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.

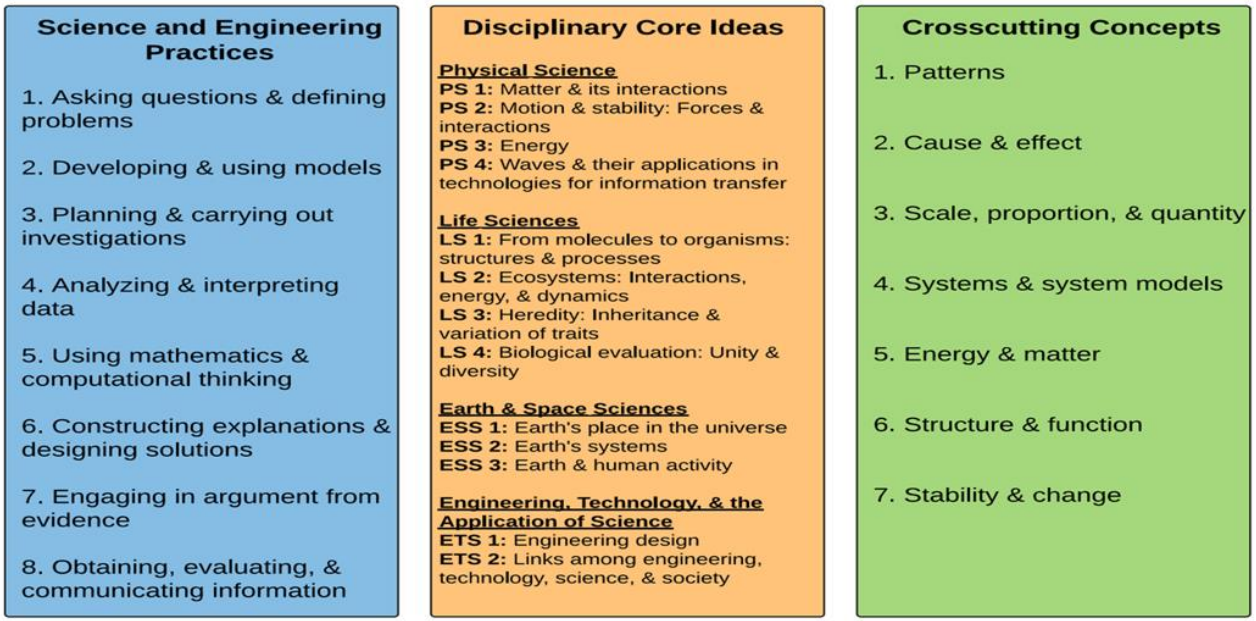
The Tennessee Academic Standards for Science were developed using the National Research Council's 2012 publication, A Framework for K-12 Science Education as their foundation. The framework presents a new model for science instruction that is a stark contrast to what has come to be the norm in science 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 3 Curriculum Map Quarter 3 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 weeks	5 weeks	3 weeks	9 weeks	**9 weeks**	9 weeks

UNIT 4: Plants (9 weeks)			
Overarching Question(s)			
How and why do organisms interact with their environment and what are the effects of these interactions?			
Unit 4: Lesson 1	**Lesson Length**	**Essential Question**	**Vocabulary**
Needs of Plants	2 weeks	What do plants need to live?	environment, nutrient, mineral

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) 1.LS2: Ecosystems: Interactions, Energy, and Dynamics 1.ETS1: Engineering Design **Standard(s)** 1.LS2.1: Conduct an experiment to show how plants depend on air, water, minerals from soil, and light to grow and thrive. 1.LS2.3: Recognize how plants depend on their surroundings and other living things to meet their needs in the places they live.	**Learning Outcomes** Students will explain what plants need to live. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.*  Phenomenon Explanation:	**Curricular Resources** <u>Engage</u> Inspire Science TE, pp. 5-6 Science in My World (Phenomenon), TE: p. 5 Be a Scientist Notebook, p. 5 - Phenomenon TE, Essential Question: p. 6 TE, Science and Engineering Practices: p. 6 <u>Explore</u> TE, pp. 7-9 *(LAB)* Be a Scientist Notebook, p. 6: Plants and Light <u>Explain</u>

1.ETS1.1: Solve scientific problems by asking testable questions, making short-term and long-term observations, and gathering information. **Explanation and Support of Standard** 1.LS2.1 Plants are unique in an ecosystem because they are able to sustain life without eating. Plant roots prevent them from moving to more favorable locations so certain plants will survive better in different settings with varying amounts of water, minerals, and light. Understanding why specific organisms survive only in certain areas requires that students understand the reliance of plants on air, water, and minerals from the soil. Experiments with plants may include comparing results of a variable such as growth with and without air, or light, or water, or minerals from soil (e.g., nitrogen, phosphorous, etc.). *(This standard seems very similar to 1.LS1.1, the key difference between these two standards is the role of each standard in a bigger picture understanding. 1.LS1.1 focuses on the structure that plants have to help them survive. 1.LS2.1 focuses on how the environment provides for the needs of plants.)*	Light is a basic need of all plants. Plants use the energy from sunlight to make their food. Plants use the food they make to live and grow.	TE, pp. 9-15 Be A Scientist Notebook, Vocabulary, p. 8 Science File: Plant Needs Digital Interactive: Needs of Plants Science File: Doing Science *(LAB)* Be a Scientist Notebook, p. 11, Inquiry Activity: Plants and Water *(LAB)* Be a Scientist Notebook, p. 13, Inquiry Activity: Plants and Air Elaborate TE, pp. 16-17 *(LAB)* Be a Scientist Notebook, p. 15, Inquiry Activity: Plant Nutrients Evaluate TE, pp. 17-19 *(LAB)* Be A Scientist Notebook, pp. 17, Performance Task: Plant Guide eAssessment **Additional Resources** Lesson: Growing Knowledge About Plants Lesson: What Do Plants Need? Video: What is a Plant? Video & Song: What a Plant Needs to Stay Alive

1.LS2.3 Interactions between living organisms in an ecosystem provide energy and matter, as well as meet other survival needs of plants. Animals carry seeds away from the parent plant, allowing the species to move into new habitat. Insects act as pollinators, which is a critical part of the plant life cycle (1.LS1.2). Decomposers break allow materials that have been used by one organism during lifetime to be used again after the deceased organism is broken down. 1.ETS1.1 The field of engineering takes situations that people want to improve or change and treats these situations as problems to be solved. In first grade, students should be preparing for this process by making observations before they begin to design a solution. Students can be given a problem to solve and tasked with making relevant observations that would inform their solutions. Students should begin to understand that there can be multiple solutions to a single problem. Observations could include how strong materials are, the behavior of materials under different conditions, etc. An example could be "How long does it take an ice cream bar to melt?" Students would observe the ice cream bar every 30 minutes. Such observations could be applied to solutions for the design of packaging for ice		**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 When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals Partner students during labs to support with understanding and speaking. Pre-teach vocabulary: **Consider pre-teaching additional vocabulary to support beginning level ELs** Depend on Provide sentence frames: We plants are living because _____.) Plant depend on….. to survive. Highlight these signal words for explaining: for example, this, in fact, as evidence

cream. *(The focus of this standard should be on the process of making observations to design a solution, rather than on spending significant amounts of time actually coming up with a solution.)* **Suggested Science and Engineering Practice(s)** Planning and Carrying Out Controlled Investigations Constructing Explanations and Designing Solutions **Suggested Crosscutting Concept(s)** Energy and Matter **Teacher Overview** Living things can grow, change, and reproduce. For living things such as plants to grow and change, they need water, air, food, and space to grow. Different living things need different kinds of air and food. Plants use water, carbon dioxide from the air, and energy from light to make food in their leaves through a process called photosynthesis. One way to find out what a plant needs is to observe its habitat, which will provide evidence about what the plant needs. **Misconceptions** Some students may think that plants do not need air. Plants do need air, but they need carbon		because

dioxide found in air as opposed to the oxygen humans and other animals need. Both gases are found in air. Some students may think that all plants need the same things in order to survive. Students may not understand the connection between habitat and needs. Tell students that a habitat is a place where plants live and that a habitat has everything that a plant needs. Plants cannot survive in a habitat that does not meet their needs. Clarify that some basic needs may be similar but that a habitat can provide evidence of what a plant needs based on how it is surviving in the habitat.		

1st Grade Quarter 3 Curriculum Map Quarter 3 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 weeks	5 weeks	3 weeks	**9 weeks**	9 weeks	9 weeks

UNIT 4: Plants (9 weeks)

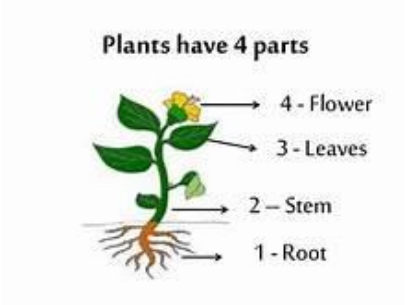
Overarching Question(s)

How and why do organisms interact with their environment and what are the effects of these interactions?

Unit 4: Lesson 2	Lesson Length	Essential Question	Vocabulary
Parts of Plants	2 weeks	How do different parts of a plant help it live?	Flower, seed, stem, leaves, root, fruit

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) 1.LS1: From Molecules to Organisms: Structures and Processes 1.ETS2: Links Among Engineering, Technology, Science, and Society **Standard(s)** 1.LS1.1: Recognize the structure of plants (roots, stems, leaves, flowers, fruits) and describe the function of the parts (taking in water and air, producing food, making new plants). 1.ETS2.1: Use appropriate tools (magnifying glass, basic balance scale) to make observations and answer testable questions.	**Learning Outcomes** Students will explain plant parts and structure. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.* Phenomenon #1: 	**Curricular Resources** Engage Inspire Science TE, pp. 21-22 Science in My World (Phenomenon), TE: p. 21 Be a Scientist Notebook, p. 21 Phenomenon TE, p. 22, Essential Question TE, p.22, Science and Engineering Practices Explore TE, pp. 23-24 *(LAB)* Be a Scientist Notebook, p. 22: Parts of a Plant

Explanation and Support of Standard 1.LS1.1 All organisms have external structure with specific functions which aid in their survival. The focus of this standard is to examine these structures in plants exclusively, and builds on kindergarten investigations where students compared the structural differences between plants and animals. Examples may include: the roots anchor the plant and take in water and nutrients, the stem takes water and nutrients to the rest of the plant, the leaves make food for the plant and take in air through openings in the leaves, the flower makes plant seeds, and the fruit protects the plant seeds. *(As with all other K-2 science standards, it is important that students must be able to have concrete experiences with the science they discuss. Because internal structures, such as organs, cannot be experienced firsthand, this standard deliberately limits explorations to external structures.)* 1.ETS2.1 The field of engineering produces tools that can be used by scientists. Scientists then knowledge gained by using these tools. This new knowledge allows engineers to make even better tools, and a cycle has started. For example, scientists study	Phenomenon #2:  Phenomenon Explanation: All of the parts of a plant help it live and grow. Each of the parts serves a different function in helping the plant carry out its life functions.	Explain TE, pp. 25-28 Be A Scientist Notebook, Vocabulary, p. 24 Digital Interactive: The Parts of a Plant Science Handbook/eBook: Plants Are Living Things Science File: Science Tools Elaborate TE, pp. 29-32 *(LAB)* Be a Scientist Notebook, p. 27, Inquiry Activity: Use a Pan Balance Video: The Sun throughout the Day *(LAB)* Inquiry Activity: Plants in Different Environments Evaluate TE, pp. 33-35 *(LAB)* Be A Scientist Notebook, pp. 30, Performance Task: Plant Model eAssessment **Additional Resources** Video: Parts of a Plant Lesson: Parts of a Plant Lesson: Looking at New Plants Lesson: Parts of Plant, (clap clap), Parts of a Plant, (clap clap), Parts of a

the behavior of light as passes through different materials. The knowledge that scientists acquire about the behavior of light is applied by engineers to develop the magnifying glass. Standards in the Measurement and Data math domain support the use of measurements in this grade level. Students can measure relative distances using nontraditional units. For example, number of whole paper clips long. (1.MD.A.1) In analogous fashion, a two-pan balance can be used to compare the weights of two objects using a third: E.g., use marbles to compare the weights of two objects. Measuring instructions given to students should be intentional to avoid confusion. For example, ask students to measure how many paperclips does it take to extend beyond the edge of the object. This avoids the confusion of the measurement tasks which merely ask, "How many paperclips of long was a side of the square?" *(Tools aligned to this standard and grade level should permit relative measurement, and activities involving measurement should consider students' math and numeric abilities.)* **Suggested Science and Engineering Practice(s)** Developing and Using Models Obtaining, Evaluating, and Communicating Information **Suggested Crosscutting Concept(s)**		Plant, Parts of a Plant, Parts of a Plant *By Dr. M. Collins of SCS* Lesson: Plant Parts Assessment  **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 When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals Partner students during labs to support with understanding and speaking.

Structure and Function **Teacher Overview** The external parts of a plant, called organs, consist of two groups: the vegetative organs and the sexual reproductive organs. The vegetative organs, which enable the plant to grow, include the roots, stem, and leaves. The sexual reproductive organs include the flowers, fruits, and seeds. Roots anchor plants in the soil; absorb water, oxygen, and minerals; and store organic materials. Running lengthwise through the roots and stem are vascular bundles, which consist of two types of tissues—xylem and phloem. Xylem cells carry water and mineral nutrients up to the leaves. Xylem begins as living tissue, but as it transports water, its cells lose their contents and the dead cells join together to form tiny hollow tubes. **Misconceptions** Students may think that plants are simple organisms when compared with animals when, in fact, they are complex. Students may not understand that the roots take in water and nutrients from the soil for the plant. Many believe this is the job of the flowers or leaves since that is where they see the rainwater hit the plant and where they might pour the water from a can or a hose onto the plant. Bring a potted		Pre-teach vocabulary: **Consider pre-teaching additional vocabulary to support beginning level ELs** Uses for Provide sentence frames: The roots help plant to…. A plant uses its leaves to… Leaves are important to a plant because… Highlight these signal words for explaining: for example, this, in fact, as evidence because

plant to class, and gently pull the plant from the dirt in the pot so that the branching root structure can be clearly seen. Explain that this root structure enables the plant to draw water from the soil into the stem, where it is transported upward to all the other parts of the plant.		

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Structure and Routine	Unit 1 Earth and Space	Unit 2 Seasons	Unit 3 Light Energy	**Unit 4 Plants**	Unit 5 Plant Environment
1 week	6 weeks	3 weeks	9 weeks	**9 weeks**	9 weeks

UNIT 4: Plants (9 weeks)

Overarching Question(s)

How and why do organisms interact with their environment and what are the effects of these interactions?

Unit 4: Lesson 3	Lesson Length	Essential Question	Vocabulary
Plants Grow and Change	2 weeks	How do plants grow and change?	life cycle, seedling

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) 1.LS1: From Molecules to Organisms: Structures and Processes **Standard(s)** 1.LS1.2: Illustrate and summarize the life cycle of plants. **Explanation and Support of Standard** 1.LS1.2 In general terms, a life cycle includes being born (sprouting in plants), growing, developing into adults, reproducing, and eventually dying. Students should be aware that a single plant will	**Learning Outcomes** Students will explain how plants grow and change. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.* Phenomenon #1	**Curricular Resources** Engage Inspire Science TE, pp. 37-38 Science in My World, p. 33, Phenomenon TE, p. 37, Phenomenon Be a Scientist Notebook, Essential Question, p. 33, TE, Essential Question, p.38 TE, Science and Engineering Practices, p. 38 Explore TE, pp. 38-39

not live forever, and that a species (type) of plant survives by reproducing. This process of reproduction is when adult plants make new young plants. Plants undergo predictable changes that accompany each stage of life, and these changes are similar across even when two plants do not look the same. For example, plants sprout with one or two leaves emerging first, or flowers will wither and fall off a plant after being pollinated. Further examples may include different ways plants: grow (e.g., increase in size, produce new parts) and reproduce (e.g., develop seeds and spores). *(Discussions of plant reproduction can be limited to plants reproducing through some form of pollination. It is not necessary to introduce other ways of reproducing plants, such as spreading through rhizomes or taking cuttings.) (This standard does not require learning specific plant structures, but should focus on the life cycle itself.)* **Suggested Science and Engineering Practice(s)** Developing and Using Models **Suggested Crosscutting Concept(s)** Patterns **Teacher Overview** Like animals, adult plants produce young. These kinds of plants produce seeds, which are	 Phenomenon #2  Phenomenon Explanation: Plants change in many ways as they grow. In addition to growing taller, plants may add new leaves and stems, develop flowers and fruits, and grow thicker stems. Some plants may also change color as they grow.	*(LAB)* Be a Scientist Notebook, p. 34, Inquiry Activity: Examine Seeds <u>Explain</u> TE, pp. 40-43 Be A Scientist Notebook, Vocabulary, p. 36 Video: Seeds Science File: How Plants Grow Digital Interactive: Pumpkins Song: Using the Science Songs <u>Elaborate</u> TE, pp. 43-44 *(LAB)* Be a Scientist Notebook, p. 39, Inquiry Activity: Plant Life Cycle <u>Evaluate</u> TE, pp. 45-47 *(LAB)* Be A Scientist Notebook, pp. 41, Performance Task: Life Cycle of an Apple Tree Video: How do plants grow and change? eAssessment **Additional Resources** Lesson: <u>Planting and Planning</u> Lesson: Plant Needs Video: <u>How Plants Grow and Change</u>

structures containing a plant embryo and a source of stored food. When they are mature, most seed plants reproduce by forming flowers, which later form seeds contained within a fleshy structure called a fruit. The process of plant growth and reproduction takes place in a series of repeating events called a life cycle. The plant life cycle begins with a seed. Under the right conditions, the seed germinates and grows a stem, roots, and leaves. The tiny new plant, called a seedling, grows into an adult plant. The adult plant eventually forms flowers. Flowers produce seeds, and the life cycle continues. **Misconceptions** Students might not understand that the roots, not the leaves or the flowers, take in water and minerals from the soil for the plant. Some students might believe that this is the job of the flowers since that is where they see rainwater hit the plant and where they pour water from a watering can or a garden hose onto the plant. To counter this misconception, water the soil of a potted plant in the classroom or show students a clear jar filled with cut flowers. Ask them how the flowers and leaves get water and encourage the students to recognize that leaves and flowers take up water through the stems, not directly from outside the plant.		 **ESL Supports and Scaffolds** **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 When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals Partner students during labs to support with understanding and speaking.

		Pre-teach vocabulary: **Consider pre-teaching additional vocabulary to support beginning level ELs** Depend on Provide sentence frames: I noticed that…. As the plant grows, it….. When a plant grows….changes…. because…. Highlight these signal words for explaining: for example, this, in fact, as evidence because

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UNIT 4: Plants (9 weeks)			
Overarching Question(s)			
How and why do organisms interact with their environment and what are the effects of these interactions?			
Unit 4: Lesson 4	**Lesson Length**	**Essential Question**	**Vocabulary**
Plant Survival	3 weeks	How do plants respond to their environment?	survive
Standards and Related Background Information		**Instructional Focus**	**Instructional Resources**
DCI(s) 1.LS1: From Molecules to Organisms: Structures and Processes 1.LS2: Ecosystems: Interactions, Energy, and Dynamics **Standard(s)** 1.LS1.3: Analyze and interpret data from observations to describe how changes in the environment cause plants to respond in different ways.		**Learning Outcomes** Students will explain how plants respond to their environment in order to meet their needs. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.*	**Curricular Resources** Engage Inspire Science TE, pp. 49-50 TE, p. 49, Phenomenon Be a Scientist Notebook, p. 45, Phenomenon TE, p. 50, Essential Question TE, p. 50, Science and Engineering Practices Explore TE, pp. 50-51 *(LAB)* Be a Scientist Notebook, p. 46, Inquiry Activity: Roots and Gravity

1.LS2.3: Recognize how plants depend on their surroundings and other living things to meet their needs in the places they live. **Explanation and Support of Standard** 1.LS1.3 Since individual plants do not move from one place to another, students may have the misconception that plants cannot sense or respond to changes in their environment. The focus of this standard is to uncover responses that plants may have to changes in their environment. Keep in mind: These responses are changes initiated by the plant and result from chemical signals and pathways within the plant. Examples may include plants leaning towards sunlight, leaves wilting from lack of water, leaves changing color in autumn, and trees losing leaves. There are more sudden responses, such as *Mimosa pudica* which will fold its leaves together when touched. *Mimosa pudica* is a smallish, creeping plant and should not be confused with the Mimosa tree (*Albizia julibrissin*) which is an invasive species in Tennessee, despite very similar leaves and flowers. *(The focus of this standard is on responses a single plant may have to changes in its environment, not changes to a species over time.)* 1.LS2.3	 Phenomenon Explanation: Both plants and animals sense and respond to things in their environment. Animals have special structures that sense inputs. For example, eyes sense light, ears sense sound, nerves in the skin sense how things feel (touch), and noses sense smell. Animals gather this sensory information with their sense structures and respond. Plants also gather sensory input through their structures and respond. These responses are called tropisms. For example, a plant can sense when there is not enough light and grow toward the light. Plants can sense gravity, which is why the roots always grow downward and the stem and leaves grow upward. Some plants, such as the mimosa, or "sensitive plant," are sensitive to touch. If you touch its leaves, the leaves will respond by folding up.	<u>Explain</u> TE, pp. 52-55 Be A Scientist Notebook, Vocabulary, p. 48 Science File: How Plants Survive Digital Interactive: Following the Sun <u>Elaborate</u> TE, pp. 55-56 *(LAB)* Be a Scientist Notebook, p. 51, Inquiry Activity: Temperature and Plants <u>Evaluate</u> TE, pp. 57-59 *(LAB)* Be A Scientist Notebook, pp. 53, Performance Task: Light and Plants Video: How do plants respond to their environment? eAssessment **Additional Resources** Lesson: Plant Secrets Video: Adaptations in Plants Video: You at The Zoo- Plant Adaptations **ESL Supports and Scaffolds** WIDA Standard 4**:**

Interactions between living organisms in an ecosystem provide energy and matter, as well as meet other survival needs of plants. Animals carry seeds away from the parent plant, allowing the species to move into new habitat. Insects act as pollinators, which is a critical part of the plant life cycle (1.LS1.2). Decomposers break allow materials that have been used by one organism during lifetime to be used again after the deceased organism is broken down. **Suggested Science and Engineering Practice(s)** Analyzing and Interpreting Data **Suggested Crosscutting Concept(s)** Structure and Function **Teacher Overview** Humans, animals, and plants all must meet daily needs for survival. Animals and plants have different parts that can function to help them meet those needs. Many animal functions occur by way of structure, such as a long, thin bird's beak used to pluck fish from the water. Similarly, many plant functions occur by way of structure, such as a seed coat with "wings" that can carry it to other locations to germinate. When humans design objects to help solve their problems, they might draw on or mimic solutions in the natural world. For example, we make cooking tongs that		**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 Partner students during labs to support with understanding and speaking. Pre-teach vocabulary: **Consider pre-teaching additional vocabulary to support beginning level ELs** Respond to needs Provide sentence frames: Plants respond to their environment by… The environment helps plants to… Plants needs are met by….

are long and thin like a bird's beak in order to gather pieces of food from a deep pot of boiling water. Solving human problems by mimicking designs seen in nature is known as biomimicry. **Misconceptions** Students may think that human-made objects are purely a product of people's imaginations. But all shapes and many tools we design and use can be found in the natural world. To help students understand and visualize this, pair images that show a human-designed product with images that show the corresponding natural structure and/or function. Some possible pairs include hook-and-loop clothing fasteners and plant burrs, gecko feet and super-adhesives, high-speed train design and kingfisher beaks, and desert water-collection systems and the Namibian beetle.		Highlight these signal words for explaining: Because An example of