**Shelby County Schools Science Vision**

Shelby County Schools' vision of science education is to ensure that from early childhood to the end of the 12th grade, all students have heightened curiosity and an increased wonder of science; possess sufficient knowledge of science and engineering to engage in discussions; are able to learn and apply scientific and technological information in their everyday lives; and have the skills such as critical thinking, problem solving, and communication to enter careers of their choice, while having access to connections to science, engineering, and technology.

To achieve this, Shelby County Schools has employed The Tennessee Academic Standards for Science to craft meaningful curricula that is innovative and provide a myriad of learning opportunities that extend beyond mastery of basic scientific principles.

**Introduction**

In 2014, the Shelby County Schools Board of Education adopted a set of ambitious, yet attainable goals for school and student performance. The District is committed to these goals, as further described in our strategic plan, Destination 2025. In order to achieve these ambitious goals, we must collectively work to provide our students with high quality standards aligned instruction. The Tennessee Academic Standards for Science provide a common set of expectations for what students will know and be able to do at the end of each grade, can be located in the Tennessee Science Standards Reference. Tennessee Academic Standards for Science are rooted in the knowledge and skills that students need to succeed in post-secondary study or careers. While the academic standards establish desired learning outcomes, the curricula provide instructional planning designed to help students reach these outcomes. The curriculum maps contain components to ensure that instruction focuses students toward college and career readiness. Educators will use this guide and the standards as a roadmap for curriculum and instruction. The sequence of learning is strategically positioned so that necessary foundational skills are spiraled in order to facilitate student mastery of the standards.

Our collective goal is to ensure our students graduate ready for college and career. Being College and Career Ready entails, many aspects of teaching and learning. We want our students to apply their scientific learning in the classroom and beyond. These valuable experiences include students being facilitators of their own learning through problem solving and thinking critically. The Science and Engineering Practices are valuable tools used by students to engage in understanding how scientific knowledge develops. These practices rest on important "processes and proficiencies" with longstanding importance in science education. The science maps contain components to ensure that instruction focuses students toward understanding how science and engineering can contribute to meeting many of the major challenges that confront society today. The maps are centered around five basic components: the Tennessee Academic Standards for Science, Science and Engineering Practices, Disciplinary Core Ideas, Crosscutting Concepts, and Phenomena.

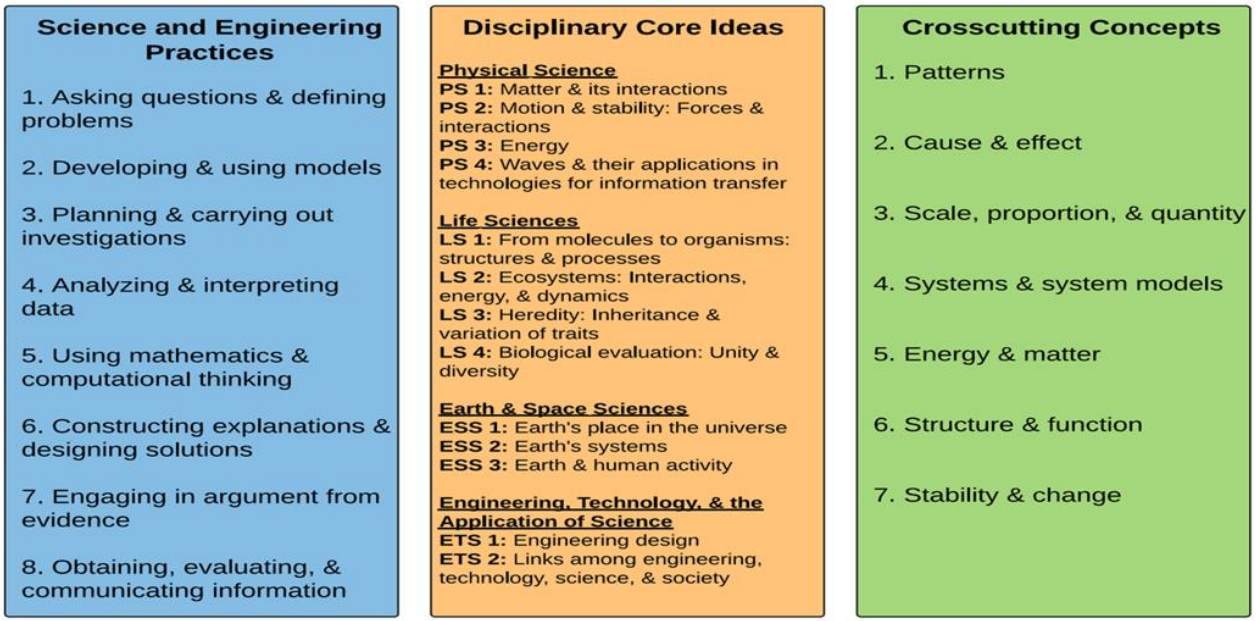
*The Tennessee Academic Standards for Science were developed using the National Research Council's 2012 publication, A Framework for K-12 Science Education as their foundation. The framework presents a new model for science instruction that is a stark contrast to what has come to be the norm in science classrooms. Thinking about science had become memorizing concepts and solving mathematical formulae. Practicing science had become prescribed lab situations with predetermined outcomes. The framework proposes a three-dimensional approach to science education that capitalizes on a child's natural curiosity. The Science Framework for K-12 Science Education* provides the blueprint for developing the effective science practices. The *Framework* expresses a vision in science education that requires students to operate at the nexus of three dimensions of learning: Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas. The *Framework* identified a small number of disciplinary core ideas that all students should learn with increasing depth and sophistication, from Kindergarten through grade twelve. Key to the vision expressed in the *Framework* is for students to learn these disciplinary core ideas in the context of science and engineering practices. The importance of combining Science and Engineering Practices, Crosscutting Concepts and Disciplinary Core Ideas is stated in the *Framework* as follows:

*Standards and performance expectations that are aligned to the framework must take into account that students cannot fully understand scientific and engineering ideas without engaging in the practices of inquiry and the discourses by which such ideas are developed and refined. At the same time, they cannot learn or show competence in practices except in the context of specific content. (NRC Framework, 2012, p. 218)*

To develop the skills and dispositions to use scientific and engineering practices needed to further their learning and to solve problems, students need to experience instruction in which they use multiple practices in developing a particular core idea and apply each practice in the context of multiple core ideas. We use the term "practices" instead of a term such as "skills" to emphasize that engaging in scientific investigation requires not only skill but also knowledge that is specific to each practice. Students in grades K-12 should engage in all eight practices over each grade band**.** Crosscutting concepts have application across all domains of science. As such, they are a way of linking the different domains of science. Crosscutting concepts have value because they provide students with connections and intellectual tools that are related across the differing areas of disciplinary content and can enrich their application of practices and their understanding of core ideas. There are seven crosscutting concepts that bridge disciplinary boundaries, uniting core ideas throughout the fields of science and engineering. Their purpose is to help students deepen their understanding of the disciplinary core ideas and develop a coherent and scientifically based view of the world.

The map is meant to support effective planning and instruction to rigorous standards. It is *not* meant to replace teacher planning, prescribe pacing or instructional practice. In fact, our goal is not to merely "cover the curriculum," but rather to "uncover" it by developing students' deep understanding of the content and mastery of the standards. Teachers who are knowledgeable about and intentionally align the learning target (standards and objectives), topic, text(s), task, and needs (and assessment) of the learners are best-positioned to make decisions about how to support student learning toward such mastery. Teachers are therefore expected--with the support of their colleagues, coaches, leaders, and other

support providers--to exercise their professional judgment aligned to our shared vision of effective instruction, the Teacher Effectiveness Measure (TEM) and related best practices. However, while the framework allows for flexibility and encourages each teacher/teacher team to make it their own, our expectations for student learning are non-negotiable. We must ensure all of our children have access to rigor—high-quality teaching and learning to grade level specific standards, including purposeful support of literacy and language learning across the content areas.




**Learning Progression**

At the end of the elementary science experience, students can observe and measure phenomena using appropriate tools. They are able to organize objects and ideas into broad concepts first by single properties and later by multiple properties. They can create and interpret graphs and models that explain phenomena. Students can keep notebooks to

record sequential observations and identify simple patterns. They are able to design and conduct investigations, analyze results, and communicate the results to others. Students will carry their curiosity, interest and enjoyment of the scientific world view, scientific inquiry, and the scientific enterprise into middle school.

At the end of the middle school science experience, students can discover relationships by making observations and by the systematic gathering of data. They can identify relevant evidence and valid arguments. Their focus has shifted from the general to the specific and from the simple to the complex. They use scientific information to make wise decision related to conservation of the natural world. They recognize that there are both negative and positive implications to new technologies.

As an SCS graduate, former students should be literate in science, understand key science ideas, aware that science and technology are interdependent human enterprises with strengths and limitations, familiar with the natural world and recognizes both its diversity and unity, and able to apply scientific knowledge and ways of thinking for individual and social purposes.

**Structure of the Standards**

- Grade Level/Course Overview: An overview that describes that specific content and themes for each grade level or high school course.
- Disciplinary Core Idea: Scientific and foundational ideas that permeate all grades and connect common themes that bridge scientific disciplines.
- Standard: Statements of what students can do to demonstrate knowledge of the conceptual understanding. Each performance indicator includes a specific science and engineering practice paired with the content knowledge and skills that students should demonstrate to meet the grade level or high school course standards.


**Purpose of Science Curriculum Maps**

This map is a guide to help teachers and their support providers (e.g., coaches, leaders) on their path to effective, college and career ready (CCR) aligned instruction and our pursuit of Destination 2025. It is a resource for organizing instruction around the Tennessee Academic Standards for Science, which define what to teach and what students need to learn at each grade level. The map is designed to reinforce the grade/course-specific standards and content (scope) and provides *suggested* sequencing, pacing, time frames, and aligned resources. Our hope is that by curating and organizing a variety of standards-aligned resources, teachers will be able to spend less time wondering what to teach and searching for quality materials (though they may both select from and/or supplement those included here) and have more time to plan, teach, assess, and reflect with colleagues to continuously improve practice and best meet the needs of their students.

The map is meant to support effective planning and instruction to rigorous standards. It is *not* meant to replace teacher planning, prescribe pacing or instructional practice. In fact, our goal is not to merely "cover the curriculum," but rather to "uncover" it by developing students' deep understanding of the content and mastery of the standards. Teachers who are knowledgeable about and intentionally align the learning target (standards and objectives), topic, text(s), task, and needs (and assessment) of the learners are best-positioned to make decisions about how to support student learning toward such mastery. Teachers are therefore expected--with the support of their colleagues, coaches, leaders, and other support providers--to exercise their professional judgment aligned to our shared vision of effective instruction, the Teacher Effectiveness Measure (TEM) and related best practices. However, while the framework allows for flexibility and encourages each teacher/teacher team to make it their own, our expectations for student learning are non-negotiable. We must ensure all of our children have access to rigor—high-quality teaching and learning to grade level specific standards, including purposeful support of literacy and language learning across the content areas.

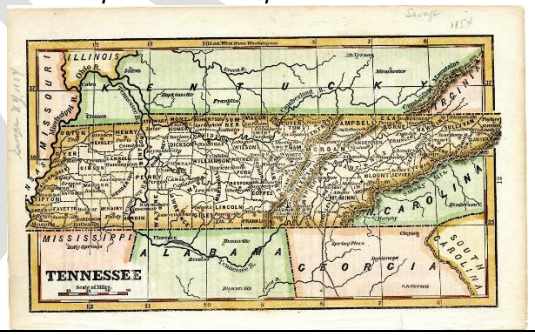
| 2nd Grade Quarter 2 Curriculum Map<br>Quarter 2 Curriculum Map Feedback | | | | | | |
|---|---|---|---|---|---|---|
| Quarter 1 | | | **Quarter 2** | | Quarter 3 | Quarter 4 |
| Structure and Routine | Unit 1<br>Living Things | Unit 2<br>Habitats | **Unit 3<br>Earth's Surface** | Unit 4<br>Earth's Changes | Unit 5<br>Forces and Motion | Unit 6<br>Sound and Light |
| 1 week | 5 weeks | 3 weeks | **4.5 weeks** | 4.5 | 9 weeks | 9 weeks |

**UNIT 3: Earth's Surface (4.5 weeks)**

**Overarching Question(s)**

How and why is Earth constantly changing?

| Unit 3: Earth's Surface, Lesson 1 | Lesson Length | Essential Question | Vocabulary |
|---|---|---|---|
| Describe Earth's Surface | 1.5 week | How can we describe Earth's surface? | landform, mountain, continent, island, hill, map, plain, valley |

| Standards and Related Background Information | Instructional Focus | Instructional Resources |
|---|---|---|
| **DCI(s)**<br>2.ESS2 Earth's Systems<br><br>**Standard(s)**<br>2.ESS2.3: Compare simple maps of different land areas to observe the shapes and kinds of land (rock, soil, sand) and water (river, stream, lake, pond).<br><br>**Explanation(s)**<br>2.ESS2.3<br>Students should consider and observe that land surfaces should not be described using general words like "dirt." What we typically refer to as "dirt" can be categorized into different types of land: rock, sand, or soil. Pairing with standards 2.ESS2.1 and 2.ESS2.4, students can also | **Learning Outcomes**<br>Students will make models to observe Earth's surface.<br><br>**Suggested Phenomenon**<br>*Click on the phenomenon picture to view the video.*<br>  <br> | **Curricular Resources**<br>Engage<br>Inspire Science TE, pp. 97-98<br>Science in My World, TE p. 97 (Phenomenon)<br>Essential Questions, TE p. 98<br><br>Explore<br>TE, pp. 98-100<br>*LAB* Be a Scientist Notebook, p. 96 Inquiry Activity: Make a Model of Land and Water<br>Science File: An Amazing Ride<br><br>Explain<br>TE, pp. 100-106<br>Be a Scientist notebook, p. 98: Vocabulary |

| | | |
|---|---|---|
| observe that other natural resources, such as hydrologic (water) features are commonly indicated on maps.<br><br>Maps are one of the earlier abstract ideas that are introduced to students. As such, students may struggle to understand how to visualize their location on a map, without first anchoring this to a concrete task such as creating a map to model their immediate surroundings.<br><br>**Suggested Science and Engineering Practice(s)**<br>Developing and Using Models<br>Obtaining, Evaluating, and Communicating Information<br><br>**Suggested Crosscutting Concept(s)**<br>Patterns<br><br>**Teacher Overview**<br>Earth's surface is made up of two key features: landforms and bodies of water. Landforms include everything from very large continents to small valleys. Bodies of water include oceans, lakes, and rivers. Topographical maps show the characteristics of landforms, particularly elevation and shape. Oceans are made of salt water, and rivers consist of fresh water, while lakes can have either salt water or fresh water. Earth's surface consists of the lithosphere (the rigid outer shell) on top of the asthenosphere (the semi-molten portion of the upper mantel). Earth's surface is under constant changes due to factors such as weathering, the movement of glaciers, and plate tectonics. | Phenomenon Explanation:<br>Maps help us observe and inform us of the land around us. | Science File: Earth's Surface<br>Digital Interactive: Landforms on Earth<br>Science File What Maps Can Tell Us<br>*LAB* Be a Scientist Notebook, p. 102 Inquiry Activity: Create a Model of a Map<br>Video: Landforms<br><br><u>Elaborate</u><br>TE, p. 107<br>Be a Scientist Notebook, p. 104: Landform Research<br><br><u>Evaluate</u><br>TE, pp, 108-111<br>*LAB* Be a Scientist Notebook, p. 105, Performance Task: Make a Model of a Landform<br>eAssessment<br><br>**Additional Resources**<br>Lesson: Making a Landform Model<br>Lesson: Planning a Landform Model<br>Video: Exploring Landforms and Bodies of Water<br>Activity: Mapping Landforms<br><br>**ESL Supports and Scaffolds**<br>WIDA Standard 4<br>To support students in speaking refer to this resource: |

| | | |
|---|---|---|
| **Misconceptions**<br>Students may have misconceptions about landforms that are not in their immediate area. For example, if there are no mountains nearby, students may believe that all mountains are just tall rocky landforms whose tops are covered with snow. Help students understand that plants, such as trees and flowers, may grow on a mountain and that people may live and work on mountains. Students may not have experience with bodies of salt water or bodies of fresh water. They may not recognize that there are different types of water. Students may think that landforms and bodies of water exist independently of each other and may not understand how they influence each other. | | WIDA Doing and Talking Science<br>When applicable- use Home Language do build vocabulary in concepts. Spanish Cognates<br><br>Interactive Science Dictionary with visuals<br><br>**Pre-teach**: (**Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs**)<br><br>Landforms, maps, landforms, reliable<br><br>**Compare sentence stems:**<br><br>This _____ is similar to that _____because both _____.<br><br>**Contrast Sentence stems:**<br><br>This _____ is different from that _____ because one has _____ and the other doesn't_____.<br><br>Landform visuals<br>Looking at Landforms |

| 2nd Grade Quarter 2 Curriculum Map<br>Quarter 2 Curriculum Map Feedback | | | | | | |
|---|---|---|---|---|---|---|
| Quarter 1 | | | **Quarter 2** | | Quarter 3 | Quarter 4 |
| Structure and Routine | Unit 1 Living Things | Unit 2 Habitats | **Unit 3 Earth's Surface** | Unit 4 Earth's Changes | Unit 5 Forces and Motion | Unit 6 Sound and Light |
| 1 week | 5 weeks | 3 weeks | **4.5 weeks** | 4.5 weeks | 9 weeks | 9 weeks |

| **UNIT 3: Earth's Surface ( 4.5 weeks)** | | | |
|---|---|---|---|
| **Overarching Question(s)** | | | |
| How and why is Earth constantly changing? | | | |
| **Unit 3: Earth's Surface, Lesson 2** | **Lesson Length** | **Essential Question** | **Vocabulary** |
| Oceans | 1.5 week | Where are Earth's oceans? | ocean, salt water |
| **Standards and Related Background Information** | | **Instructional Focus** | **Instructional Resources** |
| **DCI(s)**<br>2.ESS2 Earth's Systems<br><br>**Standard(s)**<br>2.ESS2.3: Compare simple maps of different land areas to observe the shapes and kinds of land (rock, soil, sand) and water (river, stream, lake, pond).<br><br>2.ESS2.4: Use information obtained from reliable resources to explain that water is found in the ocean, rivers, streams, lakes, and ponds, and may be solid or liquid. | | **Learning Outcomes**<br>Students will gather information about and identify Earth's oceans on a map.<br><br>**Suggested Phenomena**<br>*Click on the phenomenon picture to view the video.* | **Curricular Resources**<br>Engage<br>Inspire Science TE, pp. 113-114<br>Be A Scientist Notebook, p. 109 (Phenomenon)<br>Essential Questions, TE p. 114<br><br>Explore<br>TE, pp. 114-115<br>*LAB* Be a Scientist Notebook, p. 110 Inquiry Activity: Earth's Surface<br><br>Explain<br>TE, pp. 116-119 |

| | | |
|---|---|---|
| **Explanation(s)**<br>2.ESS2.3<br>Students should consider and observe that land surfaces should not be described using general words like “dirt." What we typically refer to as “dirt” can be categorized into different types of land: rock, sand, or soil. Pairing with standards 2.ESS2.1 and 2.ESS2.4, students can also observe that other natural resources, such as hydrologic (water) features are commonly indicated on maps.<br><br>Maps are one of the earlier abstract ideas that are introduced to students. As such, students may struggle to understand how to visualize their location on a map, without first anchoring this to a concrete task such as creating a map to model their immediate surroundings.<br><br>2.ESS2.4<br>In teaching this standard, the focus should not be on the different forms that water can take. The awareness that water takes multiple forms on earth is necessary to appreciate the impact of water on our planet.<br><br>In appreciating the amount of water and its manifestations (oceans, rivers, streams, lakes, and ponds) students should also consider the connection of water systems to other systems: geologic and biologics. There are many different types of aquatic environments, and the availability of water in a region determines which varieties of organism will be found there, while the action of water shapes habitats as it moves soil and rock. |  <br>*Click on the phenomenon picture to view the video.*<br>  <br>Aral Sea Time Lapse<br><br>Phenomena Explanation:<br>Most of Earth’s water is in oceans. About three-quarters of Earth is covered with water with almost 97 percent of that water found in oceans. | Be a Scientist notebook, p. 112: Vocabulary<br>Science File: Water on Earth<br>Digital Interactive: Where Is Most of Earth’s Water?<br>Video: Ocean Technology<br>*LAB* Be a Scientist Notebook, Inquiry Activity, p. 114: Create a Model of a Map<br><br><u>Elaborate</u><br>TE, pp. 120-121<br>Be a Scientist Notebook, p. 115: Ocean Research<br><br><u>Evaluate</u><br>TE, pp. 122-123<br>*LAB* Be a Scientist Notebook, p. 122, Performance Task: Labeling Earth’s Oceans<br>eAssessment<br><br>**Additional Resources**<br>Lesson: The Earth is Mostly Water<br><br>Videos:<br>Oceans of the Earth<br><br>**ESL Supports and Scaffolds**<br>WIDA Standard 4 |

| | | |
|---|---|---|
| (Students have been introduced to solid and liquid forms of matter in K.PS1.2.)<br><br>**Suggested Science and Engineering Practice(s)**<br>Developing and Using Models<br>Obtaining, Evaluating, and Communicating Information<br><br>**Suggested Crosscutting Concept(s)**<br>Patterns<br><br>**Teacher Overview**<br>Earth's oceans cover three-quarters of the planet. The four main ocean basins are the Pacific, Atlantic, Indian, and Arctic. In 2000, the International Hydrographic Organization recognized a fifth ocean, the Southern Ocean, which surrounds Antarctica and extends to 60 degrees south latitude. Exploring the oceans is challenging, but with current technology, scientists are able to map the ocean floor. It has landforms similar to those above water, such as mountains, valleys, and plains. The average ocean depth is three miles, and the deepest point, in the western Pacific, is almost seven miles.<br><br>**Misconceptions**<br>Students may think Earth's oceans are all the same. However, oceans can be solid (frozen) or liquid. Students may also think the ocean floor is flat, like a plain. Explain that the bottom of the ocean is called the ocean floor and that it has natural structures like those on land, such as | | To support students in speaking refer to this resource:<br><br>WIDA Doing and Talking Science<br><br>When applicable- use Home Language do build vocabulary in concepts. Spanish Cognates<br><br>Interactive Science Dictionary with visuals<br><br>**Compare sentence stems:**<br><br>This _____ is similar to that _____because both _____.<br><br>**Contrast Sentence stems:**<br><br>This _____ is different from that _____ because one has _____ and the other doesn't_____.<br><br>GetEpic Videos for Oceans |

| | | |
|---|---|---|
| mountains, valleys, and plains. Students may think that ocean water can be drunk or used to water plants. Help students recognize the difference between salt water and fresh water. | | |

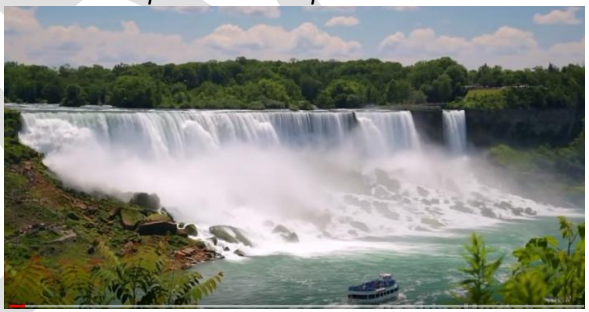
| 2nd Grade Quarter 2 Curriculum Map<br>Quarter 2 Curriculum Map Feedback | | | | | | |
|---|---|---|---|---|---|---|
| Quarter 1 | | | **Quarter 2** | | Quarter 3 | Quarter 4 |
| Structure and Routine | Unit 1<br>Living Things | Unit 2<br>Habitats | **Unit 3<br>Earth's Surface** | Unit 4<br>Earth's Changes | Unit 5<br>Forces and Motion | Unit 6<br>Sound and Light |
| 1 week | 5 weeks | 3 weeks | **4.5 weeks** | 4.5 weeks | 9 weeks | 9 weeks |

**UNIT 3: Earth's Surface (4.5 weeks)**

**Overarching Question(s)**

How and why is Earth constantly changing?

| Unit 3: Earth's Surface, Lesson 3 | Lesson Length | Essential Question | Vocabulary |
|---|---|---|---|
| Fresh Water | 1.5 weeks | Where is Earth's fresh water? | fresh water, stream, river, lake, pond, glacier |

| Standards and Related Background Information | Instructional Focus | Instructional Resources |
|---|---|---|
| **DCI(s)**<br>2.ESS2 Earth's Systems<br><br>**Standard(s)**<br>2.ESS2.3: Compare simple maps of different land areas to observe the shapes and kinds of land (rock, soil, sand) and water (river, stream, lake, pond).<br><br>2.ESS2.4: Use information obtained from reliable resources to explain that water is found in the ocean, rivers, streams, lakes, and ponds, and may be solid or liquid.<br><br>**Explanation(s)**<br>2.ESS2.3 | **Learning Outcomes**<br>Students will gather information about and identify Earth's fresh water.<br><br>**Suggested Phenomenon:**<br>*Click on the phenomenon picture to view the video.*<br>  <br>Niagara Falls | **Curricular Resources**<br>Engage<br>Inspire Science TE, pp. 125-126<br>TE, p. 125 (phenomenon)<br>Be A Scientist Notebook, p. 121: Phenomenon & Essential Questions<br><br>Explore<br>TE, pp. 126-128<br>*LAB* Be a Scientist Notebook, p. 122 Inquiry Activity: Fresh Water Changes Simulation<br>eBook: Vacation Surprise<br><br>Explain<br>TE, pp. 128-134<br>Be a Scientist notebook, p. 124: Vocabulary |

| | | |
|---|---|---|
| Students should consider and observe that land surfaces should not be described using general words like “dirt." What we typically refer to as “dirt” can be categorized into different types of land: rock, sand, or soil. Pairing with standards 2.ESS2.1 and 2.ESS2.4, students can also observe that other natural resources, such as hydrologic (water) features are commonly indicated on maps.<br><br>Maps are one of the earlier abstract ideas that are introduced to students. As such, students may struggle to understand how to visualize their location on a map, without first anchoring this to a concrete task such as creating a map to model their immediate surroundings.<br><br>2.ESS2.4<br>In teaching this standard, the focus should not be on the different forms that water can take. The awareness that water takes multiple forms on earth is necessary to appreciate the impact of water on our planet.<br><br>In appreciating the amount of water and its manifestations (oceans, rivers, streams, lakes, and ponds) students should also consider the connection of water systems to other systems: geologic and biologics. There are many different types of aquatic environments, and the availability of water in a region determines which varieties of organism will be found there, while the action of water shapes habitats as it moves soil and rock. | Phenomenon Explanation:<br><br>Ponds, rivers, streams, brooks, lakes and puddles of water are all bodies of fresh water. Niagara Falls occurs on the Niagara River, a 36-mile (58 kilometers) channel that connects two great lakes, Lake Erie and Lake Ontario, and separates New York from Ontario. The Great Lakes is the world’s largest surface freshwater system in the world. | Digital Interactive: Bodies of Water<br>eBook: Water on Earth<br>Video: Fresh Water<br>*LAB* Be a Scientist Notebook, p. 126, Inquiry Activity: Fresh Water Research<br>Be a Scientist Notebook, p. 127, Inquiry Activity: Create a Model of a Map<br><br>Elaborate<br>TE, pp. 134-135<br>*LAB* Be a Scientist Notebook, p. 129: Make a Model of a Glacier<br><br>Evaluate<br>TE, pp, 136-137<br>*LAB* Be a Scientist Notebook, p. 131, Performance Task: Make a Model of Fresh Water Movement<br>eAssessment<br><br>**Additional Resources**<br>Lesson: Salty Oceans and Fresh Water<br>Lesson: Fresh Water vs Salt Water<br>Article/website: Facts About Niagara Falls<br>Article/website: Facts About Niagara Falls<br>Video: Fresh Water Biomes<br>Video: Why are Lakes Fresh Water and Oceans Saltwater? |

| | | |
|---|---|---|
| (Students have been introduced to solid and liquid forms of matter in K.PS1.2.)<br><br>**Suggested Science and Engineering Practice(s)**<br>Obtaining, Evaluating, and Communicating Information<br><br>**Suggested Crosscutting Concept(s)**<br>Patterns<br><br>**Teacher Overview**<br>Most of Earth's water is salt water, found in the planet's oceans. Fresh water makes up only a small percentage of the water on Earth but is essential to animal and plant life. Earth's fresh water is located in ponds, lakes, rivers, streams, and glaciers. During winter, fresh water is stored in the form of ice and snow in cold mountainous areas. In spring, the ice and snow melt, causing water levels to rise. Water from melting snow and ice also flows into rivers, causing rivers to rise.<br><br>**Misconceptions**<br>Students may not be aware that there is a limited quantity of fresh water on the planet. Students also may not be aware that fresh water can become snow or ice and vice versa. Students may think rivers and lakes are made of the same type of water as oceans. Students may not realize that snow, ice, and rain affect lakes and rivers. Students may not realize that drinking water is the same type of water as is found in lakes and rivers and does not come from oceans. Point out to students that drinking water | | **ESL Supports and Scaffolds**<br>WIDA Standard 4<br>To support students in speaking refer to this resource:<br>WIDA Doing and Talking Science<br>When applicable- use Home Language do build vocabulary in concepts. Spanish Cognates<br><br>Interactive Science Dictionary with visuals<br><br>**Pre-teach**: (**Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs**)<br><br>**Compare sentence stems:**<br><br>This _____ is similar to that _____because both _____.<br><br>**Contrast Sentence stems:**<br><br>This _____ is different from that _____ because one has _____ and the other doesn't_____.<br><br>Use visuals to support Entering Level ELs in understanding the vocabulary of the unit. |

| | | |
|---|---|---|
| goes through a cleaning process to make it safe to drink. Water that comes from a well or a spring is usually not treated. | | GetEpic: Looking at Maps (landforms)<br><br>Landform flashcards |

| 2nd Grade Quarter 2 Curriculum Map<br>Quarter 2 Curriculum Map Feedback | | | | | | |
|---|---|---|---|---|---|---|
| Quarter 1 | | | Quarter 2 | | Quarter 3 | Quarter 4 |
| Structure and Routine | Unit 1 Living Things | Unit 2 Habitats | Unit 3 Earth's Surface | **Unit 4 Earth's Changes** | Unit 5 Forces and Motion | Unit 6 Sound and Light |
| 1 week | 5 weeks | 3 weeks | 4.5 weeks | **4.5** | 9 weeks | 9 weeks |

**UNIT 4: Earth's Changes (4.5 weeks)**

**Overarching Question(s)**

How and why is Earth constantly changing?

| Unit 4: Earth's Changes, Lesson 1 | Lesson Length | Essential Question | Vocabulary |
|---|---|---|---|
| Weathering and Erosion | 1.5 weeks | How can wind and water change Earth's surface? | erosion, rock, soil, flood, weathering, sand |

| Standards and Related Background Information | Instructional Focus | Instructional Resources |
|---|---|---|
| **DCI(s)**<br>2.ESS1 Earth's Place in the Universe<br>2.ESS2 Earth's Systems<br><br>**Standard(s)**<br>2.ESS1.1: Recognize that some of Earth's natural processes are cyclical while other have a beginning and an end. Some events happen quickly, while others occur slowly over time.<br><br>2.ESS2.2: Observe and analyze how blowing wind and flowing water can move Earth materials (soil, rocks) from one place to another, changing the shape of a landform and affecting the habitats of living things. | **Learning Outcomes**<br>Students will plan a model to show how wind and water change Earth's surface.<br><br>**Suggested Phenomenon**<br>*Click on the phenomenon picture to view the video.*<br>  <br>The Grand Canyon | **Curricular Resources**<br>Engage<br>Inspire Science TE, pp. 143-144<br>TE, p. 143: Phenomenon<br>Be A Scientist Notebook, p. 139 (Phenomenon),<br>Be A Scientist Notebook, Essential Questions, p. 139<br><br>Explore<br>TE, pp. 144<br>*LAB* Be a Scientist Notebook, p. 140 Inquiry Activity: How Can You Change Rocks?<br>eBook: The Mystery of the Sphinx<br><br>Explain |

| | | |
|---|---|---|
| **Explanation(s)**<br>2.ESS1.1<br>This component idea addresses changes that have occurred throughout Earth's history and evidence for those changes. Students must develop appreciation for time scales before beginning to try to explain geologic features and patterns observed in nature.<br><br>Some processes taking place on the Earth occur within a moments of time. However, the age of the Earth is so much greater than our lifespans that gradual changes to the Earth often go undetected, yet their cumulative effects have led to the variety of Earth's surface features, such as canyons and mountain ranges.<br><br>Events such as earthquakes that occur quickly can contribute to gradual changes to Earth. It is essential that students begin to build an understanding for these prolonged changes to grasp discussions of other standards in second grade and beyond. Cyclic events might include day turning to night, compared to noncyclic events such as volcanic eruptions or other natural hazards.<br><br>2.ESS2.2<br>There are several different systems named in this standard: biological (living things), geological (earth materials), hydrological (water), and atmospheric (wind)., On Earth, all of these systems interact, even though each of these systems can also be learned about on its own. | Phenomenon Explanation:<br>Water and wind can change the shape of land. Bits of rock are worn away by the wind and water through weathering. Erosion then carries these pieces of rock away. | TE, pp. 147-152<br>Be a Scientist Notebook, p. 142: Vocabulary<br>eBook: Our Changing Earth<br>*LAB* Be a Scientist Notebook, Inquiry Activity p. 143: Erosion<br>Digital Interactive: How Landforms Are Made<br><br>Elaborate<br>TE, pp. 152-153<br>*LAB* Be a Scientist Notebook, Inquiry Activity p. 148: Model Weathering<br><br>Evaluate<br>TE, pp, 154-155<br>*LAB* Be a Scientist Notebook, p. 149,<br>Performance Task: Earth's Slow Changes<br>eAssessment<br><br>**Additional Resources**<br>Lesson: Let's Compare Erosion Solution Design<br>Lesson: Types of Weathering and Erosion information Sheet<br>Videos: Billy Blue Hair - What is Erosion?<br>Video: Erosion and Earth Time Lapse<br>**ESL Supports and Scaffolds**<br>To support students in speaking refer to this resource:<br>WIDA Doing and Talking Science<br>When applicable- use Home Language do build vocabulary in concepts. Spanish Cognates |

| | | |
|---|---|---|
| Students should consider how wind or water change the shape of the land. The landforms that are created by wind and water and other materials on the land can provide homes for living organisms. Examples might include the way that some organisms find cool places to rest under rocks in the desert, or make their homes in caves formed by water breaking down rocks. Examples of types of landforms could include hills, river banks, valleys, and dunes.<br><br>**Suggested Science and Engineering Practice(s)**<br>Analyzing and Interpreting Data<br><br>**Suggested Crosscutting Concept(s)**<br>Stability and Change<br><br>**Teacher Overview**<br>Weather plays a major role in the changes of Earth's surface. Weathering is a natural process on Earth in which rock and other materials are broken down. Mechanical weathering occurs when water, wind, and other physical forces wear away rock. For example, temperature changes can cause ice to freeze inside the cracks of rock, splitting them apart. Chemical weathering occurs when chemicals, such as acid rain, transform rock into new compounds. Mechanical weathering accelerates chemical weathering because it increases the surface area of exposed rock. Erosion is the movement of weathered material—sediments—from one place to another. Agents of erosion include gravity, moving water, waves, wind, or glacier | | Compare sentence stems:<br>This _____ is similar to that _____because both _____.<br>Contrast Sentence stems:<br>This _____ is different from that _____<br><br>Define Sentence Frames:<br><br>A common characteristic of _____ and _____ is_____.<br>A characteristic of _____ and _____ is_____.<br>One attribute of _____ is _____.<br>_____ and _____ have the following traits in common: _____.<br>_____ can be identified by _____. |

| | | |
|---|---|---|
| movement. Where sediments are ultimately laid down, deposition occurs. Deposition builds up and changes the surface of the land. The processes of weathering, erosion, and deposition are continually shaping Earth's surface.<br><br>**Misconceptions**<br>Students may think that Earth was always the way it is now or that any changes on Earth's surface must have occurred suddenly, such as through earthquakes. Explain to students that although they may not be able to see it, the Earth's surface is always changing. Tell students that the mountains, beaches, and rivers they may be familiar with were very different hundreds, thousands, and millions of years ago. Encourage students to think of tangible examples to help undo the misconception. For example, help them realize that water is a powerful force in shaping Earth's surface. Ask students if they have seen powerful waves crash on a beach or whether they have observed changes caused by a storm to soil on the ground. | | |

| 2nd Grade Quarter 2 Curriculum Map<br>Quarter 2 Curriculum Map Feedback | | | | | | |
|---|---|---|---|---|---|---|
| Quarter 1 | | | Quarter 2 | | Quarter 3 | Quarter 4 |
| Structure and Routine | Unit 1 Living Things | Unit 2 Habitats | Unit 3 Earth's Surface | **Unit 4 Earth's Changes** | Unit 5 Forces and Motion | Unit 6 Sound and Light |
| 1 week | 5 weeks | 3 weeks | 4.5 weeks | **4.5 weeks** | 9 weeks | 9 weeks |

**UNIT 4: Earth's Changes (4.5 weeks)**

**Overarching Question(s)**

How and why is Earth constantly changing?

| Unit 4: Earth's Changes, Lesson 2 | Lesson Length | Essential Question | Vocabulary |
|---|---|---|---|
| Quick Changes to Earth's Surface | 1.5 week | How can Earth's surface change quickly? | landslide, earthquake, volcano, erupt, lava |

| Standards and Related Background Information | Instructional Focus | Instructional Resources |
|---|---|---|
| **DCI(s)**<br>2.ESS1 Earth's Place in the Universe<br>2.ESS2 Earth's Systems<br><br>**Standard(s)**<br>2.ESS1.1: Recognize that some of Earth's natural processes are cyclical while other have a beginning and an end. Some events happen quickly, while others occur slowly over time.<br><br>2.ESS2.2: Observe and analyze how blowing wind and flowing water can move Earth materials (soil, rocks) from one place to another, changing the shape of a landform and affecting the habitats of living things. | **Learning Outcomes**<br>Students will construct an explanation to show how Earth's surface can change quickly.<br><br>**Suggested Phenomenon**<br>*Click on the phenomenon picture to view the video.*<br>  | **Curricular Resources**<br>Engage<br>TE, pp. 157-158<br>TE p. 157: Phenomenon<br>Be A Scientist Notebook, p. 153: Phenomenon, Essential Questions<br><br>Explore<br>TE, pp. 158-160<br>*LAB* Be a Scientist Notebook, p. 154 Inquiry Activity: Model Quick Changes to Earth<br>eBook: Visiting a Volcano<br><br>Explain<br>TE, pp. 160-165 |

| | | |
|---|---|---|
| **Explanation(s)**<br>2.ESS1.1<br>This component idea addresses changes that have occurred throughout Earth's history and evidence for those changes. Students must develop appreciation for time scales before beginning to try to explain geologic features and patterns observed in nature.<br><br>Some processes taking place on the Earth occur within a moments of time. However, the age of the Earth is so much greater than our lifespans that gradual changes to the Earth often go undetected, yet their cumulative effects have led to the variety of Earth's surface features, such as canyons and mountain ranges.<br><br>Events such as earthquakes that occur quickly can contribute to gradual changes to Earth. It is essential that students begin to build an understanding for these prolonged changes to grasp discussions of other standards in second grade and beyond. Cyclic events might include day turning to night, compared to noncyclic events such as volcanic eruptions or other natural hazards.<br><br>2.ESS2.2<br>There are several different systems named in this standard: biological (living things), geological (earth materials), hydrological (water), and atmospheric (wind)., On Earth, all of these systems interact, even though each of these systems can also be learned about on its own. | Phenomenon Explanation:<br>Catastrophic processes such as volcanoes, floods, landslides, and earthquakes cause rapid changes to Earth's surface. | Be a Scientist notebook, p. 157: Vocabulary<br>eBook: Events That Change Earth's Surface<br>Digital Interactive: Parts of a Volcano<br>*LAB* Be a Scientist Notebook, Inquiry Activity p. 158: Volcano Eruption<br><br><u>Elaborate</u><br>TE, pp. 166-167<br>*LAB* Be a Scientist Notebook, Performance Task p. 163: Make a Model of a Quick Change<br><br><u>Evaluate</u><br>TE, pp, 43-45<br>*LAB* Be a Scientist Notebook, p. 149, Performance Task: Picture Cards<br>eAssessment<br><br>**Additional Resources**<br>Lesson: <u>Shaking All Around-Earthquakes</u> *By Melissa Collins, NBCT, Shelby County Schools*<br>Videos: <u>Earthquake Destruction</u><br>Video: <u>Understanding Earthquakes \| National Geographic</u><br>Video: <u>The Formation and Sustainability of Iowa's Loess Hills</u><br>Video: <u>Where Do Mountains Come From? \| Geology for Kids</u><br>Video: <u>Formation of Sand Dunes: Coastal Processes Part 5 of 6</u> |

| | | |
|---|---|---|
| Students should consider how wind or water change the shape of the land. The landforms that are created by wind and water and other materials on the land can provide homes for living organisms. Examples might include the way that some organisms find cool places to rest under rocks in the desert, or make their homes in caves formed by water breaking down rocks. Examples of types of landforms could include hills, river banks, valleys, and dunes.<br><br>**Suggested Science and Engineering Practice(s)**<br>Analyzing and Interpreting Data<br><br>**Suggested Crosscutting Concept(s)**<br>Stability and Change<br><br>**Teacher Overview**<br>Forces on Earth, such as earthquakes, floods, landslides, and volcanoes, can cause Earth's surface to change very rapidly. Earthquake-related changes include seismic shaking (ground vibrations), liquefaction (stable soil suddenly turning liquid), landslides, mud flows, and tsunamis (giant waves). Depending on the intensity of the earthquake, the damage caused by earthquakes can be quite severe. Flash floods may result from heavy rainfall and can sweep away crops, rocks, soil, and plants. Scientists measure the magnitude of earthquakes using various scales, including the familiar but outdated Richter scale, the moment magnitude scale, and the Modified Mercalli Intensity scale. On the Richter scale, a magnitude | | **ESL Supports and Scaffolds**<br><br>WIDA Standard 4<br>To support students in speaking refer to this resource:<br>WIDA Doing and Talking Science<br>When applicable- use Home Language do build vocabulary in concepts. Spanish Cognates<br><br>Compare sentence stems:<br>This _____ is similar to that _____because both _____.<br>Contrast Sentence stems:<br>This _____ is different from that _____<br><br>Define Sentence Frames:<br><br>A common characteristic of _____ and _____ is_____.<br>A characteristic of _____ and _____ is_____.<br>One attribute of _____ is _____.<br>_____ and _____ have the following traits in common: _____.<br>_____ can be identified by _____. |

| | | |
|---|---|---|
| of 2 is usually the smallest earthquake that can be felt by people; furniture moves around magnitude 5, and magnitude 8 or greater causes near total destruction. The moment magnitude scale (<2 to 8+) estimates the energy released from earthquakes, and is more precise than the Richter scale. The Modified Mercalli Intensity scale uses roman numerals (I to X+) and rates an earthquake's intensity and damage at different locations.<br><br>**Misconceptions**<br>Students may think that all earthquakes cause damage. Earthquakes happen every day on Earth, and most are not destructive or even felt. For example, according to the U.S. Geological Survey, Southern California experiences about 10,000 earthquakes each year. Most of these have a magnitude so small that they are not even noticeable. Students often confuse magma and lava and may use the terms interchangeably. Point out that both terms refer to the same thick, "goopy" material: molten rock! However, magma refers to the molten material while it still underground. Lava, on the other hand, refers to the molten material once it has erupted and is thus above ground, an image with which students are likely to be familiar. | | |

| 2nd Grade Quarter 2 Curriculum Map<br>Quarter 2 Curriculum Map Feedback | | | | | | |
|---|---|---|---|---|---|---|
| Quarter 1 | | | Quarter 2 | | Quarter 3 | Quarter 4 |
| Structure and Routine | Unit 1<br>Living Things | Unit 2<br>Habitats | Unit 3<br>Earth's Surface | **Unit 4<br>Earth's Changes** | Unit 5<br>Forces and Motion | Unit 6<br>Sound and Light |
| 1 week | 5 weeks | 3 weeks | 4.5 weeks | **4.5** | 9 weeks | 9 weeks |

**UNIT 4: Earth's Changes (4.5 weeks)**

**Overarching Question(s)**

How and why is Earth constantly changing?

| Unit 4: Earth's Changes, Lesson 3 | Lesson Length | Essential Question | Vocabulary |
|---|---|---|---|
| Slowing Earth's Changes | 1.5 weeks | How can people slow the changes to Earth's surface? | Coast, windbreak, natural resource |

| Standards and Related Background Information | Instructional Focus | Instructional Resources |
|---|---|---|
| **DCI(s)**<br>2.ESS2 Earth's Systems<br>2.ETS1 Engineering Design<br>2.ETS2 Links Among Engineering, Technology, and Society<br><br>**Standard(s)**<br>2.ESS2.1: Compare the effectiveness of multiple solutions designed to slow or prevent wind or water from changing the shape of the land.<br>2.ETS1.1: Define a simple problem that can be solved through the development of a new or improved object or tool by asking questions, making observations, and gathering accurate information about a situation people want to change. | **Learning Outcomes**<br>Students will be able to compare solutions of how people prevent changes to Earth's surface.<br><br>**Suggested Phenomenon**<br>*Click on the phenomenon picture to view the video.*<br>  | **Curricular Resources**<br>Engage<br>TE, pp. 171-172<br>TE, p. 171: Phenomenon<br>Be A Scientist Notebook, p. 167 (Phenomenon) and Essential Questions<br><br>Explore<br>TE, pp. 172-173<br>*LAB* Be a Scientist Notebook, p. 168, Inquiry Activity: Beach Erosion<br><br>Explain<br>TE, pp. 174-180<br>Be a Scientist notebook, p. 170: Vocabulary<br>Science File: Preventing Erosion |

| | | |
|---|---|---|
| 2.ETS1.4: Compare and contrast solutions to a design problem by using evidence to point out strengths and weaknesses of the design.<br><br>2.ETS2.1: Use appropriate tools to make observations, record data, and refine design ideas.<br><br>**Explanation(s)**<br>2.ESS2.1<br>Students should be asked to evaluate a set of proposed solutions (which may or may not be student generated) designed to reduce the impact of wind or water on the shape of the land. Solutions to be compared may include different designs of dikes/windbreaks and different designs for using shrubs, grass, trees to prevent erosion, or even different types of retaining walls meant to landslides.<br><br>*It is essential that students do not just see whether or not a design solution works, or which solution works best. Student evaluations should focus on how the solution impacts the land. If the evaluations do not connect to the impacts on the land, the design challenge does not adequately connect to the Earth and space science content.*<br><br>In the LS2 set of standards, students learn how animals (including humans) depend on their environment to supply the land, water, and air needed for survival. In an attempt to access these resources or reduce the negative | Phenomenon Explanation:<br>Planting trees along banks is a way humans slow down or stop water and wind erosion, which carries soil from land. The root systems of the vegetation hold soil in place. | Video: Coastal Erosion<br>Science File: Animal Life Cycles<br>Simulation: Wind Erosion<br>Digital Interactive: Ways to Prevent Land Erosion<br>*LAB* Be a Scientist Notebook, Inquiry Activity p. 174: Designing a Way to Reduce Coastal Erosion<br><br><u>Elaborate</u><br>TE, p. 181<br>*LAB* Be a Scientist Notebook, Simulation p. 177: Wind Erosion<br><br><u>Evaluate</u><br>TE, pp. 181-183<br>*LAB* Be a Scientist Notebook, p. 178, Performance Task: Compare Solutions<br>eAssessment<br><br>**Additional Resources**<br>Lesson: Company Plans to Slow or Stop Erosion<br>Lesson: Company Erosion Solution<br>Video/Demonstration: Soil and Erosion (Prevention)<br>Video: Prevention of Soil Erosion<br>Video: Fencing to Prevent Erosion by Seahore |

| | | |
|---|---|---|
| impacts of wind and water, animals alter the shape of the land. Here we look at how humans impact the land in their solutions. Humans are a specific example, but student solutions are likely to generate an understanding that all living things impact the shape of the land.<br><br>*For efficiency, this standard can be paired with 2.ESS2.2 so that students are evaluating solutions that mitigate impacts that are known/uncovered by the student.*<br><br>2.ETS1.1<br>In earlier grades, students have been presented with a problem and worked to make observations that were relevant to the process of formulating a solution to that problem.<br><br>Engineers design solutions to situations that people want to change or improve. Before designing a solution, a complete description of the situation is created in the form of a problem to be solved. Students should now be presented the opportunity to take a situation or object that they can improved and create a define their own problem to be resolved.<br><br>Asking questions, making observations, and gathering accurate data are all necessary to help define the problem accurately. The most impactful situations to address are those that are relevant to the daily lives of students. | | **ESL Supports and Scaffolds**<br>To support students in speaking refer to this resource:<br><br>WIDA Doing and Talking Science<br><br>When applicable- use Home Language do build vocabulary in concepts. Spanish Cognates<br><br>To support students with the scientific explanation: **Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing.**<br><br>Question starters:<br><br>What do you think…..?<br><br>Why did this happen?<br><br>How should we….?<br><br>What would happen if….?<br><br>Response Starters |

| | | |
|---|---|---|
| Problems may include examples arising from what happens to plants/animals when the environment changes (e.g. Should plants in the classroom be taken home over the weekend/summer?), temperature fluctuations, cutting down trees to build new homes or selecting new trees to plant in an urban setting, pollution, water conditions in a local pond change, and the effects of drought on seasonal springs near the school.<br><br>2.ETS1.4<br>Design problems can have more than one solution. The final solution to a design problem may not be one of earliest designs. Listing the strengths and weaknesses of a group of proposed solutions can lead to changes before arriving at a final solution. Students should compare multiple solutions to a problem, paying attention to the details, in the solution in order to gather evidence that can be used in a discussion of relative strengths and weaknesses of the solutions.<br><br>2.ETS2.1<br>The field of engineering produces tools that can be used to make standardized units. Standard units allow scientists to more easily understand work done by other scientists.<br><br>The second grade Measurement and Data domain for math now includes the use of some standard units of measure. The length of an object, or distance an object | | I agree with you because of (evidence or reasoning)<br><br>I don't agree with your claim because of (evidence or reasoning)<br><br>This evidence shows that…<br><br>Your explanation makes me think about ….. |

| | | |
|---|---|---|
| travels can be measured using standard units of inches, feet, yards, centimeters, or meters (2.MD.A.3). In support of 2.MSA.4, part of the design of a student test/investigation should involve students selecting and justifying the units of measurement used in an investigation.<br><br>Examples might include design/building challenges where students can capture and record data to be used in the refinement of a design based on the performance of the object under a student designed test.<br><br>**Suggested Science and Engineering Practice(s)**<br>Constructing Explanations and Designing Solutions<br><br>**Suggested Crosscutting Concept(s)**<br>Stability and Change<br><br>**Teacher Overview**<br>Humans play an important role in changing Earth's surface. People change Earth's surface in many ways, both intentionally and unintentionally. People can change Earth's surface as ways to control the damage that might occur when natural forces are at work. For example, people can build levees to control flooding. Or farm fields can be built to reduce the effect of wind erosion. People can also unintentionally damage Earth's surface, such as in the contamination of water, air, and other national resources through pollution or oil spills. People can cause undesired changes to Earth's resources even while trying | | |

| | | |
|---|---|---|
| to develop a solution to a problem. For example, building sea walls can deflect the force of ocean waves along the shore, but could also negatively affect local marine organisms and their ecological functions. When developing technological solutions to help control the effects of natural forces, people must evaluate and balance positive effects with negative consequences associated with the technology. Often, this risk-benefit analysis involves considering human values.<br><br>**Misconceptions**<br>Students may think that all pollution is caused by human activities. Although human factors, such as industrialization and motor vehicle emissions, contribute an overwhelmingly significant amount of pollution, many natural processes on Earth can also be a source of pollution. For example, volcanic eruptions produce ash, smoke, carbon dioxide, and other air pollutants; while forest fires, caused by lightning and other natural causes, release a similar set of pollutants. Dust blown by wind from areas of little vegetation contributes to air pollution. Rotting vegetation and microbial activity in wetlands give off methane gas. | | |