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 provides 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.

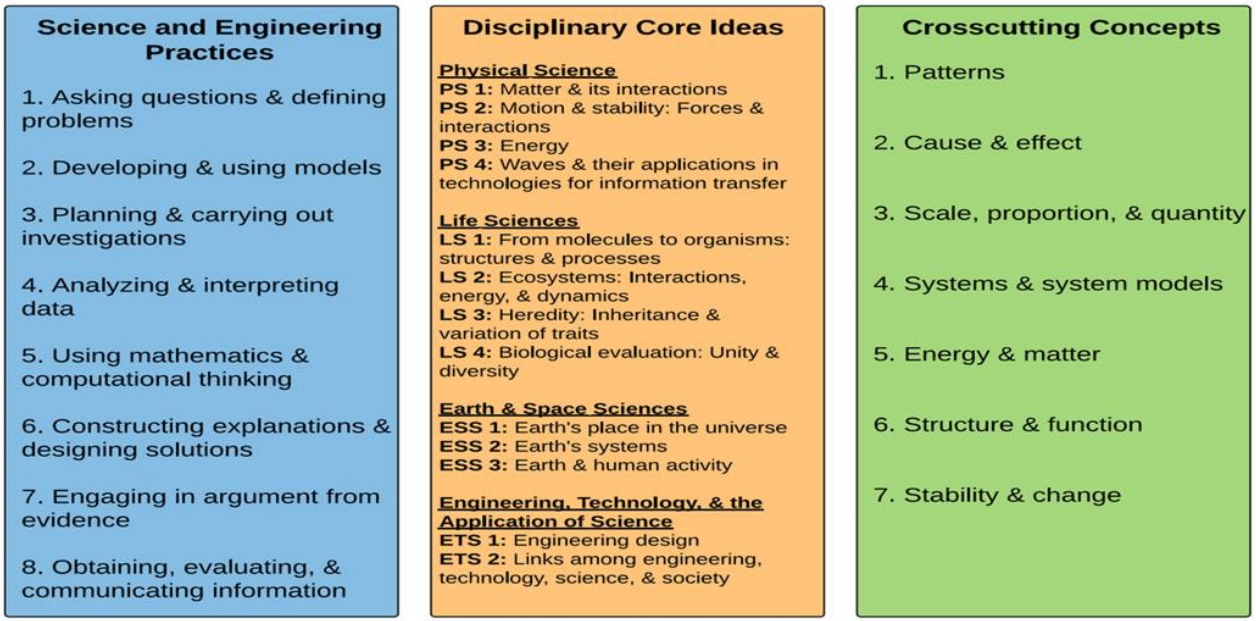
The Tennessee Academic Standards for Science were developed using the National Research Council's 2012 publication, A Framework for K-12 Science Education as their foundation. The framework presents a new model for science instruction that is a stark contrast to what has come to be the norm in science 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.

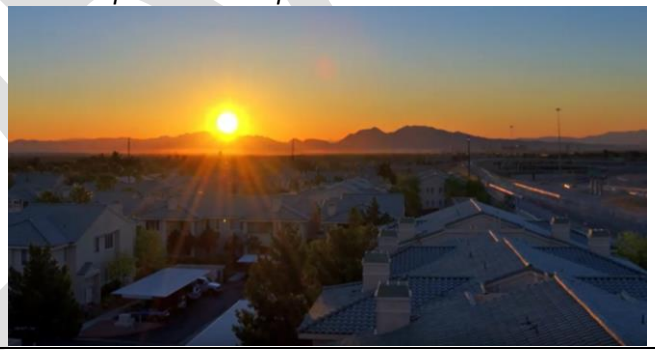
Purpose of Science Curriculum Maps

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.

1st Grade Quarter 2 Curriculum Map Quarter 2 Curriculum Map Feedback					
Quarter 1			**Quarter 2**	Quarter 3	Quarter 4
Structure and Routine	Unit 1 Earth and Space	Unit 2 Seasons	**Unit 3 Light Energy**	Unit 4 Plants	Unit 5 Plant Environment
1 week	5 weeks	3 weeks	**9 weeks**	9 weeks	9 weeks

UNIT 3: Light Energy (9 weeks)			
Overarching Question(s)			
How is energy transferred and conserved? How are waves used to transfer energy and information?			
Unit 3: Lesson 1	**Lesson Length**	**Essential Question**	**Vocabulary**
Sunlight and the Earth's Surface	2 weeks	How does the Sun affect Earth's surface?	temperature

Standards and Related Background Information	**Instructional Focus**	**Instructional Resources**
DCI(s) 1.PS3: Energy **Standard(s)** 1.PS3.1: Make observations to determine how sunlight warms Earth's surfaces (sand, soil, rocks, and water). **Explanation and Support of Standard** 1.PS3.1 This is a student's first exposure to energy transfer, but explicitly using the word energy is not necessary. The standard prepares students for the idea that the Sun causes the surface of the Earth to warm up, but not to explain how this happens. Objects can be placed directly in sunlight or shade. Different materials	**Learning Outcomes** Students will be able to conduct an investigation and make observations to explain the effect of sunlight on Earth's surface. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.* 	**Curricular Resources** Engage Inspire Science TE, pp. 191-192 TE, p. 191, Phenomenon, Be a Scientist Notebook, p. 187 TE, p. 192, Essential Question TE, p. 192, Science and Engineering Practices Explore TE, pp. 192-194 *(LAB)* Be a Scientist Notebook, p. 188 Inquiry Activity: Sunlight and Water Explain TE, pp. 194-196

can be used including light-colored sand, potting soil, water, red clay and similar colored rocks. Students may struggle to understand is that the sun causes warming, without touching the Earth and that water is warmed even though light passes through it. It is possible to support math standards 1.NBT.A.1 and 1.NBT.3 with appropriate equipment and investigation design. Nail polish can be painted over part of the digital display to hide decimal values. If readings are taken in Celsius, the values measured for safe temperatures will generally fall between 20oC and 40oC. Without making such preliminary equipment plans, observations should be limited to relative observations such as "feels warmer/cooler" or in the case of thermometers, whether "the red line went up/down." Make sure students can connect this to temperature rising without taking specific readings. **Suggested Science and Engineering Practice(s)** Obtaining, Evaluating, and Communicating Information **Suggested Crosscutting Concept(s)** Cause and Effect **Teacher Overview**	Phenomenon Explanation: When sunlight reaches the Earth, it warms the Earth's surface.	Be A Scientist Notebook, Vocabulary, p. 190 Science File: Earth and the Sun Digital Interactive: Sunlight Song: A Sun for All Seasons (print from ConnectEd) Elaborate TE, pp. 197-199 *(LAB)* Be a Scientist Notebook, p. 192, Inquiry Activity: Sunlight and Earth's Surface Video: The Sun throughout the Day Evaluate TE, pp. 200-201 *(LAB)* Be A Scientist Notebook, pp. 194, Performance Task: Give a News Report eAssessment **Additional Resources** Lesson: Exploring the Sun Lesson: Sources of Light Assessment: Sources of Light Project: Our Sun is a Star! Videos: • What is light energy? • Energy: Dr. Binocs Show Educational Videos for Kids

The Sun is a star, just like the ones you see in the sky at night. However, it is much closer to Earth than any other star, so it appears bigger and brighter. The Sun is 93 million miles away from Earth and it is 4.5 billion years old. The Sun rises in the east, appears to move across the sky, and it sets in the west. The Sun continuously produces energy from its hydrogen fusion reactions. The Sun is the primary source of energy for Earth. The Sun's energy affects Earth's surface in many ways. It warms the soil, rocks, water, and air. For example, sunlight provides the energy for the water cycle and photosynthesis. The Sun also affects Earth's seasons. **Misconceptions** Students may think that day and night are caused by the Sun revolving, or traveling in a path around Earth, or by Earth revolving around the Sun. Reinforce the patterns of day and night by demonstrating with a globe and a lamp to represent the Sun. Spin the globe to show how the side of Earth that faces the Sun has daytime and the side that faces away from the Sun has nighttime. Explain that at night, we are in Earth's shadow.		• Story Bots: I'm so Hot • How To Catch A Star by Oliver Jeffers **Simulation** Simulation of day and night **ESL Supports and Scaffolds** ESL and Alternatives: WIDA Standard 4: The Language of Science To support students in speaking refer to this resource: WIDA Doing and Talking Science When applicable- use Home Language do build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals Note- EL Grade 1 Module 2 provides visuals and resources for this unit. **Pre-teach**: (**Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs**) Affect, surface,

		Get Epic Why Blue? Why Blue? (S&E) Spanish & English Get Epic Why Blue? Why Blue? (S&E) Spanish & English MES English Flashcards MES English Flashcards **Classify Sentence frames:** _____ is an example of _____. • _____ and _____ are different. • _____ and _____ are similar. • _____ goes with _____. • _____ means the same as _____. • _____ is similar to _____. • _____ and _____ are _____. • _____ is a _____.

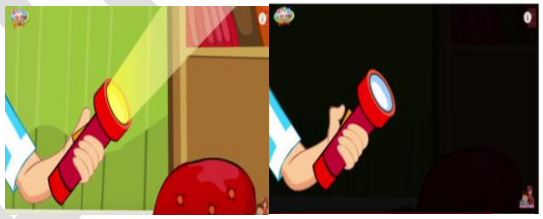
1st Grade Quarter 2 Curriculum Map Quarter 2 Curriculum Map Feedback					
Quarter 1			**Quarter 2**	Quarter 3	Quarter 4
Structure and Routine	Unit 1 Earth and Space	Unit 2 Seasons	**Unit 3 Light Energy**	Unit 4 Plants	Unit 5 Plant Environment
1 week	5 weeks	3 weeks	**9 weeks**	9 weeks	9 weeks

UNIT 3: Light Energy (9 weeks)

Overarching Question(s)

How is energy transferred and conserved? How are waves used to transfer energy and information?

Unit 3: Lesson 2	Lesson Length	Essential Question	Vocabulary
Light and Shadows	2 weeks	What is light?	light, shadow

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) 1.PS4: Waves and Their Application in Technologies for Information Transfer **Standard(s)** 1.PS4.1: Use a model to describe how light is required to make objects visible. Summarize how illumination could be from an external light source or by an object giving off its own light. **Explanation and Support of Standard** 1.PS4.1 When it is dark there are no external light sources, so no light is present to reflect off the surface of the objects, and we cannot use our sense of sight. Some objects (such as fires, the Sun, incandescent light	**Learning Outcomes** Students will explain that light makes objects visible and that some objects can be seen because light shines on the objects and some objects give off their own light. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.* 	**Curricular Resources** Engage TE, pp. 203-204 TE, p. 197, Phenomenon TE, Essential Questions, p. 204 TE, Science and Engineering Practices, p. 204 Explore TE, pp. 204-206 *(LAB)* Be a Scientist Notebook, p. 198 Inquiry Activity: Light Illuminates Objects Science Paired Read Aloud/eBook: A Constant Friend Explain TE, pp. 206-209 Be a Scientist Notebook, p. 200: Vocabulary

bulbs, or the wires in a toaster) get hot enough that they can become a source of light. Example experiences may include the inability to observe objects in a completely dark room. Pinhole viewers may be constructed using tubes from paper towel rolls or empty tubes from chips and used to observe a candelabra light bulb or trees or objects outdoors. Students can then diagram the events necessary to create the image projected on the back of the pinhole camera/viewer. **Suggested Science and Engineering Practice(s)** Developing and Using Models **Suggested Crosscutting Concept(s)** Cause and Effect **Teacher Overview** Light is one kind of energy we get from the Sun and one we can detect with our eyes. Energy from the Sun comes down to Earth and bounces off objects. The receptors in our eyes and our brain detect the changes and interpret them as shapes and colors. Light comes as a mix of colors. The light bounces off objects in different ways, giving some objects more of one color than another. For instance, a red tomato absorbs much of the light that hits it, but certain waves bounce back. Our eyes see the waves	Phenomenon Explanation: In order to see things, light must reflect off an objects and enter the eye.	Science File: Light Digital Interactive: Light Everywhere Elaborate TE, pp. 209-211 *(LAB)* Be a Scientist Notebook, p. 203 Inquiry Activity: Changing Shadows Evaluate TE, pp. 212-213 *(LAB)* Be a Scientist Notebook, p. 205 Performance Task: Light Investigation eAssessment **Additional Resources** Lesson: Shadows, Shadows, Shadows! Lesson: Introduction to Shadows Lesson: Indoor Shadows Lesson: Friendly Shadows Lesson: Moving Shadows Lesson: Outdoor Shadows Lesson: Shrinking and Stretching Shadows Lesson: Using Light to Send Signals Online Article: Light and Sight Video: Why Can't We See in the Dark? Video: Light and Shadows Video: Shadow Play Video: Shadows Dr. Binocs Interactive Sites: Light Assessment: Sending Signals

that bounce back and interpret those waves as the color red. **Misconceptions** Students may think that colors are not related to light, and that all objects retain their color no matter what light shines on them. They may also think that shadows are always the same size as the objects that cast them. They may have trouble understanding that a shadow is an area with less light and that it changes depending on the angle and the direction of the light. Students may benefit from a demonstration in which a flashlight is directed at objects from different angles. Students would be able to see how the shadow of the object changes as the angle and location of the flashlight beam shifts.		Assessment: Shadow Play Assessment: Being Shadowed **ESL Supports and Scaffolds** ESL and Alternatives: WIDA Standard 4: The Language of Science To support students in speaking refer to this resource: WIDA Doing and Talking Science When applicable- use Home Language do build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals Pre-teach: (**Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs**) shines on, shadow, light Provide sentence frame: The _____(lamp) shines on a _____(desk). The _____ (desk) makes a shadow. Have students use complete sentences to describe how shadows are made. Describe sentence frames: The _____ has____, and_____. How does the _____?

1st Grade Quarter 2 Curriculum Map Quarter 2 Curriculum Map Feedback					
Quarter 1			**Quarter 2**	Quarter 3	Quarter 4
Structure and Routine	Unit 1 Earth and Space	Unit 2 Seasons	**Unit 3 Light Energy**	Unit 4 Plants	Unit 5 Plant Environment
1 week	5 weeks	3 weeks	**9 weeks**	9 weeks	9 weeks

UNIT 3: Light Energy (9 weeks)

Overarching Question(s)

How is energy transferred and conserved? How are waves used to transfer energy and information?

Unit 3: Lesson 3	Lesson Length	Essential Question	Vocabulary
Light and Materials	2 weeks	How does light travel through different materials?	materials, opaque, translucent, transparent

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) 1.PS4: Waves and Their Application in Technologies for Information Transfer **Standard(s)** 1.PS4.2: Determine the effect of placing objects made with different materials (transparent, translucent, opaque, and reflective in the path of a beam of light). **Explanation and Support of Standard** 1.PS4.2 The focus of this standard should be on the way that objects affect the path of light, and not on rote memorization of terms. Some objects, like glass, allow light to pass through them. Others block the path of light and create shadows on surfaces beyond them. Mirrored surfaces create shadows beyond them, because they	**Learning Outcomes** Students will determine how light travels through different materials. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.*  Translcent Leaf	**Curricular Resources** Engage Inspire Science TE, pp. 215-216 TE, p. 209, Phenomenon TE p. 216, Essential Questions TE p. 216, Science and Engineering Practices Explore TE, pp. 217-218 *(LAB)* Be a Scientist Notebook, p. 140 Inquiry Activity: Light Passing Through Explain TE, pp. 218-223 Be a Scientist notebook, p. 213: Vocabulary Video: Light Digital Interactive: Types of Materials

redirect the path of light that strikes them. Students can try to direct the path of a beam of light (a focused flashlight or laser pointer) around a maze of obstacles and onto a specified target. If pinhole viewers are constructed, students can place these materials in front of the pinhole and observe the effects. *(The way light scatters off of rough surfaces may be discussed but is not a principle part of this standard.)* **Suggested Science and Engineering Practice(s)** Obtaining, Evaluating, and Communicating Information **Suggested Crosscutting Concept(s)** Cause and Effect **Teacher Overview** Different materials absorb or reflect light in different ways. Our eyes receive the waves that bounce off objects and interpret the changes as shapes and colors. Transparent objects allow light to travel through them without much light bouncing back. Windows are an example of transparent objects. Translucent objects let only some light through. An example is frosted glass; such as might be used in a home's front door. Some light is let through, but most is reflected back. Opaque objects block light altogether. The absence of light coming through these objects forms a shadow, or an area without light. Some objects are reflective, meaning they bounce a lot of light back. Objects made from	Phenomenon Explanation: The type of material an item is made of determines if light can pass through it completely, partially, or not at all.	Science Paired Read Aloud/Science File: Light and Materials Elaborate TE, p. 224 *(LAB)* Be a Scientist Notebook, p. 218 Inquiry Activity: Building Materials Evaluate TE, pp. 225-27 *(LAB)* Be a Scientist Notebook, p. 220, Performance Task: Light and Materials eAssessment **Additional Resources** Lesson: Light and Properties of Materials Assessment: Materials and Light Video: Light Video: Transparent, Translucent, and Opaque Video: Examples of Transparent, Translucent, and Opaque Video: Translucent, Transparent, and Opaque **ESL Supports and Scaffolds** WIDA Standard 4: The Language of Science To support students in speaking refer to this resource: WIDA Doing and Talking Science

materials that are transparent, translucent, opaque, or reflective can serve different purposes. **Misconceptions** Students may have the misconception that we see objects because they absorb light. They may have trouble understanding that light bounces off items, and our eyes receive that light and interpret it. They may think that only shiny objects reflect light. Students may also think that light passes through only objects that are perfectly clear and not objects that have color or are translucent. They may think that light must be entirely absorbed or entirely reflected and that partial reflection (as in the case of translucent materials) is not possible.		When applicable- use Home Language do build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals Provide sentence frames: If the chair is made of _____, it is _____. Have students use complete sentences to respond. The _____ is made from _____ materials. I know this because _____. Point to an opaque object. Ask, Is this transparent or opaque? Opaque. If students are confident with one-word answers, model a complete sentence. It is opaque. Have students repeat. Ask the second Talk About It question. Model the sentence frame for students.

1st Grade Quarter 2 Curriculum Map Quarter 2 Curriculum Map Feedback					
Quarter 1			**Quarter 2**	Quarter 3	Quarter 4
Structure and Routine	Unit 1 Earth and Space	Unit 2 Seasons	**Unit 3 Light Energy**	Unit 4 Plants	Unit 5 Plant Environment
1 week	5 weeks	3 weeks	**9 weeks**	9 weeks	9 weeks

UNIT 3: Light Energy (9 weeks)

Overarching Question(s)

How is energy transferred and conserved? How are waves used to transfer energy and information?

Unit 3: Lesson 4	Lesson Length	Essential Question	Vocabulary
How Light Travels	3 weeks	How can light bounce off objects?	mirror, reflect

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) 1.PS4: Waves and Their Application in Technologies for Information Transfer **Standard(s)** 1.PS4.2: Determine the effect of placing objects made with different materials (transparent, translucent, opaque, and reflective in the path of a beam of light). **Explanation and Support of Standard** 1.PS4.2 The focus of this standard should be on the way that objects affect the path of light, and not on rote memorization of terms. Some objects, like glass, allow light to pass through them. Others block the path of light and create shadows on surfaces beyond them. Mirrored surfaces create shadows beyond them, because they	**Learning Outcomes** Students will explain the effect of mirrors on the path of light. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.*  Mirrored Ball	**Curricular Resources** Engage TE, pp. 229-230 Science in My World, p. 229 (Phenomenon) Essential Questions, p. 230 Science and Engineering Practices, p. 230 Explore TE, pp. 231-232 *(LAB)* Be a Scientist Notebook, p. 226 Inquiry Activity: Find the Cat eBook: Mirror Land Explain TE, pp. 232-236 Be a Scientist Notebook, p. 228: Vocabulary

redirect the path of light that strikes them. Students can try to direct the path of a beam of light (a focused flashlight or laser pointer) around a maze of obstacles and onto a specified target. If pinhole viewers are constructed, students can place these materials in front of the pinhole and observe the effects. (The way light scatters off of rough surfaces may be discussed but is not a principle part of this standard.) **Suggested Science and Engineering Practice(s)** Obtaining, Evaluating, and Communicating Information **Suggested Crosscutting Concept(s)** Cause and Effect **Teacher Overview** Light travels in waves. The waves hit an object and either travel straight through or bounce off, depending on the material the object is made of. Colored objects appear to have color because they absorb all light waves except those of the color we see. So, a green ball absorbs all light waves except green ones, which bounce back to our eyes. Our brain then interprets the ball as being green. Using a triangular glass prism to test how light travels gives a surprising result. The prism causes light to bend once it enters the prism. Light is made up of different colors that each have their own wavelength. These waves bend at different angles. As each wave hits the prism, it bends and is separated from the others. This causes each color in light to separate and appear in	Phenomenon Explanation: Light will bounce off of mirrors. When light contacts the mirror, the light is reflected off the surface of the mirror.	Science Paired Read Aloud/Science File: How Does Ling Move? eBook: Mirrors and Light Digital Interactive: Mirrors <u>Elaborate</u> TE, pp. 236-237 Video: A Prism *(LAB)* Be a Scientist Notebook, p. 232, Inquiry Activity: A Prism <u>Evaluate</u> TE, pp. 237-239 *(LAB)* Be a Scientist Notebook, p. 234, Performance Task: Mirrors eAssessment **Additional Resources** Lesson: Energy All Around Us! Video: Bill Nye: Light Bending and Bouncing Activity: Investigating Reflection **ESL Supports and Scaffolds** WIDA Standard 4: The Language of Science To support students in speaking refer to this resource: <u>WIDA Doing and Talking Science</u>

its own band on the other side of the prism. So, as light travels through a prism, it is separated into different colors and appears as a rainbow on the other side of the prism. **Misconceptions** Students may think that light bounces off only highly reflective objects, such as mirrors. They may think that color is not related to light, and may not understand that color is the result of light waves reflecting off an object. They may think that light is made up of single colors and not understand that white light can be refracted into all colors of the rainbow with the use of a prism. Students may think that light is an object and not understand that light has wavelike properties that result in the colors we see.		When applicable- use Home Language do build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals Provide sentence frames: Do the Emerging activity. Have students describe the effects. The light bounced because _____. The light didn't bounce because _____. Model prompt sentence using words mirror, light, bounce, and block. For example, The wall blocks light.