | |
| 1 | Identifying the phenomenon under investigation | |
| a | Students identify and describe\* the phenomenon under investigation, which includes the following idea: different kinds of matter have different properties, and sometimes the same kind of matter has different properties depending on temperature. |
| b | Students identify and describe\* the purpose of the investigation, which includes answering a question about the phenomenon under investigation by describing\* and classifying different kinds of materials by their observable properties. |
| 2 | Identifying the evidence to address the purpose of the investigation | |
| a | Students collaboratively develop an investigation plan and describe\* the evidence that will be collected, including the properties of matter (e.g., color, texture, hardness, flexibility, whether is it a solid or a liquid) of the materials that would allow for classification, and the temperature at which those properties are observed. |
| b | Students individually describe\* that: |
| * + 1. The observations of the materials provide evidence about the properties of different kinds of materials. |
| * + 1. Observable patterns in the properties of materials provide evidence to classify the different kinds of materials. |
| 3 | Planning the investigation | |
| a | In the collaboratively developed investigation plan, students include: |
| 1. Which materials will be described\* and classified (e.g., different kinds of metals, rocks, wood, soil, powders). |
| 1. Which materials will be observed at different temperatures, and how those temperatures will be determined (e.g., using ice to cool and a lamp to warm) and measured (e.g., qualitatively or quantitatively). |
| 1. How the properties of the materials will be determined. |
| 1. How the materials will be classified (i.e., sorted) by the pattern of the properties. |
| b | Students individually describe\* how the properties of materials, and the method for classifying them, are relevant to answering the question. |
| 4 | Collecting the data | |
| a | According to the developed investigation plan, students collaboratively collect and record data on the properties of the materials. |

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| **2.3.1.B Analyze data obtained from testing different materials** to determine which materials have the properties that are best suited for an intended   purpose. | | |
| 1 | Organizing data | |
| a | Using graphical displays (e.g., pictures, charts, grade-appropriate graphs), students use the given data from tests of different materials to organize those materials by their properties (e.g., strength, flexibility, hardness, texture, ability to absorb). |
| 2 | Identifying relationships | |
| a | Students describe\* relationships between materials and their properties (e.g., metal is strong, paper is absorbent, rocks are hard, sandpaper is rough). |
| b | Students identify and describe\* relationships between properties of materials and some potential uses purpose (e.g., hardness is good for breaking objects or supporting objects; roughness is good for keeping objects in place; flexibility is good to keep a materials from breaking, but not good for keeping materials rigidly in place). |
| 3 | Interpreting data | |
| a | Students describe\* which properties allow a material to be well suited for a given intended use (e.g., ability to absorb for cleaning up spills, strength for building material, hardness for breaking a nut). |
| b | Students use their organized data to support or refute their ideas about which properties of materials allow the object or tool to be best suited for the given intended purpose relative to the other given objects/tools (e.g., students could support the idea that hardness allows a wooden shelf to be better suited for supporting materials placed on it than a sponge would be, based on the patterns relating property to a purpose; students could refute an idea that a thin piece of glass is better suited to be a shelf than a wooden plank would be because it is harder than the wood by using data from tests of hardness and strength to give evidence that the glass is less strong than the wood) . |
| c | Students describe\* how the given data from the test provided evidence of the suitability of different materials for the intended purpose. |

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| **2.3.1.C Analyze data** from tests of two objects **designed to solve the same problem** to compare the strengths and weaknesses of how each performs. | | |
| 1 | Organizing data | |
| a | With guidance, students use graphical displays (e.g., tables, pictographs, line plots) to organize given data from tests of two objects, including data about the features and relative performance of each solution. |
| 2 | Identifying relationships | |
| a | Students use their organization of the data to find patterns in the data, including: |
| 1. How each of the objects performed, relative to: |
| 1. The other object. |
| 1. The intended performance. |
| 1. How various features (e.g., shape, thickness) of the objects relate to their performance (e.g., speed, strength). |
| 3 | Interpreting data | |
| a | Students use the patterns they found in object performance to describe\*: |
| 1. The way (e.g., physical process, qualities of the solution) each object will solve the problem. |
| 1. The strengths and weaknesses of each design. |
| 1. Which object is better suited to the desired function, if both solve the problem. |

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| **2.3.1.D Make observations to construct an evidence-based account** of how an object made of a small set of pieces can be disassembled and made into a   new object. | | |
| 1 | Articulating the explanation of phenomena | |
| a | Students articulate a statement that relates the given phenomenon to a scientific idea, including that an object made of a small set of pieces can be disassembled and made into a new object. |
| b | Students use evidence and reasoning to construct an evidence-based account of the phenomenon. |
| 2 | Evidence | |
| a | Students describe\* evidence from observations (firsthand or from media), including: |
| 1. The characteristics (e.g., size, shape, arrangement of parts) of the original object. |
| 1. That the original object was disassembled into pieces. |
| 1. That the pieces were reassembled into a new object or objects. |
| 1. The characteristics (e.g., size, shape, arrangement of parts) of the new object or objects. |
| 3 | Reasoning | |
| a | Students use reasoning to connect the evidence to support an explanation. Students describe\* a chain of reasoning that includes: |
| 1. The original object was disassembled into its pieces and is reassembled into a new object or objects. |
| 1. Many different objects can be built from the same set of pieces. |
| 1. Compared to the original object, the new object or objects can have different characteristics, even though they were made of the same set of pieces. |

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| **2.3.1.E Construct an argument with evidence** that some changes caused by heating or cooling can be reversed and some cannot. | | |
| 1 | Supported claims | |
| a | Students make a claim to be supported about a phenomenon. In their claim, students include the idea that some changes caused by heating or cooling can be reversed and some cannot. |
| 2 | Identifying scientific evidence | |
| a | Students describe\* the given evidence, including: |
| 1. The characteristics of the material before heating or cooling. |
| 1. The characteristics of the material after heating or cooling. |
| 1. The characteristics of the material when the heating or cooling is reversed. |
| 3 | Evaluating and critiquing the evidence | |
| a | Students evaluate the evidence to determine: |
| 1. The change in the material after heating (e.g., ice becomes water, an egg becomes solid, solid chocolate becomes liquid). |
| 1. Whether the change in the material after heating is reversible (e.g., water becomes ice again, a cooked egg remains a solid, liquid chocolate becomes solid but can be a different shape). |
| 1. The change in the material after cooling (e.g., when frozen, water becomes ice, a plant leaf dies). |
| 1. Whether the change in the material after cooling is reversible (e.g., ice becomes water again, a plant leaf does not return to normal). |
| b | Students describe\* whether the given evidence supports the claim and whether additional evidence is needed. |
| 4 | Reasoning and synthesis | |
| a | Students use reasoning to connect the evidence to the claim. Students describe\* the following chain of reasoning: |
| 1. Some changes caused by heating or cooling can be reversed by cooling or heating (e.g., ice that is heated can melt into water, but the water can be cooled and can freeze back into ice [and vice versa]). 2. Some changes caused by heating or cooling cannot be reversed by cooling or heating (e.g., a raw egg that is cooked by heating cannot be turned back into a raw egg by cooling the cooked egg, cookie dough that is baked does not return to its uncooked form when cooled, charcoal that is formed by heating wood does not return to its original form when cooled). |

**SC.2.7 Interdependent Relationships in Ecosystems**SC.2.7.2 Gather, analyze, and communicate evidence of interdependent relationships in ecosystems.

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|  |  | C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png | SC.2.7.2.A **Plan and conduct an investigation** to determine if plants need sunlight and water to grow. Assessment is limited to testing one variable at a time. | |
| C:\Users\sara.cooper.NDE\Desktop\Standards\CivicConnection.png | C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png | C:\Users\sara.cooper.NDE\Desktop\Standards\StructureFunction.png | SC.2.7.2.B **Develop a simple model** that mimics the function of an animal in dispersing seeds or pollinating plants. | |
|  | C:\Users\sara.cooper.NDE\Desktop\Standards\CivicConnection.png | C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.png | SC.2.7.2.C **Make observations** of plants and animals **to compare** the diversity of life in different habitats. Emphasis is on the diversity of living things in each of a variety of different habitats. Assessment does not include specific animal and plant names in specific habitats. | |
|  |  |  | C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png | *NE habitats* |

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| The example indicators above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*: | | | NOTES |
| **Science and Engineering Practices**  **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. (2.7.2.B)   **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. (2.7.2.A)   + Make observations (firsthand or from media) to collect data that can be used to make comparisons. (2.7.2.C)   **-------------------------------------------------------------------**  [***Connections to Nature of Science***](http://nstahosted.org/pdfs/ngss/AppendixH-TheNatureOfScienceInTheNextGenerationScienceStandards-4.9.13.pdf)  **Scientific Knowledge is Based on Empirical Evidence**   * Scientists look for patterns and order when making observations about the world. (2.7.2.C) | **Disciplinary Core Ideas**  [**LS2.A**](https://www.nap.edu/read/13165/chapter/10#150)**: Interdependent Relationships in Ecosystems**   * + Plants depend on water and light to grow. (2.7.2.A)   + Plants depend on animals for pollination or to move their seeds around. (2.7.2.B)   C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png[**LS4.D**](https://www.nap.edu/read/13165/chapter/10#166)**: 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. (2.7.2.C)  [**ETS1.B**](https://www.nap.edu/read/13165/chapter/12#206)**: Developing Possible Solutions**  C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.pngDesigns 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 2.7.2.B)* | **Crosscutting Concepts**  **Cause and Effect**  C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.pngEvents have causes that generate observable patterns. (2.7.2.A)  C:\Users\sara.cooper.NDE\Desktop\Standards\StructureFunction.png**Structure and Function**  The shape and stability of structures of natural and designed objects are related to their function(s). (2.7.2.B)  **Patterns**  C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.pngPatterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. |
| *Connections to other DCIs in second grade:* N/A | | |
| *Articulation of DCIs across grade-levels:***K.LS1.C** (2.7.2.A); **K.ESS3.A** (2.7.2.A); **K.ETS1.A** (2.7.2.B); **3.LS4.C** (2.7.2.C); **3.LS4.D** (2.7.2.C); **5.LS1.C** (2.7.2.A); **5.LS2.A** (2.7.2.B),(2.7.2.C) | | |
| ***NGSS Connections:*** [Interdependent Relationships in Ecosystems](http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=8) [**2-LS2-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=66)(2.7.2.A); [**2-LS2-2**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=67) (2.7.2.B); [**2-LS4-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=69)(2.7.2.C) | | |
| ***ELA Connections:***  2.2.2.b Provide evidence from literary or informational text to support ideas or opinions. (2.7.2.A),(2.7.2.C)  2.2.2.c Conduct and publish research to answer questions or solve problems using resources. (2.7.2.A),(2.7.2.C)  2.2.1.i Display academic honesty and integrity by avoiding plagiarism and providing a list of sources. (2.7.2.A),(2.7.2.C)  2.3.1.c Utilize appropriate visual and/or digital tools to support verbal communication. *(2.7.2.B)*  2.4.1.a With guidance, locate, organize, and evaluate information from print and digital resources to generate and answer questions and create new understandings. (2.7.2.A),(2.7.2.C)  2.4.1.c Use or decipher multiple formats of print and digital text (e.g., manuscript, font, graphics, symbols). (2.7.2.B) | | |
| ***Mathematics Connections:***  MP.2 Communicates mathematical ideas effectively. *(2.7.2.A),(2.7.2.C)*  MP.4 Models and represents math problems *(2.7.2.A),(2.7.2.B),(2.7.2.C)*  MP.1 Solves mathematical problems. *(2.7.2.A)*  MA 2.4.1.a Create and represent a data set using pictographs and bar graphs to represent a data set with up to four categories. *(2.7.2.B),(2.7.2.C)*  MA 2.4.1.b Create and represent a data set by making a line plot. *(2.7.2.B),(2.7.2.C)*  MA 2.4.2.a Interpret data using bar graphs with up to four categories. Solve simple comparison problems using information from the graphs. *(2.7.2.B),(2.7.2.C)* | | |
| *Social Studies Connections:* | | |
| ***Fine Arts Connections:*** | | |

**Evidence Statements: Observable features of the student performance by the end of the grade.**

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| **2.7.2.A Plan and conduct an investigation** to determine if plants need sunlight and water to grow. | | |
| 1 | Identifying the phenomenon under investigation | |
| a | Students identify and describe\* the phenomenon and purpose of the investigation, which include answering a question about whether plants need sunlight and water to grow. |
| 2 | Identifying the evidence to address the purpose of the investigation | |
| a | Students describe\* the evidence to be collected, including: |
| 1. Plant growth with both light and water. |
| 1. Plant growth without light but with water. |
| 1. Plant growth without water but with light. |
| 1. Plant growth without water and without light. |
| b | Students describe\* how the evidence will allow them to determine whether plants need light and water to grow. |
| 3 | Planning the investigation | |
| a | Students collaboratively develop an investigation plan. In the investigation plan, students describe\* the features to be part of the investigation, including: |
| 1. The plants to be used. |
| 1. The source of light. |
| 1. How plants will be kept with/without light in both the light/dark test and the water/no water test. |
| 1. The amount of water plants will be given in both the light/dark test and the water/no water test. |
| 1. How plant growth will be determined (e.g., observations of plant height, number and size of leaves, thickness of the stem, number of branches). |
| b | Students individually describe\* how this plan allows them to answer the question. |
| 4 | Collecting the data | |
| a | According to the investigation plan developed, students collaboratively collect and record data on the effects on plant growth by: |
| 1. Providing both light and water, |
| 1. Withholding light but providing water, |
| 1. Withholding water but providing light, or |
| 1. Withholding both water and light. |

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| **2.7.2.B Develop a simple model** that mimics the function of an animal in dispersing seeds or pollinating plants. | | |
| 1 | Components of the model | |
| a | Students develop a simple model that mimics the function of an animal in seed dispersal or pollination of plants. Students identify the relevant components of their model, including those components that mimic the natural structure of an animal that helps it disperse seeds (e.g., hair that snares seeds, squirrel cheek pouches that transport seeds) or that mimic the natural structure of an animal that helps it pollinate plants (e.g., bees have fuzzy bodies to which pollen sticks, hummingbirds have bills that transport pollen). The relevant components of the model include: |
| 1. Relevant structures of the animal. |
| 1. Relevant structures of the plant. |
| 1. Pollen or seeds from plants. |
| 2 | Relationships | |
| a | In the model, students describe\* relationships between components, including evidence that the developed model mimics how plant and animal structures interact to move pollen or disperse seeds. |
| 1. Students describe\* the relationships between components that allow for movement of pollen or seeds. |
| 1. Students describe\* the relationships between the parts of the model they are developing and the parts of the animal they are mimicking. |
| 3 | Connections | |
| a | Students use the model to describe\*: |
| 1. How the structure of the model gives rise to its function. |
| 1. Structure-function relationships in the natural world that allow some animals to disperse seeds or pollinate plants. |

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| **2.7.2.C Make observations** of plants and animals **to compare** the diversity of life in different habitats. | | |
| 1 | Identifying the phenomenon under investigation | |
| a | Students identify and describe\* the phenomenon and purpose of the investigation, which includes comparisons of plant and animal diversity of life in different habitats. |
| 2 | Identifying the evidence to address the purpose of the investigation | |
| a | Based on the given plan for the investigation, students describe\* the following evidence to be collected: |
| 1. Descriptions\* based on observations (firsthand or from media) of habitats, including land habitats (e.g., playground, garden, forest, parking lot) and water habitats (e.g., pond, stream, lake). |
| 1. Descriptions\* based on observations (firsthand or from media) of different types of living things in each habitat (e.g., trees, grasses, bushes, flowering plants, lizards, squirrels, ants, fish, clams). |
| 1. Comparisons of the different types of living things that can be found in different habitats. |
| b | Students describe\* how these observations provide evidence for patterns of plant and animal diversity across habitats. |
| 3 | Planning the investigation | |
| a | Based on the given investigation plan, students describe\* how the different plants and animals in the habitats will be observed, recorded, and organized. |
| 4 | Collecting the data | |
| a | Students collect, record, and organize data on different types of plants and animals in the habitats. |

**SC.2.13 Earth's Systems: Processes That Shape the Earth**SC.2.13.3 Gather, analyze, and communicate evidence of the processes that shape the earth.

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|  | C:\Users\sara.cooper.NDE\Desktop\Standards\CivicConnection.png | C:\Users\sara.cooper.NDE\Desktop\Standards\StabilityChange.png | SC.2.13.3.A **Use information from several sources to provide evidence** that Earth events can occur quickly or slowly. Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly. Assessment does not include quantitative measurements of timescales. | |
| C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png | *Flooding and tornadoes quickly cause change; wind slowly formed the Sandhills* |
|  | C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png | C:\Users\sara.cooper.NDE\Desktop\Standards\StabilityChange.png | SC.2.13.3.B **Compare multiple solutions designed to** slow or prevent wind or water from changing the shape of the land. 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. | |
| C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png | *Soil conservation* |
|  | **C:\Users\sara.cooper.NDE\Desktop\Standards\ComputerScienceConnection.png** | C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.png | SC.2.13.3.C **Develop a model to represent** the shapes and kinds of land and bodies of water in an area. Assessment does not include quantitative scaling in models. | |
| C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png | *Manmade dams, sandbagging, windbreaks, terracing* |
|  | **C:\Users\sara.cooper.NDE\Desktop\Standards\ComputerScienceConnection.png** | C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.png | SC.2.13.3.D **Obtain information to identify** where water is found on Earth and that it can be solid or liquid. | |
| C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png | *NE water bodies* |

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| The example indicators above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*: | | | NOTES | |
| **Science and Engineering Practices**  **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. (2.13.3.C)   **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. (2.13.3.A) * Compare multiple solutions to a problem. (2.13.3.B)   **Obtaining, Evaluating, and Communicating Information**  Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.   * 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. (2.13.3.D) | **Disciplinary Core Ideas**  C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png[**ESS1.C**](https://www.nap.edu/read/13165/chapter/11#177)**: The History of Planet Earth**  Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2.13.3.A)  [**ESS2.A**](https://www.nap.edu/read/13165/chapter/11#180)**: Earth Materials and Systems**  C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.pngWind and water can change the shape of the land. (2.13.3.B)  C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.png[**ESS2.B**](https://www.nap.edu/read/13165/chapter/11#182)**: 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. (2.13.3.C)  [**ESS2.C**](https://www.nap.edu/read/13165/chapter/11#184)**: The Roles of Water in Earth’s Surface Processes**  C:\Users\sara.cooper.NDE\Desktop\Standards\NebraskaConnection.pngWater is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2.13.3.D)  [**ETS1.C**](https://www.nap.edu/read/13165/chapter/12#208)**: Optimizing the Design Solution**  C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.pngBecause there is always more than one possible solution to a problem, it is useful to compare and test designs. *(secondary to 2.13.3.B)* | **Crosscutting Concepts**  **Patterns**  C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.pngPatterns in the natural world can be observed. (2.13.3.C),(2.13.3.D)  C:\Users\sara.cooper.NDE\Desktop\Standards\StabilityChange.png**Stability and Change**  Things may change slowly or rapidly. (2.13.3.A),(2.13.3.B)  **-----------------------------------**  C:\Users\sara.cooper.NDE\Desktop\Standards\EngineeringConnection'.png[***Connections to Engineering, Technology,******and Applications of Science***](http://nstahosted.org/pdfs/ngss/20130509/AppendixJ-ScienceTechnologySocietyAndTheEnvironment_0.pdf)  [**Influence of Engineering, Technology, and Science on Society and the Natural World**](https://www.nap.edu/read/13165/chapter/12#212)   * Developing and using technology has impacts on the natural world. (2.13.3.B)   **----------------------------------------------------**  [***Connections to Nature of Science***](http://nstahosted.org/pdfs/ngss/AppendixH-TheNatureOfScienceInTheNextGenerationScienceStandards-4.9.13.pdf)  **Science Addresses Questions About the Natural and Material World**   * Scientists study the natural and material world. (2.13.3.B) | |
| *Connections to other DCIs in second grade:* **2.PS1.A** (2.13.3.D) | | | |
| *Articulation of DCIs across grade-levels:***K.ETS1.A** (2.13.3.B); **3.LS2.C** (2.13.3.A); **4.ESS1.C** (2.13.3.A); **4.ESS2.A** (2.13.3.A),(2.13.3.B); **4.ESS2.B** (2.13.3.C); **4.ETS1.A** (2.13.3.B); **4.ETS1.B** (2.13.3.B); **4.ETS1.C** (2.13.3.B); **5.ESS2.A** (2.13.3.B); **5.ESS2.C** (2.13.3.C),(2.13.3.D) | | | |
| ***NGSS Connections:*** Earth’s Systems: [Processes That Shape the Earth](http://ngss.nsta.org/DisplayStandard.aspx?view=topic&id=9)  [**2-ESS1-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=30) (2.13.3.A); [**2-ESS2-1**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=35) (2.13.3.B); [**2-ESS2-2**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=37) (2.13.3.C); [**2-ESS2-3**](http://ngss.nsta.org/DisplayStandard.aspx?view=pe&id=38) (2.13.3.D) | | | |
| **C:\Users\sara.cooper.NDE\Desktop\Standards\ComputerScienceConnection.png***Computer Science Connections:* | | | |
| **ELA Connections:**  2.1.6.dRetell major events and key details from a literary text and/or media and support a prompted theme. (2.13.3.A),*(2.13.3.B)*  2.1.6.h Identify topics and/or patterns across multiple literary and informational texts to develop a multicultural perspective. (2.13.3.B)  2.1.6.i Construct and/or answer literal and inferential questions and support answers with specific evidence from the text or additional sources. *(2.13.3.A)*  2.1.6.l Build background knowledge and activate prior knowledge to identify text-to-self, text-to-text, and text-to-world connections before, during, and after reading. (2.13.3.B)  2.2.1.i Display academic honesty and integrity by avoiding plagiarism and providing a list of sources. (2.13.3.A),(2.13.3.D)  2.2.2.a Communicate information and ideas effectively in analytic, descriptive, informative, narrative, poetic, persuasive, and reflective modes to multiple audiences using a variety of media and formats. *(2.13.3.A),(2.13.3.D)*  2.2.2.b Provide evidence from literary or informational text to support ideas or opinions. (2.13.3.A),(2.13.3.D)  2.2.2.c Conduct and publish research to answer questions or solve problems using resources. (2.13.3.A),(2.13.3.D)  2.3.1.c Utilize appropriate visual and/or digital tools to support verbal communication. *(2.13.3.C)*  2.3.3.c Apply conversation strategies to recognize and consider new information presented by others in relationship to one's own ideas. (2.13.3.A)  2.3.3.d Listen, ask clarifying questions, and respond to information being communicated about a topic, text, or issue under study. (2.13.3.A)  2.4.1.a With guidance, locate, organize, and evaluate information from print and digital resources to generate and answer questions and create new understandings. (2.13.3.A), (2.13.3.D)  2.4.1.c Use or decipher multiple formats of print and digital text (e.g., manuscript, font, graphics, symbols). *(2.13.3.C)*  2.4.2.b Use appropriate digital tools (e.g., social media, online collaborative tools, apps) to communicate with others for conveying information, gathering opinions, and solving problems. *(2.13.3.A),(2.13.3.D)* | | | |
| ***Mathematics Connections:***  MP.2 Communicates mathematical ideas effectively. *(2.13.3.B),(2.13.3.B),(2.13.3.C)*  MP.4 Models and represents math problems *(2.13.3.A),(2.13.3.B),(2.13.3.C)*  MP.1 Solves mathematical problems. *(2.13.3.B)*  **2.NBT.A** Understand place value. (2.13.3.A)  MA 2.1.1.b Read and write numbers within the range of 0 - 1,000 using standard, word, and expanded forms *(2.13.3.C)*  MA 2.2.3.a Solve real-world problems involving addition and subtraction within 100 in situations of addition and subtraction, including adding to, subtracting from, joining and   separating, and comparing situations with unknowns in all positions using objects, models, drawings, verbal explanations, expressions and equations *(2.13.3.B)*  MA 2.3.3.h Use measurement lengths and addition and subtraction within 100 to solve real-world problems. *(2.13.3.B)* | | | |
| *Social Studies Connections:* | | | |

**Evidence Statements: Observable features of the student performance by the end of the grade.**

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| **2.13.3.A Use information from several sources to provide evidence** that Earth events can occur quickly or slowly. | | |
| 1 | Articulating the explanation of phenomena | |
| a | Students articulate a statement that relates the given phenomenon to a scientific idea, including that Earth events can occur very quickly or very slowly. |
| b | Students use evidence and reasoning to construct an evidence-based account of the phenomenon. |
| 2 | Evidence | |
| a | Students describe\* the evidence from observations (firsthand or from media; e.g., books, videos, pictures, historical photos), including: |
| 1. That some Earth events occur quickly (e.g., the occurrence of flood, severe storm, volcanic eruption, earthquake, landslides, erosion of soil). |
| 1. That some Earth events occur slowly. |
| 1. Some results of Earth events that occur quickly. |
| 1. Some results of Earth events that occur very slowly (e.g., erosion of rocks, weathering of rocks). |
| 1. The relative amount of time it takes for the given Earth events to occur (e.g., slowly, quickly, hours, days, years). |
| b | Students make observations using at least three sources |
| 3 | Reasoning | |
| a | Students use reasoning to logically connect the evidence to construct an evidence-based account. Students describe\* their reasoning, including: |
| 1. In some cases, Earth events and the resulting changes can be directly observed; therefore those events must occur rapidly. |
| 1. In other cases, the resulting changes of Earth events can be observed only after long periods of time; therefore these Earth events occur slowly, and change happens over a time period that is much longer than one can observe. |

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| **2.13.3.B Compare multiple solutions designed to** slow or prevent wind or water from changing the shape of the land. | | |
| 1 | Using scientific knowledge to generate design solutions | |
| a | Students describe\* the given problem, which includes the idea that wind or water can change the shape of the land by washing away soil or sand. |
| b | Students describe\* at least two given solutions in terms of how they slow or prevent wind or water from changing the shape of the land. |
| 2 | Describing\* specific features of the design solution, including quantification where appropriate | |
| a | Students describe\* the specific expected or required features for the solutions that would solve the given problem, including: |
| 1. Slowing or preventing wind or water from washing away soil or sand. |
| 1. Addressing problems created by both slow and rapid changes in the environment (such as many mild rainstorms or a severe storm and flood). |
| 3 | Evaluating potential solutions | |
| a | Students evaluate each given solution against the desired features to determine and describe\* whether and how well the features are met by each solution. |
| b | Using their evaluation, students compare the given solutions to each other. |

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| **2.13.3.C Develop a model to represent** the shapes and kinds of land and bodies of water in an area. | | |
| 1 | Components of the model | |
| a | Students develop a model (i.e., a map) that identifies the relevant components, including components that represent both land and bodies of water in an area. |
| 2 | Relationships | |
| a | In the model, students identify and describe\* relationships between components using a representation of the specific shapes and kinds of land (e.g., playground, park, hill) and specific bodies of water (e.g., creek, ocean, lake, river) within a given area. |
| b | Students use the model to describe\* the patterns of water and land in a given area (e.g., an area may have many small bodies of water; an area may have many different kinds of land that come in different shapes). |
| 3 | Connections | |
| a | Students describe\* that because they can map the shapes and kinds of land and water in any area, maps can be used to represent many different types of areas. |

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| **2.13.3.D Obtain information to identify** where water is found on Earth and that it can be solid or liquid. | | |
| 1 | Obtaining information | |
| a | Students use books and other reliable media as sources for scientific information to answer scientific questions about: |
| 1. Where water is found on Earth, including in oceans, rivers, lakes, and ponds. |
| 1. The idea that water can be found on Earth as liquid water or solid ice (e.g., a frozen pond, liquid pond, frozen lake). |
| 1. Patterns of where water is found, and what form it is in. |
| 2 | Evaluating Information | |
| a | Students identify which sources of information are likely to provide scientific information (e.g., versus opinion). |

**K-2 Disciplinary Core Idea Elements**

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| ***PS1 Matter and Its Interactions***   * **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.   (2.3.1.A)  · Different properties are suited to different purposes. (2.3.1.B),(2.3.1.D)  · A great variety of objects can be built up from a small set of pieces. (2.3.1.D)   * **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. (2.3.1.E) | ***PS2 Motion and Stability: Forces and Interactions***   * **PS2.A Forces and Motion**   · Pushes and pulls can have different strengths and directions. (K.1.1.A), (K.1.1.B)  · Pushing or pulling on an object can change the speed or direction of its motion and can   start or stop it. (K.1.1.A), (K.1.1.B)   * **PS2.B Types of Interactions**   · When objects touch or collide, they push on one another and can change motion.   (K.1.1.A) | ***ETS1 Engineering Design***   * **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. Such problems may have many acceptable solutions. (secondary to K.1.1.B)  · Asking questions, making observations, and gathering information are helpful in thinking about problems. (K.12.3.E)   * **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 K.7.2.D)  · 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. (1.6.2.B)  · 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 2.7.2.B)   * **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. (2.3.1.C)  · Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (secondary to 2.13.3.B) |
| ***PS3 Energy***   * **PS3.B Conservation of Energy and Energy Transfer**   · Sunlight warms Earth’s surface. (K.12.3.C),(K.12.3.D)   * **PS3.C Relationship Between Energy and Forces**   · A bigger push or pull makes things speed up or slow down more quickly.   (secondary to K.1.1.A) | ***PS4 Waves and Their Applications in Technologies for Information Transfer***   * **PS4.A Wave Properties**   · Sound can make matter vibrate, and vibrating matter can make sound. (1.2.1.A)   * **PS4.B Electromagnetic Radiation**   · Objects can be seen if light is available to illuminate them or if they give off their own light.   (1.2.1.B)  · Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (1.2.1.C)   * **PS4.C Information Technologies and Instrumentation**   · People also use a variety of devices to communicate (send and receive information) over long distances. (1.2.1.D) |

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| ***LS1 From Molecules to Organisms: Structures and Processes***   * **LS1.A Structure and Function**   · All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1.6.2.A)   * **LS1.B Growth and Development of Organisms**   · Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1.6.2.C)   * **LS1.C Organization for Matter and Energy Flow in Organisms**   · All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. (K.7.2.A)   * **LS1.D Information Processing**   · Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1.6.2.A) | ***LS2 Ecosystems: Interactions, Energy, and Dynamics***   * **LS2.A Interdependent Relationships in Ecosystems**   · Plants depend on water and light to   grow. (2.7.2.A)  · Plants depend on animals for pollination or to move their seeds around. (2.7.2.B) | ***LS3 Heredity: Inheritance and Variation of Traits***   * **LS3.A Inheritance of Traits**   · Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents. (1.6.2.D)   * **LS3.B Variation of Traits**   · Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1.6.2.D) |
| ***ESS2 Earth’s Systems***   * **ESS2.A Earth Materials and Systems**   · Wind and water can change the shape of the land. (2.13.3.B)   * **ESS2.B Plate Tectonics and Large-Scale Interactions**   · Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2.13.3.C)   * **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. (2.13.3.D)   * **ESS2.D Weather and Climate**   · Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. (K.12.3.A)   * **ESS2.E Biogeology**   · Plants and animals can change their   environment. (K.7.2.B) | ***ESS3 Earth and Human Activity***   * **ESS3.A Natural Resources**   · Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. (K.7.2.C)   * **ESS3.B Natural Hazards**   · Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events. (K.12.3.B)   * **ESS3.C Human Impacts on Earth Systems**   · Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. (secondary to K.7.2.B), (K.7.2.D) |
| ***ESS1 Earth’s Place in the Universe***   * **ESS1.A The Universe and Its Stars**   · Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1.11.3.A)   * **ESS1.B Earth and the Solar System**   · Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1.11.3.B)   * **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. (2.13.3.A) |

**K-2 Crosscutting Concept Elements**

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| C:\Users\sara.cooper.NDE\Desktop\Standards\Patterns.png**Patterns** – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them. |
| **K-2 Crosscutting Statements**   * Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence. |
| C:\Users\sara.cooper.NDE\Desktop\Standards\CauseEffect.png**Cause and Effect: Mechanism and Prediction** – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering. |
| **K-2 Crosscutting Statements**   * Events have causes that generate observable patterns. * Simple tests can be designed to gather evidence to support or refute student ideas about causes. |
| C:\Users\sara.cooper.NDE\Desktop\Standards\ScaleProportionQuantity.png**Scale, Proportion, and Quantity** – In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change. |
| **K-2 Crosscutting Statements**   * Relative scales allow objects and events to be compared and described (e.g., bigger and smaller; hotter and colder; faster and slower). * Standard units are used to measure length. |
| C:\Users\sara.cooper.NDE\Desktop\Standards\Systems.png**Systems and System Models –** A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems. |
| **K-2 Crosscutting Statements**   * Objects and organisms can be described in terms of their parts. * Systems in the natural and designed world have parts that work together. |
| C:\Users\sara.cooper.NDE\Desktop\Standards\EnergyMatter.png**Energy and Matter: Flows, Cycles, and Conservation** – Tracking energy and matter flows, into, out of, and within systems helps one understand their system’s behavior. |
| **K-2 Crosscutting Statements**   * Objects may break into smaller pieces, be put together into larger pieces, or change shapes. |
| C:\Users\sara.cooper.NDE\Desktop\Standards\StructureFunction.png**Structure and Function** – The way an object is shaped or structured determines many of its properties and functions. |
| **K-2 Crosscutting Statements**   * The shape and stability of structures of natural and designed objects are related to their function(s). |
| C:\Users\sara.cooper.NDE\Desktop\Standards\StabilityChange.png**Stability and Change** – For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand. |
| **K-2 Crosscutting Statements**   * Some things stay the same while other things change. * Things may change slowly or rapidly. |

\* Adapted from: National Research Council (2011). A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas. Committee on a Conceptual Framework for New K-12 Science Education Standards. Board on Science Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academy Press. Chapter 4: Crosscutting Concepts.

**K-2 Science and Engineering Practice Elements**

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| **Asking questions and defining problems** in K–2 builds on prior experiences and progresses to simple descriptive questions that can be tested.   * Ask questions based on observations to find more information about the   natural and/or designed world(s). * Ask and/or identify questions that can be answered by an investigation. * Define a simple problem that can be solved through the development of a new   or improved object or tool. | **Mathematical and computational thinking** in K–2 builds on prior experience and progresses to recognizing that mathematics can be used to describe the natural and designed world(s).   * Decide when to use qualitative vs. quantitative data. * Use counting and numbers to identify and describe patterns in the natural and  designed world(s). * Describe, measure, and/or compare quantitative attributes of different objects  and display the data using simple graphs. * Use quantitative data to compare two alternative solutions to a problem. |
| **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.   * Distinguish between a model and the actual object, process, and/or events the model represents. * Compare models to identify common features and differences. * Develop and/or use a model to represent amounts, relationships, relative   scales (bigger, smaller), and/or patterns in the natural and designed world(s). * Develop a simple model based on evidence to represent a proposed object or tool. | **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. * Use tools and/or materials to design and/or build a device that solves a specific problem or a solution to a specific problem. * Generate and/or compare multiple solutions to a problem. |
| **Planning and carrying out investigations** to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.   * With guidance, plan and conduct an investigation in collaboration with peers   (for K). * Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. * Evaluate different ways of observing and/or measuring a phenomenon to determine which way can answer a question. * Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons. * Make observations (firsthand or from media) and/or measurements of a proposed object or tool or solution to determine if it solves a problem or meets a goal. * Make predictions based on prior experiences. | **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).   * Identify arguments that are supported by evidence. * Distinguish between explanations that account for all gathered evidence and  those that do not. * Analyze why some evidence is relevant to a scientific question and some is  not. * Distinguish between opinions and evidence in one’s own explanations. * Listen actively to arguments to indicate agreement or disagreement based on  evidence, and/or to retell the main points of the argument. * Construct an argument with evidence to support a claim. * Make a claim about the effectiveness of an object, tool, or solution that is  supported by relevant evidence. |
| **Analyzing data** in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.   * Record information (observations, thoughts, and ideas). * Use and share pictures, drawings, and/or writings of observations. * Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems. * Compare predictions (based on prior experiences) to what occurred (observable events). * Analyze data from tests of an object or tool to determine if it works as intended. | **Obtaining, evaluating, and communicating information** in K–2 builds on prior experiences and uses observations and texts to communicate new information.   * Read grade-appropriate texts and/or use media to obtain scientific and/or  technical information to determine patterns in and/or evidence about the  natural and designed world(s). * Describe how specific images (e.g., a diagram showing how a machine works)  support a scientific or engineering idea. * 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 and/or supporting a scientific claim. * Communicate information or design ideas and/or solutions with others in oral  and/or written forms using models, drawings, writing, or numbers that provide  detail about scientific ideas, practices, and/or design ideas. |

\* Adapted from: National Research Council (2011). A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas. Committee on a Conceptual Framework for New K-12 Science Education Standards. Board on Science Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academy Press. Chapter 3: Science and Engineering Practices.

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| **Topic\Grade** | **K** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **HS** |
| **1** Forces & Interactions | **SC.K.1** |  |  | **SC.3.1** |  |  |  |  | **SC.8.1** | **SC.HS.1** |
| **2** Waves & Electro-magnetic Radiation |  | **SC.1.2** |  |  | **SC.4.2** |  |  |  | **SC.8.2** | **SC.HS.2** |
| **3** Structure & Properties of Matter |  |  | **SC.2.3** |  |  | **SC.5.3** |  | **SC.7.3** |  | **SC.HS.3** |
| **4** Energy |  |  |  |  | **SC.4.4** |  | **SC.6.4** |  | **SC.8.4** | **SC.HS.4** |
| **5** Chemical Reactions |  |  |  |  |  |  |  | **SC.7.5** |  | **SC.HS.5** |
| **6** Structure & Function |  | **SC.1.6** |  |  | **SC.4.6** |  | **SC.6.6** |  |  | **SC.HS.6** |
| **7** Inter-dependent Relationships in Ecosystems | **SC.K.7** |  | **SC.2.7** | **SC.3.7** |  |  |  | **SC.7.7** |  | **SC.HS.7** |
| **8** Matter & Energy in Organisms & Ecosystems |  |  |  |  |  | **SC.5.8** |  | **SC.7.8** |  | **SC.HS.8** |
| **9** Heredity: Inheritance & Variation of Traits |  |  |  | **SC.3.9** |  |  | **SC.6.9** |  | **SC.8.9** | **SC.HS.9** |
| **10** Biological Evolution |  |  |  |  |  |  |  |  | **SC.8.10** | **SC.HS.10** |
| **11** Space Systems |  | **SC.1.11** |  |  |  | **SC.5.11** |  |  | **SC.8.11** | **SC.HS.11** |
| **12** Weather & Climate | **SC.K.12** |  |  | **SC.3.12** |  |  | **SC.6.12** |  |  | **SC.HS.12** |
| **13** Earth’s Systems |  |  | **SC.2.13** |  | **SC.4.13** | **SC.5.13** | **SC.6.13** | **SC.7.13** |  | **SC.HS.13** |
| **14** History of Earth |  |  |  |  |  |  |  | **SC.7.14** | **SC.8.14** | **SC.HS.14** |
| **15** Sustainability |  |  |  |  |  |  |  |  |  | **SC.HS.15** |