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.

Science and Engineering Practices

1. Asking questions & defining problems
2. Developing & using models
3. Planning & carrying out investigations
4. Analyzing & interpreting data
5. Using mathematics & computational thinking
6. Constructing explanations & designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, & communicating information

Disciplinary Core Ideas

<u>**Physical Science**</u>
PS 1: Matter & its interactions
PS 2: Motion & stability: Forces & interactions
PS 3: Energy
PS 4: Waves & their applications in technologies for information transfer

<u>**Life Sciences**</u>
LS 1: From molecules to organisms: structures & processes
LS 2: Ecosystems: Interactions, energy, & dynamics
LS 3: Heredity: Inheritance & variation of traits
LS 4: Biological evaluation: Unity & diversity

<u>**Earth & Space Sciences**</u>
ESS 1: Earth's place in the universe
ESS 2: Earth's systems
ESS 3: Earth & human activity

<u>**Engineering, Technology, & the Application of Science**</u>
ETS 1: Engineering design
ETS 2: Links among engineering, technology, science, & society

Crosscutting Concepts

1. Patterns
2. Cause & effect
3. Scale, proportion, & quantity
4. Systems & system models
5. Energy & matter
6. Structure & function
7. Stability & change

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.

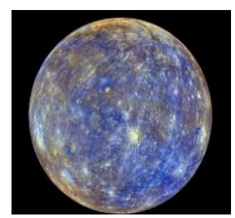
3rd Grade Quarter 3 Curriculum Map [Quarter 3 Curriculum Map Feedback]							
Quarter 1			Quarter 2	**Quarter 3**		Quarter 4	
Structure and Routine	Unit 1 Matter	Unit 2 Magnetic Forces	Unit 3 Energy	**Unit 4 Solar System**	Unit 5 Weather and Climate	Unit 6 Types of Living Things	Unit 7 Survival of Animals and Plants
1 week	5 weeks	3 weeks	9 weeks	**3 weeks**	6 weeks	3 weeks	6 weeks

UNIT 4: Solar System (3 weeks)

Overarching Question(s)

What is the universe, and what is Earth's place in it?

Unit 4: Lesson 1	Lesson Length	Essential Question	Vocabulary
The Inner Planets	1.5 weeks	How are the inner planets similar?	terrestrial planet, Mercury, Venus, Earth, satellite, Mars, asteroid belt

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) 3.ESS1 Earth's Place in the Universe **Standard(s)** 3.ESS1.1: Use data to categorize the planets in the solar system as inner or outer planets according to their physical properties. **Explanation and Support of Standard** 3.ESS1.1 The orbital path a planet follows around the sun is dictated by a combination of the size (mass) of the planet and how fast it travels through space. Students	**Learning Outcomes** Students will identify the physical properties of the inner planets. **Suggested Phenomena** *Click on the phenomenon picture to view the video.*  **Earth**  **Mercury**	**Curricular Resources** Engage Inspire Science TE, pp. 105-106 TE p. 105: Phenomenon Be A Scientist Notebook, Science in My World (Phenomenon): p. 103 TE, Essential Question p. 106 Explore TE, pp. 106-107 *(LAB)* Be a Scientist Notebook, p. 105, Inquiry Activity: Inner Planet Sizes

should be led to make comparisons about these factors (e.g., Planets closer to the sun must either be very small, orbit very quickly, or a combination of the two.). On a particular planet, the duration of its day is determined by how quickly it spins on its axis. Additionally, students should collect data which can be used to create a classification system for planets. Possible types of data might include: makeup of the surface of the planet, size of planets, number of moons, and presence of rings. Criteria for planetary classification, such as clearing the neighborhood, may be used for enrichment, but are beyond the scope of this standard due to a reliance gravity concept not yet introduced. **Suggested Science and Engineering Practice(s)** Analyzing and Interpreting Data **Suggested Crosscutting Concept(s)** Patterns **Teacher Overview** The solar system's four inner, or terrestrial, planets are small, rocky bodies orbiting relatively close to the sun: Mercury, Venus, Earth, and Mars. They are mostly solid with gaseous atmospheres and molten cores. Each is a different size and has different characteristics; for example, Venus is the hottest planet in the solar system, even though it is not the closest to the sun.	Phenomenon Explanation: The inner plants, terrestrial planets, have similar compositions to Earth.	Explain TE, pp. 108-112 Be A Scientist Notebook, p. 107: Vocabulary Science File: Space Science File: Inner Planets *(LAB)* Be A Scientist Notebook, p.109, Inquiry Activity: Recording Inner Planet Data Simulation: Rockets Overcome Gravity Elaborate TE, pp. 112-113 *(LAB)* Be a Scientist Notebook, p. 112, Inquiry Activity: Exploring Mars Evaluate TE, pp. 114-115 *(LAB)* Be A Scientist Notebook, p. 114 Performance Task: Inner Planet Research Journal eAssessment **Additional Resources** Lesson: Do You Know the Inner Planets? Video: Inner Planets Part 1 Video: Inner Planets Part 2 Video: Explore the Solar System: The Rocky Planets

Misconceptions Students might think that other planets are much like Earth, with trees and breathable atmosphere, and possibly animals and people. Help students understand how different other planets are from earth.		**ESL Supports and Scaffolds** **The Language of Science** To support students in speaking, refer to this resource: WIDA Doing and Talking Science When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals Use graphic organizers or concept maps to support students in their explanations of the similarities of the inner planets. Provide compare/contrast sentence stems: This is the same as because... This is different than because… All these are because…, and all have/are…. Consider partnering students to support comprehension and speaking as students analyze data and discuss the similarities of the inner planets.

3rd Grade Quarter 3 Curriculum Map

[Quarter 3 Curriculum Map Feedback]

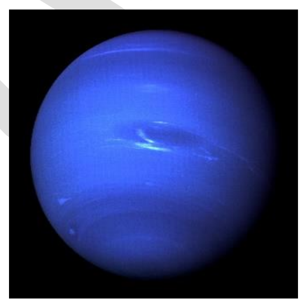
Quarter 1			Quarter 2	**Quarter 3**		Quarter 4	
Structure and Routine	Unit 1 Matter	Unit 2 Magnetic Forces	Unit 3 Energy	**Unit 4 Solar System**	Unit 5 Weather and Climate	Unit 6 Types of Living Things	Unit 7 Survival of Animals and Plants
1 week	5 weeks	3 weeks	9 weeks	**3 weeks**	6 weeks	3 weeks	6 weeks

UNIT 4: Solar System (3 weeks)

Overarching Question(s)

What is the universe, and what is Earth's place in it?

Unit 4: Lesson 2	Lesson Length	Essential Question	Vocabulary
The Outer Planets	1.5 weeks	How are the outer planets similar?	gas, giant, Jupiter, Saturn, Uranus, Neptune

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) 3.ESS1 Earth's Place in the Universe **Standard(s)** 3.ESS1.1: Use data to categorize the planets in the solar system as inner or outer planets according to their physical properties. **Explanation and Support of Standard** The orbital path a planet follows around the sun is dictated by a combination of the size (mass) of the planet and how fast it travels through space. Students should be led to make comparisons about these factors (e.g., Planets	**Learning Outcomes** Students will identify the physical properties of the outer planets. **Suggested Phenomena** *Click on the phenomenon picture to view the video.*  Neptune	**Curricular Resources** Engage Inspire Science TE p. 117-118 TE p. 117: Phenomenon Science in My World (Phenomenon): p. 117 TE, Essential Question: p. 118 Explore TE, pp. 118-119 *(LAB)* Be a Scientist Notebook, p. 119, Inquiry Activity: Outer Planet Sizes Explain

closer to the sun must either be very small, orbit very quickly, or a combination of the two.). On a particular planet, the duration of its day is determined by how quickly it spins on its axis. Additionally, students should collect data which can be used to create a classification system for planets. Possible types of data might include: makeup of the surface of the planet, size of planets, number of moons, and presence of rings. Criteria for planetary classification, such as clearing the neighborhood, may be used for enrichment, but are beyond the scope of this standard due to a reliance gravity concept not yet introduced. **Suggested Science and Engineering Practice(s)** Analyzing and Interpreting Data **Suggested Crosscutting Concept(s)** Patterns **Teacher Overview** The solar system's four outer, or gas giant, planets are large, gaseous bodies orbiting relatively far from the sun: Jupiter, Saturn, Uranus, and Neptune. They are called gas giants because they contain little solid matter, and are significantly larger than the terrestrial planets. Many of the gas giants have spectacular storms, the largest of which, on Jupiter, is more than	Phenomenon Explanation: Neptune is one of the outer planets, known as the gas giants. They are called gas giants because they contain little solid matter, and are significantly larger than the terrestrial planets.	TE, pp. 120-124 Be A Scientist Notebook, p. 121: Vocabulary Science File: Outer Planets Simulation: Rockets Overcome Gravity Elaborate TE, pp. 125 *(LAB)* Be a Scientist Notebook, p. 126, Inquiry Activity: Exploring the Outer Planets Evaluate TE, pp. 126-127 *(LAB)* Be A Scientist Notebook, p. 128 Performance Task: Outer Planet Research Journal eAssessment **Additional Resources** Lesson: Explore the Outer Planets Activity: Tour the Planets Video: The Outer Planets Video: Explore the Solar System: The Gas Giants **ESL Supports and Scaffolds** **The Language of Science**

twice the size of the whole Earth. Saturn has striking rings made of ice and dust. **Misconceptions** Students might think that all planets are solid like Earth, and that they all have breathable atmospheres, the same gravity, and even life. Help them understand that conditions on the outer planets are incredibly hostile to life as we know it.		To support students in speaking, refer to this resource: WIDA Doing and Talking Science When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals Use graphic organizers or concept maps to support students in their explanations of the similarities of the outer planets. Provide compare/contrast sentence stems: This is the same as because... This is different than because... All these are because..., and all have/are.... Consider partnering students to support comprehension and speaking as students analyze data and discuss the similarities of the outer planets.

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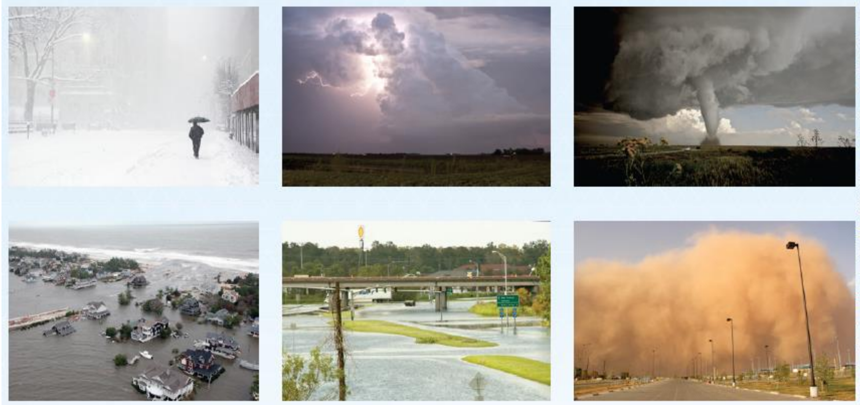
3rd Grade Quarter 3 Curriculum Map Quarter 3 Curriculum Map Feedback							
Quarter 1			Quarter 2	**Quarter 3**		Quarter 4	
Structure and Routine	Unit 1 Matter	Unit 2 Magnetic Forces	Unit 3 Energy	Unit 4 Solar System	**Unit 5 Weather and Climate**	Unit 6 Types of Living Things	Unit 7 Survival of Animals and Plants
1 week	5 weeks	3 weeks	9 weeks	3 weeks	**6 weeks**	3 weeks	6 weeks

UNIT 5: Weather and Climate (6 weeks)			
Overarching Question(s)			
How and why is Earth constantly changing?			
Unit 5: Lesson 1	**Lesson Length**	**Essential Question**	**Vocabulary**
Weather Changes	2 weeks	How does weather change?	Weather, atmosphere, precipitation, air pressure

Standards and Related Background Information	**Instructional Focus**	**Instructional Resources**
DCI(s) 3.ESS2 Earth's Systems **Standard(s)** 3.ESS2.1: Explain the cycle of water on Earth. 3.ESS2.2: Associate major cloud types (nimbus, cumulus, cirrus, and stratus) with weather conditions. 3.ESS2.3: Use tables, graphs, and tools to describe precipitation, temperature, and wind (direction and speed) to determine local weather and climate.	**Learning Outcomes** Students will be able to identify different weather patterns. **Suggested Phenomena** *Click on the phenomenon picture to view the video.* **Next Page** ↓	**Curricular Resources** Engage TE, p. 133-134 TE p. 133: Phenomenon Be a Scientist Notebook, p. 135 Phenomenon TE, Essential Question: p. 134 Explore TE, pp. 135 *(LAB)* Be a Scientist Notebook, p. 137, Inquiry Activity: Air Is Around You

Explanation and Support of Standard 3.ESS2.1 3.PS1.1 introduces students to the idea that materials can be subdivided to smaller and smaller pieces to the point where these smaller parts are no longer visible. We use the generic term particles to describe these invisible forms of matter. Even though these invisible particles exist, they are still present. Being able to explain why a puddle of water disappears or clouds form requires that students grasp the particulate nature of matter. Despite the large amount of water on our planet, the majority is found in oceans, limiting its immediate use by organisms living on land. The remaining pool of fresh water is located mainly with glaciers or underground. A very small amount of fresh water is found in lakes, streams, or wetland areas. As water flows across the surface of the Earth towards oceans, it creates features on the surface of the Earth. *It may be helpful to show students that clouds can form from nothing with a demonstration. Without such an experience, students may assume that clouds simply blow across the sky without considering where they come from.* 3.ESS2.2 This standard pairs well with 3.PS1.1 which presents the theory that matter is made of particles that exist even when we cannot see	 Phenomenon Explanation: Weather is a complex system driven largely by changes in the temperature and pressure of air masses.	<u>Explain</u> TE, pp. 136-144 Be A Scientist Notebook, p. 139: Vocabulary Science Handbook/eBook: Weather Video: Weather Report Science Handbook/eBook: Weather—Describing and Measuring Weather Science Handbook/eBook: Predicting Weather *(LAB)* Be A Scientist Notebook, p.141, Inquiry Activity: Predict Weather Digital Interactive: The Water Cycle Science Handbook/eBook: Clouds Teacher Demonstration: Clouds in a Jar Science File: Bad Weather <u>Elaborate</u> TE, pp. 144-145 Be a Scientist Notebook, p. 145, Write a Script Digital Interactive/Simulation: Weather Events <u>Evaluate</u> TE, pp. 146-147

them. Cloud formation can be treated as evidence for invisible particles of matter. Scientists can track patterns in cloud formation and subsequent weather conditions. By observing patterns in the types and shapes of clouds, weather scientists are able to predict near future weather conditions. This standard can also be bundled with 3.ESS2.3 as set of data to record about weather. *Students do not have exposure to phase transitions (condensation) until 5.PS1.1, so discussions of the microscopic processes that form clouds are beyond the scope of this standard.* 3.ESS2.3 Clarification may be needed to differentiate between the terms weather and climate. Weather scientists record data at different times of the day/year and also in different areas. Weather occurs at a local scale. By analyzing pattern in their data, it is possible for scientists to make weather predictions. Students should become familiar with the tools and techniques used to monitor weather. Climate occurs at broader scales of condition and time. Climate descriptions take into account the range of weather conditions that occur over longer periods of time. Weather measurements should be gathered and organized to permit		*(LAB)* Be A Scientist Notebook, p. 147, Performance Task: Become a Meteorologist eAssessment **Additional Resources** Lesson: What's The Weather? Lesson: How Much Has It Really Rained? Lesson: The Weather House - Design and Construction Video: Changes in Weather Video: Clouds and Weather Patterns (PBS) **ESL Supports and Scaffolds** **The Language of Science** To support students in speaking, refer to this resource: WIDA Doing and Talking Science When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals **Weather visuals and flashcards**

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classification of their climate as well as making short term predictions such as probable weather. **Suggested Science and Engineering Practice(s)** Analyzing and Interpreting Data Obtaining, Evaluating, and Communicating Information **Suggested Crosscutting Concept(s)** Patterns **Teacher Overview** Weather is a complex system driven largely by changes in the temperature and pressure of air masses. Meteorologists use large amounts of weather data, such as temperature, pressure, humidity, and wind speed over large areas, to create weather reports and make forecasts. Weather maps and charts are tools that help to show and analyze weather data. **Misconceptions** Students may have the misconception that clouds covering the sun cause cold temperatures. Temperature depends on many factors, such as time of year, location, elevation, and winds. Students may also think that seasons cause the weather to change. Certain weather patterns and temperatures occur during a particular season; however, a season is simply a human classification, not a force that causes weather.		Use graphic organizers or concept maps to support students in their explanations of the similarities and differences of the types of clouds. Provide compare/contrast sentence stems: This is the same as because... This is different than because… All these are because…, and all have/are…. Explain sentence stems: This happens because…. When the weather…. It is because… I notice that when…. The weather changes by…. Consider partnering students to support comprehension and speaking as students analyze data and discuss weather patterns.

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3rd Grade Quarter 3 Curriculum Map

[Quarter 3 Curriculum Map Feedback]

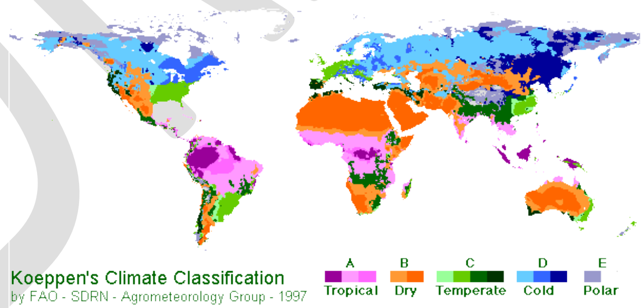
Quarter 1			Quarter 2	**Quarter 3**		Quarter 4	
Structure and Routine	Unit 1 Matter	Unit 2 Magnetic Forces	Unit 3 Energy	Unit 4 Solar System	**Unit 5 Weather and Climate**	Unit 6 Types of Living Things	Unit 7 Survival of Animals and Plants
1 week	5 weeks	3 weeks	9 weeks	3 weeks	**6 weeks**	3 weeks	6 weeks

UNIT 5: Weather and Climate (6 weeks)

Overarching Question(s)

How and why is Earth constantly changing?

Unit 4: Lesson 2	Lesson Length	Essential Question	Vocabulary
Different Climates	2 weeks	How do climates vary in different regions of the world?	axis, climate

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) 3.ESS2 Earths Systems **Standard(s)** 3.ESS2.3: Use tables, graphs, and tools to describe precipitation, temperature, and wind (direction and speed) to determine local weather and climate. 3.ESS2.4: Incorporate weather data to describe major climates (polar, temperate, and tropical) in different regions of the world. **Explanation and Support of Standard** 3.ESS2.3	**Learning Outcomes** Students will be able to identify different weather patterns. **Suggested Phenomena** *Click on the phenomenon picture to view the video.* 	**Curricular Resources** Engage TE, p. 149-150 TE p. 149: Phenomenon Be A Scientist Notebook: Science in My World (Phenomenon): p. 151, TE, Essential Question: p. 150 Explore TE, pp. 151 *(LAB)* Be a Scientist Notebook, p. 151, Inquiry Activity: Compare Weather Patterns Explain

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Clarification may be needed to differentiate between the terms weather and climate. Weather scientists record data at different times of the day/year and also in different areas. Weather occurs at a local scale. By analyzing pattern in their data, it is possible for scientists to make weather predictions. Students should become familiar with the tools and techniques used to monitor weather. Climate occurs at broader scales of condition and time. Climate descriptions take into account the range of weather conditions that occur over longer periods of time. Weather measurements should be gathered and organized to permit classification of their climate as well as making short term predictions such as probable weather. 3.ESS2.4 Climate is the range of conditions seen in a particular area over multiple years. Instruction of this standard should not be limited to discussions of the average/typical conditions of the listed climates. Additionally, the range of weather conditions seen in these area should be explored. It is important that students recognize that changes in climate may not be apparent during a human lifetime and are easiest identify when weather scientists study the extremes of the range of weather conditions in a location, rather than the typical weather type. **Suggested Science and Engineering Practice(s)** Analyzing and Interpreting Data	Phenomenon Explanation: Climate refers to conditions that happen over a long period of time. Locations that are the same distance from the equator may have similar climates, but climate also depends on topography.	TE, pp. 152-157 Be A Scientist Notebook, p. 155: Vocabulary Science Handbook/eBook: Climate Video: Climate Tour Science Handbook/eBook: Factors That Affect Climate Simulation: Comparing Data Elaborate TE, pp. 158-159 *(LAB)* Be a Scientist Notebook, p.161, Inquiry Activity: Land and Temperature Change Evaluate TE, pp. 160-161 *(LAB)* Be A Scientist Notebook, p. 163, Performance Task: Create a Climate Travel Poster eAssessment **Additional Resources** Video: Weather vs. Climate (PBS) Video: Basics of Geography: Climate Lesson: What is Climate (PBS) Lesson: Climate Is What You Expect – Close Reading Lesson: Plotting Climate Data

Obtaining, Evaluating, and Communicating Information **Suggested Crosscutting Concept(s)** Patterns **Teacher Overview** Climate refers to the pattern of the weather at a certain place over a long period of time. Climate includes temperature patterns, precipitation, winds, and other weather conditions and events. Weather in any given area is often dependent upon the seasons. Locations that are the same distance from the equator may have similar climates, but climate also depends on topography. Mountains, plains, plateaus, deserts, and coastlines may all be at an equal distance from the equator and have very different climates. Proximity to water, such as oceans or lakes, also impacts regional climate. **Misconceptions** Students may have the misconception that weather and climate have the same meaning. Weather refers to conditions that are happening right now. Climate refers to conditions that happen over a long period of time. Students may also have the misconception that Earth gets closer to the sun in summer and is farther away in winter. As Earth moves around the sun, the axis points either toward or away from the sun. When Earth's axis points away from the sun in the Northern		**ESL Supports and Scaffolds** **The Language of Science** To support students in speaking, refer to this resource: WIDA Doing and Talking Science When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals **Weather visuals and flashcards** Use graphic organizers or concept maps to support students in their explanations of the similarities and differences of the types of clouds. Provide compare/contrast sentence stems: This is the same as because... This is different than because… All these are because…, and all have/are…. Explain sentence stems: This happens because…. When the weather…. It is because… I notice that when…. The weather changes by….

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Hemisphere, that half of Earth has winter. When the Northern Hemisphere points toward the sun, that hemisphere has summer. Another misconception students may have is that all areas that are an equal distance from the equator have the same climate.		Consider partnering students to support comprehension and speaking as students analyze data and discuss weather patterns.

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3rd Grade Quarter 3 Curriculum Map [Quarter 3 Curriculum Map Feedback]							
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Structure and Routine	Unit 1 Matter	Unit 2 Magnetic Forces	Unit 3 Energy	Unit 4 Solar System	**Unit 5 Weather and Climate**	Unit 6 Types of Living Things	Unit 7 Survival of Animals and Plants
1 week	5 weeks	3 weeks	9 weeks	3 weeks	**6 weeks**	3 weeks	6 weeks

UNIT 5: Weather and Climate (6 weeks)
Overarching Question(s)
How do Earth's surface processes and human activities affect each other?

Unit 5: Lesson 3	Lesson Length	Essential Question	Vocabulary
Natural Hazards	2 weeks	What are natural hazards and how can they change environments	El Niño, levee, lightning rod

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) 3.ESS3 Earth and Human Activity **Standard(s)** 3.ESS3.1: Explain how natural hazards (fires, landslides, earthquakes, volcanic eruptions, floods) impact humans and the environment. 3.ESS3.2: Design solutions to reduce the impact of natural hazards (fires, landslides, earthquakes, volcanic eruptions, floods) on the environment. **Explanation and Support of Standard** 3.ESS3.1:	**Learning Outcomes** Students will describe and define how natural hazards affect environments, and they will identify ways that humans can reduce the impacts of natural hazards. **Suggested Phenomena** *Click on the phenomenon picture to view the video.*  Wildfire	**Curricular Resources** Engage TE, p. 163-164 TE p. 163: Phenomenon Be A Scientist Notebook, Science in My World (Phenomenon): p167, TE, Essential Question: p. 164 Explore TE, pp. 164-165 *(LAB)* Be a Scientist Notebook, p. 169, Inquiry Activity: Floods Affect Plants Explain

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Natural hazards are hazardous events that can potentially harm humans. These hazards are the result of processes that happen in the natural world. Humans cannot prevent these natural processes from occurring, therefore it is impossible to prevent the natural hazards that occur as an outcome. The goal of studying these natural hazards is to try to reduce their impacts. Instruction to this standard will stay closest to the intent of the standard if students are asked to apply their understanding of the hazards in the same way that a scientist would, through design tasks. *In K.ESS3.2 a foundation is set for this standard by examining severe weather. Scientists study severe weather in order to help people stay safe in severe weather conditions.* 3.ESS3.2: Activities, such as building a model of a volcano, may allow students to understand something about volcanoes. However, such lessons are not in line with the intent of the standard, unless they also address how scientists use those understandings to help reduce the impacts of natural hazards. The third-grade ESS3 standards, together, emphasize the application of scientific understanding, rather than just the acquisition of scientific knowledge. Students should apply an understanding of how natural hazards impact the environment (3.ESS3.1) in their solutions.	Phenomenon Explanation: Natural hazards include weather related events, such as hurricanes, tornadoes, severe lightning, forest fires, and floods.	TE, pp. 166-173 Be A Scientist Notebook, p. 171: Vocabulary Science Handbook/eBook: Volcanoes and Earthquakes Science Handbook/eBook: Floods and Landslides Digital Interactive: Droughts, Landslides, and Flood *(LAB)* Be A Scientist Notebook, p. 173, Inquiry Activity: Landslide Science Handbook/eBook: Weather Events—Tornadoes and Hurricanes Digital Interactive: Tornadoes and Hurricanes Digital Interactive: Building Structures Video: Humans and Natural Hazards Science File: Preparedness Digital Interactive: Lightning Rod Elaborate TE, p. 174 Digital Interactive: Lightning Rod *(LAB)* Be a Scientist Notebook, p. 177, Digital Interactive: Lightning Rod Evaluate TE, pp. 175-177

Suggested Science and Engineering Practice(s) Engaging in Argument from Evidence **Suggested Crosscutting Concept(s)** Cause and Effect Systems and System Models **Teacher Overview** Natural hazards kill thousands of people and cause billions of dollars in economic losses every year. No nation or community is immune to the damage natural hazards cause. Lightning strikes are common occurrences wherever thunderstorms happen. A simple lightning rod can protect a building from a lightning strike. Invented by Benjamin Franklin in 1749, a lightning rod is a metal pole attached to the top of a building. The pole is attached to a copper cable that leads underground. When lightning strikes the rod, the electric charge from the lightning travels along the cable and into the ground. This reduces the risk of a fi re or heat damage from a lightning strike. Federal and non-governmental agencies have established organizations to help people with emergency services and rebuilding when natural disasters occur. The Federal Emergency Management Agency (FEMA) supports citizens and first responders to ensure that the citizens "work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from and mitigate all hazards."		*(LAB)* Be A Scientist Notebook, p. 178 Performance Task: Building Weatherproof Structures eAssessment **Additional Resources** Lesson: Weather Hazards in Our Area Lesson: Earthquake Hazards Lesson: Weather Hazards – Rainy Day Walk Lesson: Natural Disasters Video: Natural Hazards Affect Humans Video: Nature's Fury **ESL Supports and Scaffolds** **The Language of Science** To support students in speaking, refer to this resource: WIDA Doing and Talking Science When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals **Weather visuals and flashcards**

Misconceptions One possible misconception among students is that their communities could be struck by any natural disaster. Hurricanes, earthquakes, and tornadoes occur in specific areas, and many people experience no natural disasters at all. A common misconception among students is that buildings are completely destroyed by natural hazards, such as earthquakes or hurricanes. In reality, the buildings might receive only partial damage from a disaster. Damaged buildings might still be unfit for people to live in. Make sure students understand that many buildings can survive the impact of winds registering more than 200 miles per hour or the shaking of the ground during major earthquakes.		Use graphic organizers or concept maps to support students in their explanations of the hazardous weather Explain sentence stems: Humans can reduce the impact of hazardous weather by… Hazardous weather can…. Because… In order to prevent…from…people should…. Consider partnering students to support comprehension and speaking as students analyze data and discuss the effects of hazardous weather.

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