

## GRADE 3

Grade 3 students are increasingly aware of their environment and have already discovered many patterns and processes in nature. Their capacity to process information is growing, making them eager to participate in scientific and engineering practices. Writing and mathematics skills are used when students communicate scientific information during varied instructional activities.

Students in Grade 3 learn disciplinary core ideas from the three scientific domains of Physical, Life, and Earth and Space Sciences while demonstrating their learning in the context of the content standards for this grade level. In Physical Science, students investigate, measure, and predict the motion of an object and test the cause-and-effect relationship of electric and magnetic interactions. In Life Science, students use evidence to interpret fossil data and construct explanations of an organism's ability to survive in different habitats. Students examine organisms' life cycles and traits and the influence of environment on these traits. In Earth and Space Science, students develop representations to describe weather and climate. The disciplinary core ideas of the Engineering, Technology, and Applications of Science (ETS) domain are integrated within the content standards of the three scientific domains and are denoted with an asterisk (\*).

Grade 3 content standards provide students with opportunities for investigation, observation, and interpretation of a variety of scientific phenomena. Through participation in specific engineering design challenges, they find solutions regarding how to use magnets to solve a simple design problem, how to solve problems created by environmental changes, and how to reduce the impact of weather-related hazards.

## **Grade 3: Forces and Interactions**

### **(Motion and Stability: Forces and Interactions)**

Students will:

AL.3.1 - Plan and carry out an experiment to determine the effects of balanced and unbalanced forces on the motion of an object using one variable at a time, including number, size, direction, speed, position, friction, or air resistance (e.g., balanced forces pushing from both sides on an object, such as a box, producing no motion; unbalanced force on one side of an object, such as a ball, producing motion), and communicate these findings graphically.

AL.3.2 - Investigate, measure, and communicate in a graphical format how an observed pattern of motion (e.g., a child swinging in a swing, a ball rolling back and forth in a bowl, two children teetering on a see-saw, a model vehicle rolling down a ramp of varying heights, a pendulum swinging) can be used to predict the future motion of an object.

AL.3.3 - Explore objects that can be manipulated in order to determine cause-and-effect relationships (e.g., distance between objects affecting strength of a force, orientation of magnets affecting direction of a magnetic force) of electric interactions between two objects not in contact with one another (e.g., force on hair from an electrically charged balloon, electrical forces between a charged rod and pieces of paper) or magnetic interactions between two objects not in contact with one another (e.g., force between two permanent magnets or between an electromagnet and steel paperclips, force exerted by one magnet versus the force exerted by two magnets).

AL.3.4 - Apply scientific ideas about magnets to solve a problem through an engineering design project (e.g., constructing a latch to keep a door shut, creating a device to keep two moving objects from touching each other such as a maglev system).\*

## Grade 3: Forces and Interactions

### (Motion and Stability: Forces and Interactions)

Students who demonstrate understanding can:

- 3-PS2-1**      **Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.** [Clarification Statement: Examples could include how an unbalanced force on one side of a ball can make it start moving; and, balanced forces pushing on a box from both sides will not produce any motion at all.] [Assessment Boundary: Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.]
- 3-PS2-2**      **Make observations and/or measurements of an object’s motion to provide evidence that a pattern can be used to predict future motion.** [Clarification Statement: Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl, and two children on a see-saw.] [Assessment Boundary: Assessment does not include technical terms such as period and frequency.]
- 3-PS2-3**      **Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.** [Clarification Statement: Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paperclips, and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause and effect relationships could include how the distance between objects affects strength of the force and how the orientation of magnets affects the direction of the magnetic force.] [Assessment Boundary: Assessment is limited to forces produced by objects that can be manipulated by students, and electrical interactions are limited to static electricity.]
- 3-PS2-4**      **Define a simple design problem that can be solved by applying scientific ideas about magnets.\*** [Clarification Statement: Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.]

## Grade 3: Forces and Interactions

### (Motion and Stability: Forces and Interactions)

The performance expectations were developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i> :		
<p style="text-align: center;"><b>Science and Engineering Practices</b></p> <p><b>Asking Questions and Defining Problems</b>  <u>Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.</u></p> <ul style="list-style-type: none"> <li>Ask questions that can be investigated based on <u>patterns such as cause and effect relationships.</u> (3-PS2-3)</li> <li>Define a simple problem that can be solved <u>through the development of a new or improved object or tool.</u> (3-PS2-4)</li> </ul> <p><b>Planning and Carrying Out Investigations</b>  <u>Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.</u></p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation <u>collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.</u> (3-PS2-1)</li> <li>Make observations and/or measurements to produce data to serve as the basis for evidence <u>for an explanation of a phenomenon or test a design solution.</u> (3-PS2-2)</li> </ul> <p style="text-align: center;">-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p><b>Science Knowledge is Based on Empirical Evidence</b></p> <ul style="list-style-type: none"> <li>Science findings are based on <u>recognizing patterns.</u> (3-PS2-2)</li> </ul> <p><b>Scientific Investigations Use a Variety of Methods</b></p> <ul style="list-style-type: none"> <li>Science investigations use a variety of <u>methods, tools, and techniques.</u> (3-PS2-1)</li> </ul>	<p style="text-align: center;"><b>Disciplinary Core Ideas</b></p> <p><b>PS2.A: Forces and Motion</b></p> <ul style="list-style-type: none"> <li><u>Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object’s speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level.)</u> (3-PS2-1)</li> <li>The patterns of an object’s motion in various situations can be <u>observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.)</u> (3-PS2-2)</li> </ul> <p><b>PS2.B: Types of Interactions</b></p> <ul style="list-style-type: none"> <li>Objects in contact exert forces on each other. (3-PS2-1)</li> <li>Electric, and magnetic forces between a pair of objects <u>do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other.</u> (3-PS2-3),(3-PS2-4)</li> </ul>	<p style="text-align: center;"><b>Crosscutting Concepts</b></p> <p><b>Patterns</b></p> <ul style="list-style-type: none"> <li><u>Patterns of change can be used to make predictions.</u> (3-PS2-2)</li> </ul> <p><b>Cause and Effect</b></p> <ul style="list-style-type: none"> <li><u>Cause and effect relationships are routinely identified.</u> (3-PS2-1)</li> <li><u>Cause and effect relationships are routinely identified, tested, and used to explain change.</u> (3-PS2-3)</li> </ul> <p style="text-align: center;">-----</p> <p style="text-align: center;"><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p><b>Interdependence of Science, Engineering, and Technology</b></p> <ul style="list-style-type: none"> <li>Scientific discoveries about the natural world can often lead to <u>new and improved technologies, which are developed through the engineering design process.</u> (3-PS2-4)</li> </ul>
<p><i>Connections to other DCIs in third grade: N/A</i></p> <p><i>Articulation of DCIs across grade-levels:</i>  <b><u>K.PS2.A</u></b> (3-PS2-1); <b><u>K.PS2.B</u></b> (3-PS2-1); <b><u>K.PS3.C</u></b> (3-PS2-1); <b><u>K.ETS1.A</u></b> (3-PS2-4); <b><u>1.ESS1.A</u></b> (3-PS2-2); <b><u>4.PS4.A</u></b> (3-PS2-2); <b><u>4.ETS1.A</u></b> (3-PS2-4); <b><u>5.PS2.B</u></b> (3-PS2-1); <b><u>MS.PS2.A</u></b> (3-PS2-1),(3-PS2-2); <b><u>MS.PS2.B</u></b> (3-PS2-3),(3-PS2-4); <b><u>MS.ESS1.B</u></b> (3-PS2-1),(3-PS2-2); <b><u>MS.ESS2.C</u></b> (3-PS2-1)</p>		
<p><i>Common Core State Standards Connections:</i></p> <p><i>ELA/Literacy -</i></p> <p><b><u>RI.3.1</u></b> Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-PS2-1),(3-PS2-3)</p> <p><b><u>RI.3.3</u></b> Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-PS2-3)</p> <p><b><u>RI.3.8</u></b> Describe the logical connection between particular sentences and paragraphs in a text (e.g., comparison, cause/effect, first/second/third in a sequence). (3-PS2-3)</p> <p><b><u>W.3.7</u></b> Conduct short research projects that build knowledge about a topic. (3-PS2-1),(3-PS2-2)</p> <p><b><u>W.3.8</u></b> Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-PS2-1),(3-PS2-2)</p> <p><b><u>SL.3.3</u></b> Ask and answer questions about information from a speaker, offering appropriate elaboration and detail. (3-PS2-3)</p>		

## Grade 3: Forces and Interactions

### (Motion and Stability: Forces and Interactions)

*Mathematics -*

**MP.2** Reason abstractly and quantitatively. (3-PS2-1)

**MP.5** Use appropriate tools strategically. (3-PS2-1)

**3.MD.A.2** Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (3-PS2-1)

\* The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

The section entitled "Disciplinary Core Ideas" is reproduced from *A Framework for K-12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas*. Integrated and reprinted with permission from the National Academy of Sciences.

## **Grade 3: Inheritance and Variation of Traits: Life Cycles and Traits**

**(From Molecules to Organisms: Structures and Processes)**

**(Heredity: Inheritance and Variation of Traits)**

**(Unity and Diversity)**

Students will:

AL.3.5 - Obtain and combine information to describe that organisms are classified as living things, rather than nonliving things, based on their ability to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.

AL.3.6 - Create representations to explain the unique and diverse life cycles of organisms other than humans (e.g., flowering plants, frogs, butterflies), including commonalities such as birth, growth, reproduction, and death.

AL.3.7 - Examine data to provide evidence that plants and animals, excluding humans, have traits inherited from parents and that variations of these traits exist in groups of similar organisms (e.g., flower colors in pea plants, fur color and pattern in animal offspring).

AL.3.8 - Engage in argument from evidence to justify that traits can be influenced by the environment (e.g., stunted growth in normally tall plants due to insufficient water, change in an arctic fox's fur color due to light and/or temperature, stunted growth of a normally large animal due to malnourishment).

## Grade 3: Inheritance and Variation of Traits: Life Cycles and Traits

(From Molecules to Organisms: Structures and Processes)

(Heredity: Inheritance and Variation of Traits)

(Unity and Diversity)

Students who demonstrate understanding can:

- 3-LS1-1**      **Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.** [Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]
- 3-LS3-1**      **Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.** [Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.] [Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.]
- 3-LS3-2**      **Use evidence to support the explanation that traits can be influenced by the environment.** [Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.]
- 3-LS4-2**      **Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.** [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.]

# Grade 3: Inheritance and Variation of Traits: Life Cycles and Traits

(From Molecules to Organisms: Structures and Processes)

(Heredity: Inheritance and Variation of Traits)

(Unity and Diversity)

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

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><b>Developing and Using Models</b> Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.</p> <ul style="list-style-type: none"> <li>Develop models to describe phenomena. (3-LS1-1)</li> </ul> <p><b>Analyzing and Interpreting Data</b> Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.</p> <ul style="list-style-type: none"> <li>Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1)</li> </ul> <p><b>Constructing Explanations and Designing Solutions</b> Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.</p> <ul style="list-style-type: none"> <li>Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2)</li> <li>Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2)</li> </ul> <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p><b>Scientific Knowledge is Based on Empirical Evidence</b></p> <ul style="list-style-type: none"> <li>Science findings are based on recognizing patterns. (3-LS1-1)</li> </ul>	<p><b>LS1.B: Growth and Development of Organisms</b></p> <ul style="list-style-type: none"> <li>Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)</li> </ul> <p><b>LS3.A: Inheritance of Traits</b></p> <ul style="list-style-type: none"> <li>Many characteristics of organisms are inherited from their parents. (3-LS3-1)</li> <li>Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3-LS3-2)</li> </ul> <p><b>LS3.B: Variation of Traits</b></p> <ul style="list-style-type: none"> <li>Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)</li> <li>The environment also affects the traits that an organism develops. (3-LS3-2)</li> </ul> <p><b>LS4.B: Natural Selection</b></p> <ul style="list-style-type: none"> <li>Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)</li> </ul>	<p><b>Patterns</b></p> <ul style="list-style-type: none"> <li>Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1)</li> <li>Patterns of change can be used to make predictions. (3-LS1-1)</li> </ul> <p><b>Cause and Effect</b></p> <ul style="list-style-type: none"> <li>Cause and effect relationships are routinely identified and used to explain change. (3-LS3-2),(3-LS4-2)</li> </ul>
<p><i>Connections to other DCIs in third grade:</i> <b>3.LS4.C</b> (3-LS4-2)</p>		
<p><i>Articulation of DCIs across grade-levels:</i> <b>1.LS3.A</b> (3-LS3-1),(3-LS4-2); <b>1.LS3.B</b> (3-LS3-1); <b>MS.LS1.B</b> (3-LS1-1),(3-LS3-2); <b>MS.LS3.A</b> (3-LS3-1); <b>MS.LS2.A</b> (3-LS4-2); <b>MS.LS3.A</b> (3-LS3-1); <b>MS.LS3.B</b> (3-LS3-1),(3-LS4-2); <b>MS.LS4.B</b> (3-LS4-2)</p>		
<p><i>Common Core State Standards Connections:</i> <i>ELA/Literacy</i> —</p> <p><b>RI.3.1</b> Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS3-1),(3-LS3-2),(3-LS4-2)</p> <p><b>RI.3.2</b> Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS3-1),(3-LS3-2),(3-LS4-2)</p> <p><b>RI.3.3</b> Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS3-1),(3-LS3-2),(3-LS4-2)</p> <p><b>RI.3.7</b> Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). (3-LS1-1)</p> <p><b>W.3.2</b> Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS3-1),(3-LS3-2),(3-LS4-2)</p> <p><b>SL.3.4</b> Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS3-1),(3-LS3-2),(3-LS4-2)</p> <p><b>SL.3.5</b> Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details. (3-LS1-1)</p>		



**Grade 3: Inheritance and Variation of Traits: Life Cycles and Traits**  
**(From Molecules to Organisms: Structures and Processes)**  
**(Heredity: Inheritance and Variation of Traits)**  
**(Unity and Diversity)**

*Mathematics —*

**MP.2** Reason abstractly and quantitatively. (3-LS3-1),(3-LS3-2),(3-LS4-2)

**MP.4** Model with mathematics. (3-LS1-1),(3-LS3-1),(3-LS3-2),(3-LS4-2)

**3.NBT** Number and Operations in Base Ten (3-LS1-1)

**3.NF** Number and Operations—Fractions (3-LS1-1)

**3.MD.B.3** Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. (3-LS4-2)

**3.MD.B.4** Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. (3-LS3-1),(3-LS3-2)

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## **Grade 3: Interdependent Relationships in Ecosystems: Environmental Impacts on Organisms**

### **(Interdependent Relationships in Ecosystems: Environmental Impacts on Organisms)**

Students will:

AL.3.9 - Analyze and interpret data from fossils (e.g., type, size, distribution) to provide evidence of organisms and the environments in which they lived long ago (e.g., marine fossils on dry land, tropical plant fossils in arctic areas, fossils of extinct organisms in any environment).

AL.3.10 - Investigate how variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing (e.g., plants having larger thorns being less likely to be eaten by predators, animals having better camouflage coloration being more likely to survive and bear offspring).

AL.3.11 - Construct an argument from evidence to explain the likelihood of an organism's ability to survive when compared to the resources in a certain habitat (e.g., freshwater organisms survive well, less well, or not at all in saltwater; desert organisms survive well, less well, or not at all in woodlands).

- a. Construct explanations that forming groups helps some organisms survive.
- b. Create models that illustrate how organisms and their habitats make up a system in which depend on each other.
- c. Categorize resources in various habitats as basic materials (e.g., sunlight, air, freshwater, soil), produced materials (e.g., food, fuel, shelter), or as nonmaterial (e.g., safety, instinct, nature-learned behaviors).

AL.3.12 - Evaluate engineered solutions to a problem created by environmental changes and any resulting impacts on the types and density of plant and animal populations living in the environment (e.g., replanting of sea oats in coastal areas due to destruction by hurricanes, creating property development restrictions in vacation areas to reduce displacement and loss of native animal populations).\*

## Grade 3: Interdependent Relationships in Ecosystems: Environmental Impacts on Organisms

### (Interdependent Relationships in Ecosystems: Environmental Impacts on Organisms)

Students who demonstrate understanding can:

- 3-LS2-1**      **Construct an argument that some animals form groups that help members survive.**
- 3-LS4-1**      **Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.** *[Clarification Statement: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.] [Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.]*
- 3-LS4-3**      **Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.** *[Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]*
- 3-LS4-4**      **Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.\*** *[Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.] [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.]*

# Grade 3: Interdependent Relationships in Ecosystems: Environmental Impacts on Organisms

## (Interdependent Relationships in Ecosystems: Environmental Impacts on Organisms)

The performance expectations were developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i> :		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><b>Analyzing and Interpreting Data</b> Analyzing data in 3–5 builds on K–2 experiences and progresses to <u>introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.</u></p> <ul style="list-style-type: none"> <li>Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1)</li> </ul> <p><b>Engaging in Argument from Evidence</b> <u>Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).</u></p> <ul style="list-style-type: none"> <li>Construct an argument with evidence, data, and/or a model. (3-LS2-1)</li> <li>Construct an argument with evidence. (3-LS4-3)</li> <li>Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4)</li> </ul>	<p><b>LS2.C: Ecosystem Dynamics, Functioning, and Resilience</b></p> <ul style="list-style-type: none"> <li>When the environment changes in ways that affect a place’s physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. <i>(secondary to 3-LS4-4)</i></li> </ul> <p><b>LS2.D: Social Interactions and Group Behavior</b></p> <ul style="list-style-type: none"> <li>Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size <i>(Note: Moved from K–2)</i>. (3-LS2-1)</li> </ul> <p><b>LS4.A: Evidence of Common Ancestry and Diversity</b></p> <ul style="list-style-type: none"> <li>Some kinds of plants and animals that once lived on Earth are no longer found anywhere. <i>(Note: moved from K-2)</i> (3-LS4-1)</li> <li>Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)</li> </ul> <p><b>LS4.C: Adaptation</b></p> <ul style="list-style-type: none"> <li>For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)</li> </ul> <p><b>LS4.D: Biodiversity and Humans</b></p> <ul style="list-style-type: none"> <li>Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)</li> </ul>	<p><b>Cause and Effect</b></p> <ul style="list-style-type: none"> <li>Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1),(3-LS4-3)</li> </ul> <p><b>Scale, Proportion, and Quantity</b></p> <ul style="list-style-type: none"> <li>Observable phenomena exist from very short to very long time periods. (3-LS4-1)</li> </ul> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>A system can be described in terms of its components and their interactions. (3-LS4-4)</li> </ul> <hr/> <p><i>Connections to Engineering, Technology and Applications of Science</i></p> <p><b>Interdependence of Engineering, Technology, and Science on Society and the Natural World</b></p> <ul style="list-style-type: none"> <li>Knowledge of relevant scientific concepts and research findings is important in engineering. (3-LS4-4)</li> </ul> <hr/> <p><i>Connections to Nature of Science</i></p> <p><b>Scientific Knowledge Assumes an Order and Consistency in Natural Systems</b></p> <ul style="list-style-type: none"> <li>Science assumes consistent patterns in natural systems. (3-LS4-1)</li> </ul>
<p><i>Connections to other DCIs in third grade:</i> <b>3.ESS2.D</b> (3-LS4-3); <b>3.ESS3.B</b> (3-LS4-4)</p>		
<p><i>Articulation of DCIs across grade-levels:</i> <b>K.ESS3.A</b> (3-LS4-3),(3-LS4-4); <b>K.ETS1.A</b> (3-LS4-4); <b>1.LS1.B</b> (3-LS2-1); <b>2.LS2.A</b> (3-LS4-3),(3-LS4-4); <b>2.LS4.D</b> (3-LS4-3),(3-LS4-4); <b>4.ESS1.C</b> (3-LS4-1); <b>4.ESS3.B</b> (3-LS4-4); <b>4.ETS1.A</b> (3-LS4-4); <b>MS.LS2.A</b> (3-LS2-1),(3-LS4-1),(3-LS4-3),(3-LS4-4); <b>MS.LS2.C</b> (3-LS4-4); <b>MS.LS4.A</b> (3-LS4-1); <b>MS.LS4.B</b> (3-LS4-3); <b>MS.LS4.C</b> (3-LS4-3),(3-LS4-4); <b>MS.ESS1.C</b> (3-LS4-1),(3-LS4-3),(3-LS4-4); <b>MS.ESS2.B</b> (3-LS4-1); <b>MS.ESS3.C</b> (3-LS4-4)</p>		
<p><i>Common Core State Standards Connections:</i> <i>ELA/Literacy</i> —</p> <p><b>RI.3.1</b> Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS2-1),(3-LS4-1),(3-LS4-3),(3-LS4-4)</p> <p><b>RI.3.2</b> Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS4-1),(3-LS4-3),(3-LS4-4)</p> <p><b>RI.3.3</b> Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS2-1),(3-LS4-1),(3-LS4-3),(3-LS4-4)</p> <p><b>W.3.1</b> Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS2-1),(3-LS4-1),(3-LS3-3),(3-LS4-4)</p> <p><b>W.3.2</b> Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS4-1),(3-LS3-3),(3-LS3-4)</p> <p><b>W.3.8</b> Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-LS4-1)</p>		

## Grade 3: Interdependent Relationships in Ecosystems: Environmental Impacts on Organisms

### (Interdependent Relationships in Ecosystems: Environmental Impacts on Organisms)

<b>SL.3.4</b>	<u>Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.</u> (3-LS4-3),(3-LS4-4)
<i>Mathematics —</i>	
<b>MP.2</b>	<u>Reason abstractly and quantitatively.</u> (3-LS4-1),(3-LS4-3),(3-LS4-4)
<b>MP.4</b>	<u>Model with mathematics.</u> (3-LS2-1),(3-LS4-1),(3-LS4-3),(3-LS4-4)
<b>MP.5</b>	<u>Use appropriate tools strategically.</u> (3-LS4-1)
<b>3.NBT</b>	<u>Number and Operations in Base Ten.</u> (3-LS2-1)
<b>3.MD.B.3</b>	<u>Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.</u> (3-LS4-3)
<b>3.MD.B.4</b>	<u>Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.</u> (3-LS4-1)

\* The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

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## Grade 3: Weather and Climate

(Earth's Systems)

(Earth and Human Activity)

Students will:

AL.3.13 - Display data graphically and in tables to describe typical weather conditions expected during a particular season (e.g., average temperature, precipitation, wind direction).

AL.3.14 - Collect information from a variety of sources to describe climates in different regions of the world.

AL.3.15 - Evaluate a design solution (e.g., flood barriers, wind resistant roofs, lightning rods) that reduces the impact of a weather-related hazard.

Students who demonstrate understanding can:

- 3-ESS2-1** **Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.** *[Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction.] [Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.]*
- 3-ESS2-2** **Obtain and combine information to describe climates in different regions of the world.**
- 3-ESS3-1** **Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.\*** *[Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.]*

**Grade 3: Weather and Climate**  
**(Earth's Systems)**  
**(Earth and Human Activity)**

<p>The performance expectations were developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i>:</p>		
<p><b>Science and Engineering Practices</b></p>	<p><b>Disciplinary Core Ideas</b></p>	<p><b>Crosscutting Concepts</b></p>
<p><b>Analyzing and Interpreting Data</b>  Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.</p> <ul style="list-style-type: none"> <li>Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. (3-ESS2-1)</li> </ul> <p><b>Engaging in Argument from Evidence</b>  Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world (s).</p> <ul style="list-style-type: none"> <li>Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-ESS3-1)</li> </ul> <p><b>Obtaining, Evaluating, and Communicating Information</b>  Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.</p> <ul style="list-style-type: none"> <li>Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2)</li> </ul>	<p><b>ESS2.D: Weather and Climate</b></p> <ul style="list-style-type: none"> <li>Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)</li> <li>Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)</li> </ul> <p><b>ESS3.B: Natural Hazards</b></p> <ul style="list-style-type: none"> <li>A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) <i>(Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.)</i></li> </ul>	<p><b>Patterns</b></p> <ul style="list-style-type: none"> <li>Patterns of change can be used to make predictions. (3-ESS2-1),(3-ESS2-2)</li> </ul> <p><b>Cause and Effect</b></p> <ul style="list-style-type: none"> <li>Cause and effect relationships are routinely identified, tested, and used to explain change. (3-ESS3-1)</li> </ul> <p>-----</p> <p><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p><b>Influence of Engineering, Technology, and Science on Society and the Natural World</b></p> <ul style="list-style-type: none"> <li>Engineers improve existing technologies or develop new ones to increase their benefits (e.g., better artificial limbs), decrease known risks (e.g., seatbelts in cars), and meet societal demands (e.g., cell phones). (3-ESS3-1)</li> </ul> <p>-----</p> <p><i>Connections to Nature of Science</i></p> <p><b>Science is a Human Endeavor</b></p> <ul style="list-style-type: none"> <li>Science affects everyday life. (3-ESS3-1)</li> </ul>
<p><i>Connections to other DCIs in third grade: N/A</i></p>		
<p><i>Articulation of DCIs across grade-levels:</i>  <b>K.ESS2.D</b> (3-ESS2-1); <b>K.ESS3.B</b> (3-ESS3-1); <b>K.ETS1.A</b> (3-ESS3-1); <b>4.ESS2.A</b> (3-ESS2-1); <b>4.ESS3.B</b> (3-ESS3-1); <b>4.ETS1.A</b> (3-ESS3-1); <b>5.ESS2.A</b> (3-ESS2-1); <b>MS.ESS2.C</b> (3-ESS2-1),(3-ESS2-2); <b>MS.ESS2.D</b> (3-ESS2-1),(3-ESS2-2); <b>MS.ESS3.B</b> (3-ESS3-1)</p>		
<p><i>Common Core State Standards Connections:</i></p> <p><i>ELA/Literacy —</i></p> <p><b>RI.3.1</b> Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-ESS2-2),(3-ESS3-1)</p> <p><b>RI.3.9</b> Compare and contrast the most important points and key details presented in two texts on the same topic. (3-ESS2-2)</p> <p><b>W.3.1</b> Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-ESS3-1)</p> <p><b>W.3.7</b> Conduct short research projects that build knowledge about a topic. (3-ESS3-1)</p> <p><b>W.3.8</b> Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-ESS2-2)</p> <p><i>Mathematics —</i></p> <p><b>MP.2</b> Reason abstractly and quantitatively. (3-ESS2-1),(3-ESS2-2),(3-ESS3-1)</p> <p><b>MP.4</b> Model with mathematics. (3-ESS2-1),(3-ESS2-2),(3-ESS3-1)</p> <p><b>MP.5</b> Use appropriate tools strategically. (3-ESS2-1)</p> <p><b>3.MD.A.2</b> Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (3-ESS2-1)</p> <p><b>3.MD.B.3</b> Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in bar graphs. (3-ESS2-1)</p>		

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## Grade 3: Engineering Design

Engineering, technology, and science core disciplinary ideas are integrated into grade level science performance expectations.

Students will:

AL.3.4 - Apply scientific ideas about magnets to solve a problem through an engineering design project (e.g., constructing a latch to keep a door shut, creating a device to keep two moving objects from touching each other such as a maglev system).\*

AL.3.12 - Evaluate engineered solutions to a problem created by environmental changes and any resulting impacts on the types and density of plant and animal populations living in the environment (e.g., replanting of sea oats in coastal areas due to destruction by hurricanes, creating property development restrictions in vacation areas to reduce displacement and loss of native animal populations).\*

AL.3.15 - Evaluate a design solution (e.g., flood barriers, wind resistant roofs, lightning rods) that reduces the impact of a weather-related hazard.\*

Students who demonstrate understanding can:

- 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.**
- 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.**
- 3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.**



## Grade 3: Engineering Design

Engineering, technology, and science core disciplinary ideas are integrated into grade level science performance expectations.

The performance expectations were developed using the following elements from the NRC document <i>A Framework for K- 12 Science Education</i> :		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><b><u>Asking Questions and Defining Problems</u></b> Asking questions and defining problems in 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships.</p> <ul style="list-style-type: none"> <li>Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)</li> </ul> <p><b><u>Planning and Carrying Out Investigations</u></b> Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.</p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-5-ETS1-3)</li> </ul> <p><b><u>Constructing Explanations and Designing Solutions</u></b> Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.</p> <ul style="list-style-type: none"> <li>Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)</li> </ul>	<p><b><u>ETS1.A: Defining and Delimiting Engineering Problems</u></b></p> <ul style="list-style-type: none"> <li>Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)</li> </ul> <p><b><u>ETS1.B: Developing Possible Solutions</u></b></p> <ul style="list-style-type: none"> <li>Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)</li> <li>At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)</li> <li>Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)</li> </ul> <p><b><u>ETS1.C: Optimizing the Design Solution</u></b></p> <ul style="list-style-type: none"> <li>Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)</li> </ul>	<p><b><u>Influence of Science, Engineering, and Technology on Society and the Natural World</u></b></p> <ul style="list-style-type: none"> <li>People’s needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)</li> <li>Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS1-2)</li> </ul>
<p><i>Connections to 3-5-ETS1.A: Defining and Delimiting Engineering Problems include:</i>  <b>Fourth Grade: 4-PS3-4</b></p> <p><i>Connections to 3-5-ETS1.B: Developing Possible Solutions Problems include:</i>  <b>Fourth Grade: 4-ESS3-2</b></p> <p><i>Connections to K-2-ETS1.C: Optimizing the Design Solution include:</i>  <b>Fourth Grade: 4-PS4-3</b></p>		
<p><i>Articulation of DCIs across grade-levels:</i>  <b><u>K-2.ETS1.A</u></b> (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3); <b><u>K-2.ETS1.B</u></b> (3-5-ETS1-2); <b><u>K-2.ETS1.C</u></b> (3-5-ETS1-2),(3-5-ETS1-3); MS.ETS1.A (3-5-ETS1-1); <b><u>MS.ETS1.B</u></b> (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3); <b><u>MS.ETS1.C</u></b> (3-5-ETS1-2),(3-5-ETS1-3)</p>		
<p><i>Common Core State Standards Connections:</i>  <b>ELA/Literacy -</b></p> <p><b><u>RI.5.1</u></b> Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (3-5-ETS1-2)</p> <p><b><u>RI.5.1</u></b> Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (3-5-ETS1-2)</p> <p><b><u>RI.5.9</u></b> Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (3-5-ETS1-2)</p> <p><b><u>W.5.7</u></b> Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (3-5-ETS1-1),(3-5-ETS1-3)</p> <p><b><u>W.5.8</u></b> Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (3-5-ETS1-1),(3-5-ETS1-3)</p> <p><b><u>W.5.9</u></b> Draw evidence from literary or informational texts to support analysis, reflection, and research. (3-5-ETS1-1),(3-5-ETS1-3)</p>		

## Grade 3: Engineering Design

Engineering, technology, and science core disciplinary ideas are integrated into grade level science performance expectations.

*Mathematics -*

<b>3.OA</b>	Operations and Algebraic Thinking (3-ETS1-1),(3-ETS1-2)
<b>MP.2</b>	Reason abstractly and quantitatively. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3)
<b>MP.4</b>	Model with mathematics. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3)
<b>MP.5</b>	Use appropriate tools strategically. (3-5-ETS1-1),(3-5-ETS1-2),(3-5-ETS1-3)
<b>3-5.OA</b>	Operations and Algebraic Thinking (3-ETS1-1),(3-ETS1-2)

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