

## **Second Grade Science**

### **Course Description (Storyline):**

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

### **Course Rationale:**

Knowledge of science, as well as engineering and technology (as stated in the Next Generation Science Standards), is critical in preparing all students for higher education and jobs of the future as well as becoming informed, voting citizens. In addition, students need to gain substance in reading, writing, and figuring math solutions which allows for natural integration within the sciences. It is of critical importance to instill a high interest and knowledge of science so all students can succeed in a technologically advanced, global society whether they choose to pursue college or the workforce upon graduation.

**First Quarter**

Level: **2**

Content: **Elementary Science**

Standard, Title, Code: **2.PS1 Matter and its Interactions**

<b>Major Measureable Objective:</b>	
2.PS1 Matter and Its Interactions	
<b><u>Know (disciplinary core ideas)</u></b>  PS1.A: Structure and Properties of Matter <ul style="list-style-type: none"><li>Different properties are suited to different purposes (2PS1-a)</li><li>Objects or samples of a substance can be weighed, and their size can be described and measured. (Boundary; volume is introduced only for liquid measure.) (2-PS1-c)</li><li>A great variety of objects can be built up from a small set of pieces (e.g. blocks, construction sets) (2-PS1-b)</li></ul>	<b><u>Do (performance expectations)</u></b>  (2-PS1-a) Analyze data from testing objects made from different materials to determine if a proposed object functions as intended.  (2-PS1-c) Analyze data from tests of a student-designed tool to determine if the tool measures weight or size accurately, compared to standard measuring tools.  (2PS1-b) Design an object built from a small set of pieces to solve a problem and compare solutions designed by peers given the same set of pieces.
<b>Previous Knowledge Needed</b> Properties of Matter (Kg & 2 <sup>nd</sup> )	<b>Additional Concepts</b> <ul style="list-style-type: none"><li>Tools can help us make observations and perform measurements.</li><li>Knowing which tools to use for each type of measurement.</li></ul>
<b>ELA integration</b> <ul style="list-style-type: none"><li>Write to describe the reasons why different properties are suited for different purposes.</li><li>Compare and contrast how the object they built relates to an example or another student's work.</li><li>Review letter writing.</li></ul>	<b>Math integration</b>  Measurement: <ul style="list-style-type: none"><li>Use appropriate tools strategically.</li><li>Attend to precision.</li><li>Draw a picture graph and a bar graph to represent the data. For example, graph results of weighed measurements.</li></ul>

Level: **2**

Content: Elementary Science

Standard, Title, Code: 2.PS1 Matter and its Interactions

<b>Major Measureable Objective:</b>	
2.PS1 Matter and Its Interactions	
<b><u>Know (disciplinary core ideas)</u></b>  PS1.B: Chemical Reactions <ul style="list-style-type: none"><li>Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible (e.g., melting and freezing), and sometimes they are not (e.g., baking a cake, burning fuel) (2PS1-d)</li></ul>	<b><u>Do (performance expectations)</u></b>  (2PS1-d) Identify arguments that are supported by evidence that some changes caused by heating or cooling can be reversed and some cannot.
<b>Previous Knowledge Needed</b>	<b>Additional Concepts</b> <ul style="list-style-type: none"><li>Vocabulary (such as melting, freezing, burning, heating, cooling)</li></ul>
<b>ELA integration</b> <ul style="list-style-type: none"><li>Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report, record scientific observations)</li><li>Compare and contrast what causes substance changes to be reversible versus irreversible.</li></ul>	<b>Math integration</b> <ul style="list-style-type: none"><li>Construct viable arguments and critique the reasoning of others. (e.g., a student predicts that if you put something in the oven, it will have an irreversible change. Do you agree? Why?)</li></ul>

## **Second Quarter**

**Level: 2**

**Content: Elementary Science**

**Standard, Title, Code: 2.PS2 Motion and Stability: Forces and Interactions**

<b>Major Measureable Objective:</b> 2.PS2 Motion and Stability: Forces and Interactions	
<p><b><u>Know (disciplinary core ideas)</u></b></p> <p>PS2-A: Forces and Motion</p> <ul style="list-style-type: none"><li>• Objects pull or push each other whether they collide or are connected.(2-PS2-a)</li><li>• Pushes and pulls can have different strengths and directions. (2-PS2-b, 2-PS2-a, 2-PS2-c)</li><li>• Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (2-PS2-b)</li></ul> <p>PS2.B – Types of Interactions</p> <ul style="list-style-type: none"><li>• When objects touch or collide, they push on one another and can change motion or shape.(2PS2-a)</li></ul> <p>PS2.C – Stability and Instability in Physical Systems</p> <ul style="list-style-type: none"><li>• Whether an object stays still or moves often depends on the effects of multiple pushes and pulls on it (e.g., multiple players trying to pull an object in different directions). It is useful to investigate, what pushes and pulls keep something in place (e.g., a ball on a slope, a ladder leaning on a wall) as well as what makes something change or move.(2.PS2-b)</li></ul>	<p><b><u>Do (performance expectations)</u></b></p> <p>(2-PS2-a) Design and conduct investigations of objects moving at different speeds to compare the change of an object’s motion and shape before and after a collision.</p> <p>(2-PS2-b) Carry out investigations to provide evidence that an object may stay in one place, move, or change shape when pushed or pulled.</p> <p>(2 PS2-c) Make a claim about the effectiveness of a solution that applies a push or a pull to change the speed or direction of an object to solve a problem.</p>
<p><b>Previous Knowledge Needed</b></p> <p>None</p>	<p><b>Additional Concepts</b></p> <ul style="list-style-type: none"><li>• Directionality-moves such as straight, zig-zag, round and round, back and forth, and fast and slow.</li></ul>

Level: **2**

Content: Elementary Science

Standard, Title, Code: 2.PS3 Energy

<b>Major Measureable Objective:</b>	
2.PS3 Energy	
<p><b>Know (disciplinary core ideas)</b></p> <p>PS3.D: Energy in Chemical Processes and Everyday Life</p> <ul style="list-style-type: none"><li>When two objects rub against each other this interaction is called friction. Friction between two surfaces can warm both of them (e.g., rubbing hands together). There are ways to reduce the friction between two objects. (2PS3-a), (2PS3-b)</li></ul> <p>PS2.A: Forces and Motion</p> <ul style="list-style-type: none"><li>An object sliding on a surface or sitting on a slope experiences a pull due to friction on the object due to the surface that opposes the object's motion. (secondary 2-PS3-a) (Secondary 2-PS3-b)</li></ul> <p>ETS1.A: Defining Engineering Problems</p> <ul style="list-style-type: none"><li>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 2-PS3-b)</li></ul>	<p><b>Do (performance expectations)</b></p> <p>(2-PS3- a) Carry out investigations to determine the relationship among friction, motion, and the warming of objects.</p> <p>(2-PS3- b) Define a problem caused by either too much or too little friction between two objects and develop solutions that address the problem.</p>
<p><b>Previous Knowledge Needed</b></p> <p>None</p>	<p><b>Additional Concepts</b></p> <p>None</p>
<p><b>ELA integration</b></p> <ul style="list-style-type: none"><li>Writing topics:<ul style="list-style-type: none"><li>Describe the connection between friction and motion.</li><li>Evaluate specific design features that reduce or increase friction.</li></ul></li><li>Research and write about a problem that involves friction that people want to change. Write a solution to solve that problem.</li></ul>	<p><b>Math integration</b></p> <ul style="list-style-type: none"><li>Measurement:<ul style="list-style-type: none"><li>Measure the distance an object has traveled using appropriate tools.</li><li>Estimate distances traveled.</li><li>Measure to determine how much further an object travels compared to another.</li></ul></li><li>Make sense of problems and persevere in solving them (e.g.,</li></ul>

## Third Quarter

Level: **2**

Content: Elementary Science

Standard, Title, Code: 2.ESS2 Earth Systems

<b>Major Measureable Objective:</b>	
2 ESS2 Earth Systems	
<b><u>Know (disciplinary core ideas)</u></b>	<b><u>Do (performance expectations)</u></b>
<p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"><li>• Wind and water can change the shape of the land. The resulting landforms, together with the materials on the land, provide homes for living things. (2-ESS2-a, 2-ESS2-b, 2-ESS2-c, 2-ESS2-d)</li></ul> <p>ESS2.B: Plate Tectonics and Large-Scale System Interactions</p> <ul style="list-style-type: none"><li>• Rocks, soils, and sand are present in most areas where plants and animals live. There may also be rivers, streams, lakes, and ponds. Maps show where living things are located. One can map the shapes and kinds of land and water; in any area. (2-ESS2-e, 2-ESS2-a)</li></ul> <p>ESS2.C: The Roles of Water in Earth's Surface Processes</p> <ul style="list-style-type: none"><li>• Water is found in the ocean, rivers, lakes and ponds. Water exists as solid ice and in liquid form. It carries soil and rocks from one place to another and determines the variety of life forms that can live in a particular location. (2-ESS2-f)</li></ul>	<p>(2-ESS2-f) Use observations to construct explanations that water exists in different forms in natural landscapes, determining the variety of life forms that live in a particular location.</p> <p>(2-ESS2-e) Develop and use models to describe patterns of kinds and shapes of landforms and of bodies of water.</p> <p>(2-ESS2-a) Use observations to construct explanations about how landforms and bodies of water provide homes for living things.</p>
<b>Previous Knowledge Needed</b>	<b>Additional Concepts</b>
<ul style="list-style-type: none"><li>• Types of weather (Kg)</li></ul>	<ul style="list-style-type: none"><li>• Habitats</li></ul>
<b>ELA integration</b>	<b>Math integration</b>
<ul style="list-style-type: none"><li>• Write informative/explanatory texts in which they introduce a topic, use</li></ul>	<ul style="list-style-type: none"><li>• Use patterns from observations to draw conclusions.</li></ul>

Level: **2**

Content: Elementary Science

Standard, Title, Code: 2.ESS2 Earth's Systems

<b>Major Measureable Objective:</b>	
2 ECS Earth's Changing Surface	
<b><u>Know (disciplinary core ideas)</u></b>	<b><u>Do (performance expectations)</u></b>
<p>ESS1.C: The History of Planet Earth</p> <ul style="list-style-type: none"><li>Some events, like an earthquake, happen very quickly; others, such as the formation of the Grand Canyon, occur very slowly, over a time period much longer than one can observe. (2-ESS2-b)</li></ul> <p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"><li>Wind and water can change the shape of the land. The resulting landforms, together with the materials on the land, provide homes for living things (2-ESS2-b, 2-ESS2-c, 2-ESS2-d)</li></ul> <p>ETS1.B: Developing Possible Solutions</p> <ul style="list-style-type: none"><li>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-ESS2-d)</li></ul> <p>ETS1.C: Optimizing the Design Solution</p> <ul style="list-style-type: none"><li>Because there is always more than one possible solution to a problem, it is useful to compare designs, test them, and discuss their strengths and weaknesses. (secondary to 2-ESS2-c) (secondary to ESS2-d)</li></ul>	<p>(2-ESS2-b) Develop models to investigate how wind and water can move Earth materials from one place to another and change the shape of the land quickly or slowly.</p> <p>(2-ESS2-c) Communicate information about possible design solutions to the loss of homes on land for living things resulting from wind or water resulting in change in the shape of the land.</p> <p>(2-ESS2-d) Use drawings and physical models to test, compare strengths and weaknesses, and communicate design solutions that slow or prevent wind and/ or water from changing the shape of the land.</p>
<b>Previous Knowledge Needed</b>	<b>Additional Concepts</b>
<ul style="list-style-type: none"><li>Effect of sunlight on natural materials on Earth's surface (Kg)</li></ul>	<ul style="list-style-type: none"><li>Measurement</li><li>Data collection</li><li>Erosion</li></ul>

## **Fourth Quarter**

**Level: 2**

**Content: Elementary Science**

**Standard, Title, Code: 2.LS2 Ecosystem: Interactions, Energy, and Dynamics**

<b>Major Measureable Objective:</b> Ecosystems: Interactions, Energy, and Dynamics	
<b>Know (disciplinary core ideas)</b>	<b>Do (performance expectations)</b>
<p>LS2-A: Interdependent Relationships to Ecosystems</p> <ul style="list-style-type: none"><li>• Animals depend on their surroundings to get what they need, including food, water, shelter, and a favorable temperature. Animals depend on plants or other animals for food. (2-LS2-a)</li><li>• Plants depend on air, water, minerals (in the soil), and light to grow. (2-LS2-a)</li><li>• Different plants survive better in different settings because they have varied needs for water, minerals, and sunlight. (2-LS2-a)</li></ul> <p>LS2.B: Cycles of Matter and Energy Transfer in Ecosystems</p> <ul style="list-style-type: none"><li>• Organisms obtain the materials they need to grow and survive from the environment. Many of these materials come from organisms, and are used again by other organisms. (2-LS2-a)</li></ul> <p>LS4.C: Adaptation</p> <ul style="list-style-type: none"><li>• Living things can survive only where their needs are met. If some places are too hot or too cold or have too little water or food, plants and animals may not be able to live there. (secondary to 2-LS2-a/ secondary to 2-LS2-c)</li></ul>	<p>(2-LS2-a) Develop and use models to compare how living things depend on their surroundings to meet their needs in the places they live.</p>



<p><b>Previous Knowledge Needed</b></p> <ul style="list-style-type: none"> <li>• 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. (kg)</li> <li>• Living things need water, air, and resources from the land, and they try to live in places that have the things they need. Humans use natural resources for everything they do: for examples, they use soil and water to grow food, wood to burn to provide heat or to build shelters, and materials such as iron or copper extracted from the earth to make cooking pans. (kg)</li> <li>• 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-for example, by reducing trash through reuse and recycling. (kg)</li> <li>• Plants and animals have predictable characteristics at different stages of development. Plants and animals grow and change. (1<sup>st</sup>)</li> </ul>	<p><b>Additional Concepts</b></p> <ul style="list-style-type: none"> <li>• Ecosystems</li> <li>• Habitats</li> </ul>
<p><b>ELA integration</b></p> <ul style="list-style-type: none"> <li>• Compare and contrast habitats.</li> <li>• Create a model of a habitat and give an oral presentation as to how the different pieces in the habitat function together.</li> </ul>	<p><b>Math integration</b></p> <ul style="list-style-type: none"> <li>• Create and interpret a graph of the different types of animals that live in different habitats.</li> </ul>

Level: **2**

Content: Elementary Science

Standard, Title, Code: 2-LS4 Biological Evolution: Unity and Diversity

<b>Major Measureable Objective:</b> 2-LS4 Biological Evolution: Unity and Diversity	
<b><u>Know (disciplinary core ideas)</u></b>  LS4.D: Biodiversity and Humans <ul style="list-style-type: none"><li>There are many different kinds of living things in any area, and they exist in different places on land and in water.</li></ul>	<b><u>Do (performance expectations)</u></b>  (2-LS4-a). Make observations about the variety of plants and animals living in an area and identify the specific places they live in order to make comparisons between different areas.
<b>Previous Knowledge Needed</b> None	<b>Additional Concepts</b> None
<b>ELA integration</b> <ul style="list-style-type: none"><li>Compare and contrast the most important points presented by two texts on the same topic.</li></ul>	<b>Math integration</b> <ul style="list-style-type: none"><li>Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories.</li><li>Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.</li></ul>

Level: **2**

Content: Elementary Science

Standard, Title, Code: 2-LS2 Ecosystems: Interactions, Energy, and Dynamics

<b>Major Measureable Objective:</b> Ecosystems: Interactions, Energy and Dynamics	
<b>Know (disciplinary core ideas)</b>  LS2.A: Interdependent Relationships in Ecosystems <ul style="list-style-type: none"><li>Animals can move around, but plants cannot, and they often depend on animals for pollination or to move their seeds. (2-LS2-b)</li></ul> LS2.D: Social Interactions and Group Behavior <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. (2-LS2-b)</li></ul>	<b>Do (performance expectations)</b>  (2-LS2-b) Define a simple problem and test solutions to determine which better fulfills the functions of an animal necessary for the reproduction of a flowering plant.
<b>Previous Knowledge Needed</b> <ul style="list-style-type: none"><li>They (animals) use their senses to find food and water, and they use their body parts to gather, catch, eat, and chew the food. (1<sup>st</sup>)</li></ul>	<b>Additional Concepts</b> <ul style="list-style-type: none"><li>Pollination</li></ul>
<b>ELA integration</b> <ul style="list-style-type: none"><li>Compare and contrast the most important points presented by two texts on the same topic.</li></ul>	<b>Math integration</b>

Level: **2**

Content: Elementary Science

Standard, Title, Code: 2-LS2 Ecosystems: Interactions, Energy, and Dynamics

<b>Major Measureable Objective:</b> 2-LS2 Ecosystems: Interactions, Energy, and Dynamics	
<b>Know (disciplinary core ideas)</b>  LS2.C: Ecosystems Dynamics, Functioning, and Resilience <ul style="list-style-type: none"><li>The places where plants and animals live often change, sometimes slowly and sometimes rapidly. (2-LS2-c)</li><li>When animals and plants get too hot or too cold, they may die. If they cannot find enough food, water, or air, they may die. (2-LS2-c)</li></ul> LS4.C: Adaptation <ul style="list-style-type: none"><li>Living things can survive only where their needs are met. If some places are too hot or too cold or have too little water or food, plants and animals may not be able to live there. (secondary to 2-LS2-a/secondary to 2-LS2-c)</li></ul>	<b>Do (performance expectations)</b> (2-LS2-c) Design a solution to a problem caused when a habitat changes and some of the plants and animals may no longer be able to live there.
<b>Previous Knowledge Needed</b> <ul style="list-style-type: none"><li>How humans' use of natural resources can affect the world around them and share solutions that reduce human impact. (kg)</li><li>How plants and animals depend on the air, land and water where they live to meet their needs, and can change their environment. (kg)</li></ul>	<b>Additional Concepts</b> <ul style="list-style-type: none"><li>Extinction</li><li>Habitats</li></ul>
<b>ELA integration</b> <ul style="list-style-type: none"><li>Write about the adaptation of an animal from winter to spring; e.g. dog or cat shedding his coat</li></ul>	<b>Math integration</b> <ul style="list-style-type: none"><li>Measure the temperature change over time. Ask students, "Could this change affect the habitat; why or why not."</li></ul>