Shelby County Schools Science Vision

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

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

Introduction

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

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

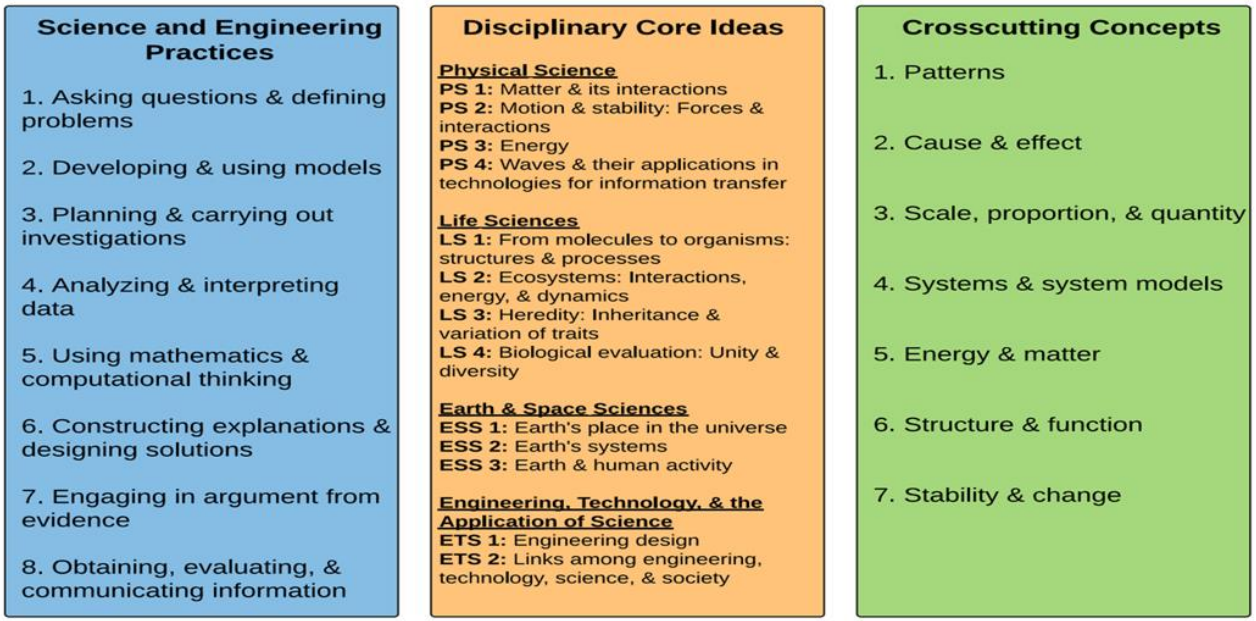
The Tennessee Academic Standards for Science were developed using the National Research Council's 2012 publication, A Framework for K-12 Science Education as their foundation. The framework presents a new model for science instruction that is a stark contrast to what has come to be the norm in science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

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

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

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

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



Learning Progression

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

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

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

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

Structure of the Standards

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

Purpose of Science Curriculum Maps

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

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

5th Grade Quarter 2 Curriculum Map Quarter 2 Curriculum Map Feedback							
Quarter 1		**Quarter 2**		Quarter 3		Quarter 4	
Structure and Routine	Unit 1 The Solar System and Beyond	**Unit 2 Structure and Functions of Living Things**	Unit 3 Traits and Heredity	Unit 4 Learn from the Past	Unit 5 Matter	Unit 6 Physical and Chemical Changes	Unit 7 Forces and Motion
1 week	8 weeks	**3 weeks**	6 weeks	4 weeks	5 weeks	5 weeks	4 weeks

UNIT 2: Structure and Function of Living Things (3 weeks)

Overarching Question(s)

How do organisms live, grow, respond to their environment, and reproduce?

Unit 2: Lesson 1	Lesson Length	Essential Question	Vocabulary
Information Processing in Animals	1.5 weeks	How do animals sense and respond to information?	nervous system, brain, spinal cord, central nervous system, peripheral, nervous system, sensory organ, instinct, reflex

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) 5.LS1 From Molecules to Organisms: Structures and Processes 5.ETS2 Links Among Engineering, Technology, Science, and Society **Standard(s)** 5.LS1.1: Compare and contrast animal responses that are instinctual versus those that are gathered through senses, processed, and stored as memories to guide their actions.	**Learning Outcomes** Students will develop and use models to describe how sense receptors in animals receive information, which is processed in the brain. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.*	**Curricular Resources** Engage Inspire Science TE, p. 5-6 Be a Scientist Notebook, p. 5: Phenomenon TE, Science in My World, p. 5: Phenomenon: TE, Essential Question, p. 6 TE, Science and Engineering Practices, p. 6 Explore TE, pp. 6-7 *(LAB)* Be a Scientist Notebook, p. 7, Inquiry Activity: Sense of Touch

5.ETS2.1: Use appropriate measuring tools, simple hand tools, and fasteners to construct a prototype of a new or improved technology. 5.ETS2.2: Describe how human beings have made tools and machines (X-ray cameras, microscopes, satellites, computers) to observe and do things that they could not otherwise sense or do at all, or as quickly or efficiently. 5.ETS2.3: Identify how scientific discoveries lead to new and improved technologies. **Explanation and Support of Standard** 5.LS1.1 Organisms survive by gathering and processing information about their surroundings. Sense receptor is a generic term that is used to describe structures that an organism has to detect information about its surroundings. For example, the retina in the eye detects light, while the ear drum detects sounds. Some generalization about the specific roles of structures may be needed because cellular components are beyond the scope of this standard.	 Phenomenon Explanation: The leopard's enormous eyes are capable of vast dilation, which allows the predator to see in near-lightless conditions. Human eyes, like the eyes of the leopard's prey, become useless in low light.	<u>Explain</u> TE, pp. 8-14 Be a Scientist Notebook, p. 9, Vocabulary *(LAB)* Be a Scientist Notebook, p. 9, Inquiry Activity: Reaction Time Digital Interaction: The Brain and Parts of the Nervous System Science Handbook/eBook: Structural Adaptations—Animal Senses Science Handbook/eBook: Behavioral Adaptations Simulation: Brain Illumination *(LAB)* Be a Scientist Notebook, p. 12: Brain Illumination Science Handbook/eBook: Memory Storage <u>Elaborate</u> TE, pp. 14-16 Science Handbook/eBook: The Nervous System <u>Evaluate</u> TE, pp. 16-19 *(LAB)* Be A Scientist Notebook, p. 15 Performance Task: Comparing Senses eAssessment **Additional Resources** Lesson: Macro-Structures of Animals Lesson: How Animals Use Their Senses to Find Food Video: Amazing Animals (Animal Senses) Video: How Do Dragonflies See the World?

Information that is detected by sense receptors travels to the brain where it is processed. The actions that an organism takes will be guided by how perceptions and memories interpret the information gathered by the senses. Information that is gathered may elicit instinctual responses or stored as memories that guide future actions. Instinctual responses might include migrations in response to temperature changes. *(Students are not responsible for knowing about nerve cells used to connect between receptors and the brain.)* 5.ETS2.1 In accordance with 5.NBT math standards, it is now reasonable for students to perform appropriately precise metric measurements. With any measuring device, a student should include one estimated place value. For example, measurements made with a typical centimeter ruler, which includes millimeter increments, should also contain an estimated value for the tenths of a millimeter. Using tools allows students to acquire two important engineering skills. Students can		Video: You'll Never Hear a Leopard Coming. Video: PBS Sniffing Senses **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 To support students when they design their device: **Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing.** **Sequencing and compare sentence stems:** At fi rst, , but now . We saw that first , then , and finally . When I , it . After I , it . This is the same as because . This is diff erent than because . All these are because . , , and all

gain an understanding of how tools have enabled humans to build. Students acquire the ability to produce actual prototypes as part of the engineering process. This skill allows for development of more involved tests of components of a design. *(It is beyond the intent of the standard for students to arrive independently at the level of uncertainty for the device they are using to measure. This information should be provided. For example, students should be told that the ruler described above has an uncertainty of +/-0.05cm.)* 5.ETS2.2 Scientific understanding develops as scientists are able to observe and explain things in the natural world. Technology has enabled scientists to extend their senses through the use of tools. These tools allow data storage, complex mathematical models, and increased capacity to see smaller and smaller details. For example, remote telescopes can be sent into space to observe stars and galaxies too distant to be observed from Earth's surface.		have/are .

5.ETS2.3 The processes of scientific discovery and technological evolution are symbiotic. Scientific understanding allows engineers to design systems differently and utilize materials to their fullest extent. This perpetuates the creation of new devices that are more efficient or powerful than previous versions. The new devices open new research opportunities and permit further scientific understanding. This cycle is perpetual. Examples may include taking a current piece of technology, viewing how the invention has developed through the years, and making predictions on how that technology might improve: (e.g., telegraph, telephone, and cell phone). **Suggested Science and Engineering Practice(s)** Obtaining, Evaluating, and Communicating Information **Suggested Crosscutting Concept(s)** Systems and System Models **Teacher Overview** Many animals process information in the same way humans do. Mammals, like humans, use sensory responses to stimuli. Mammals run, hide, or fl inch when in		

danger. They react to pain, hunger, and loneliness. Many social animals, such as monkeys, apes, and wolves, have strong family ties. Humans are not the only species that feels affection or loss. **Misconceptions** A common misconception is that humans process information differently than other animals. Make it clear to students that other animals have similar nervous systems, and their brains are divided into similar sections that are meant for processing stimuli from the environment. Although they are similar in process, humans are able to carry out much more complex actions with their nervous systems than animals.		

5th Grade Quarter 2 Curriculum Map Quarter 2 Curriculum Map Feedback							
Quarter 1		**Quarter 2**		Quarter 3		Quarter 4	
Structure and Routine	Unit 1 The Solar System and Beyond	**Unit 2 Structure and Functions of Living Things**	Unit 3 Traits and Heredity	Unit 4 Learn from the Past	Unit 5 Matter	Unit 6 Physical and Chemical Changes	Unit 7 Forces and Motion
1 week	8 weeks	**3 weeks**	6 weeks	4 weeks	5 weeks	5 weeks	4 weeks

UNIT 2: Structure and Function of Living Things (3 weeks)

Overarching Question(s)

How do organisms live, grow, respond to their environment, and reproduce?

Unit 2: Structure and Functions of Living Things, **Lesson 2**	**Lesson Length**	**Essential Question**	**Vocabulary**
The Role of Animals' Eyes	1.5 weeks	How do animals see?	Image, reflection, refraction, concave lens, convex lens, transparent, translucent, opaque

Standards and Related Background Information	**Instructional Focus**	**Instructional Resources**
DCI(s) 5.LS1 From Molecules to Organisms: Structures and Processes **Standard(s)** 5.LS1.1: Compare and contrast animal responses that are instinctual versus those that are gathered through senses, processed, and stored as memories to guide their actions.	**Learning Outcomes** Students will develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.*	**Curricular Resources** Engage Inspire Science TE, p. 21-22 Be a Scientist Notebook, p. 19: Phenomenon TE, Science in Our World (Phenomenon): p.19 TE, Essential Question: p. 22 TE, Science and Engineering Practices, p. 22 Explore TE, pp. 23-24

Explanation and Support of Standard
5.LS1.1
Organisms survive by gathering and processing information about their surroundings. Sense receptor is a generic term that is used to describe structures that an organism has to detect information about its surroundings. For example, the retina in the eye detects light, while the ear drum detects sounds. Some generalization about the specific roles of structures may be needed because cellular components are beyond the scope of this standard.

Information that is detected by sense receptors travels to the brain where it is processed. The actions that an organism takes will be guided by how perceptions and memories interpret the information gathered by the senses. Information that is gathered may elicit instinctual responses or stored as memories that guide future actions. Instinctual responses might include migrations in response to temperature changes.

(Students are not responsible for knowing about nerve cells used to connect between receptors and the brain.)

Dragon Fly

Phenomenon Explanation:
(Click picture to play video)
The Dragonfly's vision is so quick that it can detect view high speed small objects?

(LAB) Be a Scientist Notebook, p. 21, Inquiry Activity: In the Blink of an Eye

Explain
TE, pp. 24-29
Be a Scientist Notebook, p. 23: Vocabulary
Science File: The Way Eyes See It
Video: How Do Animals See?
Science File: Bouncing and Bending of Light

Elaborate
TE, p. 29
Science File: Animal Senses
(LAB) Be a Scientist Notebook, p. 28, Inquiry Activity: Animal Senses

Evaluate
TE, pp. 30-31
(LAB) Be A Scientist Notebook, p. 29, Performance Task: Story About Senses
eAssessment

Additional Resources
Lesson: I Look, I See Lesson Plan
Lesson: Now You See It
Video: How Animals See The World
Video: Why is a Convex Mirror Used in a Rearview Mirror?
Video: Laws of Reflection

Suggested Science and Engineering Practice(s) Obtaining, Evaluating, and Communicating Information **Suggested Crosscutting Concept(s)** Cause and Effect **Teacher Overview** Both human and animal eyes use focusing lenses and optic nerves to read and convey information from light that reaches the eye. Eyes are able to adjust focus over long and short distances, and can widen (dilate) or narrow (contract) the opening of the pupil to let in more or less light. Pupils can come in many shapes across the animal kingdom, including vertical saucer shapes in many reptiles and some mammals such as cats, and horizontal bars in some animals like goats. Many animals' eyes have reflective irises that make them more adept at seeing in the dark than humans. **Misconceptions** One common misconception is that some animals, such as dogs, see the world in black and white. While humans typically have three types of cone shaped structures		**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 To support students when they design their device: **Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing.** This is the same as because . This is different than because . All these are because , , and all have/are .

in their eyes that allow them to see the full human range of color, dogs have only two. This means they can't tell the difference between colors as easily, in the same way some people are red-green colorblind. Another misconception may be that eyes always evolve to be better—that reptiles have better eyes than fish and mammals have better eyes than reptiles, and so on. Animal eyesight is much more closely linked to their environments and their roles in them. Birds of prey like hawks, eagles, and owls have excellent eyesight, while some fish and amphibians living in lightless caves or at the bottom of the ocean have evolved away the eyes their species once possessed.		

5th Grade Quarter 2 Curriculum Map Quarter 2 Curriculum Map Feedback							
Quarter 1		**Quarter 2**		Quarter 3		Quarter 4	
Structure and Routine	Unit 1 The Solar System and Beyond	Unit 2 Structure and Functions of Living Things	**Unit 3** Traits and Heredity	Unit 4 Learn from the Past	Unit 5 Matter	Unit 6 Physical and Chemical Changes	Unit 7 Forces and Motion
1 week	8 weeks	3 weeks	**6 weeks**	4 weeks	5 weeks	5 weeks	4 weeks

UNIT 3: Traits and Heredity (6 weeks)

Overarching Question(s)

How do organisms live, grow, respond to their environment, and reproduce?

Unit 3: Lesson 1	Lesson Length	Essential Question	Vocabulary
Inherited Traits	2 weeks	How are living things like their parents?	Inherit, trait, variation, dominant, recessive

Standards and Related Background Information	Instructional Focus	Instructional Resources
DCI(s) 5.LS3 Heredity: Inheritance and Variation of Traits **Standard(s)** 5.LS3.2: Provide evidence and analyze data that plants and animals have traits inherited from parents and that variations of these traits exist in a group of similar organisms. **Explanation and Support of Standard** 5.LS3.2	**Learning Outcomes** Students will analyze and interpret data to explain that living things are influenced by both inherited and learned traits. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.*	**Curricular Resources** Engage Inspire Science TE, p. 37-38 Be a Scientist Notebook, p. 37: Phenomenon TE, Science in Our World (Phenomenon): p. 37 TE, Essential Question: p. 38 TE, Science and Engineering Practices: p. 38 Explore TE, pp. 39-40 *(LAB)* Be a Scientist Notebook, p. 39, Inquiry Activity: Dominant Traits Explain

Inheritance explain that (1) offspring look like, but not identical to their parents and (2) that variation exists even in a group of related organisms. Within a group, there are still patterns in the appearances of organisms. Supporting the first idea, we see that inherited traits are observable in the similar appearances of parent and offspring, as well as offspring and siblings. However, we also see that there are differences in appearances. Noting differences between offspring, parents, and siblings is as important as noting similarities. When we look at populations, we see many of the same appearances, as well as patterns for how often we may see certain appearances. In their data analysis, students may observe that traits that are less common in a population may occur more frequently in offspring when their parents possess the relatively uncommon trait. *(note: Students should look for patterns in data, but are not expected to explain a mechanism underlying patterns in their data.)*	 Inherited traits Phenomenon Explanation: Children can be born with different traits passed down from their parents. Parents may pass down different combinations of traits. Some traits, called "dominant traits" are always visible when they are present, while others, called "recessive traits" may be masked by other traits.	TE, pp. 40-44 Be a Scientist Notebook, p. 41: Vocabulary Science Handbook/eBook: Heredity Science Handbook/eBook: Variation and Natural Selection Digital Interactive: Dominant and Recessive Traits <u>Elaborate</u> TE, pp. 44-45 *(LAB)* Be a Scientist Notebook, p. 45, Inquiry Activity: Fingerprints <u>Evaluate</u> TE, pp. 46-47 *(LAB)* Be A Scientist Notebook, p. 47, Performance Task: Animal Inherited Traits eAssessment Additional Resources Lesson: Generations of Traits Lesson: The Apple Doesn't Fall Too Far from The Tree Lesson: Acquired and Inherited Traits Activity **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>

Suggested Science and Engineering Practice(s) Obtaining, Evaluating, and Communicating Information **Suggested Crosscutting Concept(s)** Cause and Effect **Teacher Overview** Living things on Earth pass traits from parent to offspring through DNA. Asexual reproduction produces an organism with identical DNA and the same inherited traits. Sexual reproduction, as in animals and plants, combines the DNA of two different parents to produce a new DNA strand with a combination of the traits of the parents. DNA can be divided into sections, or genes, that control biological traits. Some traits may be governed by a single gene, but others result from several genes. Offspring receive a full set of genes from each parent, so the organism has two sets of "instructions." The genes may be the identical, such as genes that control for number of fingers in humans, or different, as can be the case for eye color. Often, one variation is dominant over others, and that		To support students when they design their device: **Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing.** This is the same as because . This is different than because . All these are because , , and all have/are . Use graphic organizers, narratives or concept maps to identify part/ whole or cause–and–effect relationships. Use relationship verbs such as *contain*, *consist of*. As , then . When I changed , then happened. The more/less , then .

variation will be expressed whenever it is present. **Misconceptions** Students may not recognize that biological facts that they take for granted, such as the number or arms, legs, eyes, fingers, and toes, are also the result of inherited genes. Polydactylism, an inheritable trait that results in more than five fingers, can be used to correct this oversight in understanding. Students may not understand that the environment can impact some traits while other traits may be inherited from their parents. Students may confuse inherited traits and learned traits, because there are some traits that organisms may learn from their parents at a young age.		

5th Grade Quarter 2 Curriculum Map Quarter 2 Curriculum Map Feedback							
Quarter 1		**Quarter 2**		Quarter 3		Quarter 4	
Structure and Routine	Unit 1 The Solar System and Beyond	Unit 2 Structure and Functions of Living Things	Unit 3 Traits and Heredity	Unit 4 Learn from the Past	Unit 5 Matter	Unit 6 Physical and Chemical Changes	Unit 7 Forces and Motion
1 week	8 weeks	3 weeks	6 weeks	4 weeks	5 weeks	5 weeks	4 weeks

UNIT 3: Traits and Heredity (6 weeks)

Overarching Question(s)

How are characteristics of one generation passed to the next? How can individuals of the same species and even siblings have different characteristics?

Unit 3: Traits and Heredity, **Lesson 2**	**Lesson Length**	**Essential Question**	**Vocabulary**
Learned Traits	2 weeks	How do inherited and learned traits affect living things?	learned trait, environment, instinct

Standards and Related Background Information	**Instructional Focus**	**Instructional Resources**
DCI(s) 5.LS3 Heredity: Inheritance and Variation of Traits **Standard(s)** 5.LS3.1: Distinguish between inherited characteristics and those characteristics that result from a direct interaction with the environment. **Explanation and Support of Standard** 5.LS3.1	**Learning Outcomes** Students will analyze and interpret data to explain that living things are influenced by both inherited and learned traits. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.*	**Curricular Resources** Engage Inspire Science TE, p. 49-50 TE, Phenomenon, p. 49 Be a Scientist Notebook p. 51, Phenomenon TE, Essential Question: p. 50 TE, Science and Engineering Practices, p. 50 Explore TE, pp. 50-51 *(LAB)* Be a Scientist Notebook, p. 53, Inquiry Activity: Learned Behaviors and Skills

We know that traits are inherited and that there will be variation in these traits within a population. However, similar organisms may look dissimilar as a result of interactions with the environment.

Oftentimes, an organism's appearance is a result of a combination of both environment and inheritance. For example, plants which have inherited green leaf color from their parents may appear white if they are grown in the absence of light.

The interactions of an organism with its environment can extend from diet, such as availability of food and water, to exercise, or chemical pollutants. Examples of this could be the stunted growth of plants with insufficient water, a lizard that has lost its tail due to a predator, a dog being overfed or under-exercised becoming overweight. The overall appearance and characteristics of an organism are due to a blend of inheritance and interaction.

Suggested Science and Engineering Practice(s)
Obtaining, Evaluating, and Communicating Information

Calf Suckling Milk

Phenomenon Explanation:
Some animal behaviors are inherited in the form of instincts. The calf suckling milk is an example of this type of behavior.

Explain
TE, pp. 52-55
Be a Scientist Notebook, p. 55: Vocabulary
Digital Interactive: Learned Traits and Survival
Video: Inherited and Learned Behavior

Elaborate
TE, pp. 55-56
Science Handbook/eBook: Learned Behaviors and Heredity
(LAB) Be a Scientist Notebook, p. 58, Inquiry Activity: Learned Behaviors and Heredity

Evaluate
TE, pp. 57-59
(LAB) Be A Scientist Notebook, p. 60 Performance Task: Animal Learned Traits
eAssessment

Additional Resources
Lesson: Behavioral and Structural Adaptations
Lesson: Inherited and Learned Traits PPT
Video: Innate and Learned Behaviors (3-2-1 Contact)

ESL Supports and Scaffolds
WIDA Standard 4- The Language of Science

To support students in speaking, refer to this resource:

Suggested Crosscutting Concept(s) Cause and Effect **Teacher Overview** Many external characteristics are a result of inherited traits, but environmental factors also cause similarities because parents and offspring often share similar environments and conditions. Trees such as aspen are shorter when growing at a higher elevation in the mountains than the same species at a lower elevation due to environmental conditions rather than heredity. Not all acquired characteristics are learned. Scars are an example of acquired characteristics that result from an environmental event and are not passed down to offspring genetically. Before the discovery of DNA and mutations, some biologists incorrectly believed traits acquired during an organism's life could be passed down to offspring. Human's ability to teach their offspring helped them survive over other primates. Today, animals have been seen displaying behaviors such as using tools to accomplish tasks, but few have been seen demonstrating for offspring how to do so. Animal offspring merely watch and imitate their parents to learn the skills.		<u>WIDA Doing and Talking Science</u> To support students when they design their device: **Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing.** To support students when they design their device: **Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing.** This is the same as because . This is different than because . All these are because , , and all have/are . Use graphic organizers, narratives or concept maps to identify part/ whole or cause–and–effect relationships. Use relationship verbs such as *contain*, *consist of*. As , then . When I changed , then happened. The more/less ,

Misconceptions Students may confuse inherited traits and learned traits, because there are some traits that organisms may learn from their parents at a young age. Students may be unsure if certain talents like being a dancer or personality traits like a short temper, are inherited or acquired. Scientists are unsure how much is nature and how much nurture. Likely, certain predispositions are passed on genetically, but abilities must be developed through practice.		then .

5th Grade Quarter 2 Curriculum Map Quarter 2 Curriculum Map Feedback							
Quarter 1		**Quarter 2**		Quarter 3		Quarter 4	
Structure and Routine	Unit 1 The Solar System and Beyond	Unit 2 Structure and Functions of Living Things	**Unit 3 Traits and Heredity**	Unit 4 Learn from the Past	Unit 5 Matter	Unit 6 Physical and Chemical Changes	Unit 7 Forces and Motion
1 week	8 weeks	3 weeks	**6 weeks**	4 weeks	5 weeks	5 weeks	4 weeks

UNIT 3: Traits and heredity (6 weeks)

Overarching Question(s)

How are characteristics of one generation passed to the next? How can individuals of the same species and even siblings have different characteristics?

Unit 3: Traits and Heredity, **Lesson 3**	**Lesson Length**	**Essential Question**	**Vocabulary**
Adaptations	2 weeks	How do variations of traits help living things survive?	adaptation, survival, reproduction

Standards and Related Background Information	**Instructional Focus**	**Instructional Resources**
DCI(s) 5.LS4 Heredity: Inheritance and Variation of Traits **Standard(s)** 5.LS4.2: Use evidence to construct an explanation for how variations in characteristics among individuals within the same species may provide advantages to those individuals in their survival and reproduction.	**Learning Outcomes** Students will use evidence to explain that variations of traits allow some organisms to survive better than others. **Suggested Phenomenon** *Click on the phenomenon picture to view the video.*	**Curricular Resources** Engage Inspire Science TE, p. 61-62 TE, Phenomenon, p. 61 Be a Scientist Notebook, Phenomenon: p. 65 TE, Essential Question: p. 65 TE, Science and Engineering Practices, p. 65 Explore TE, pp. 63-64 *(LAB)* Be a Scientist Notebook, p. 67, Inquiry Activity: Trait Variation and Survival

Explanation and Support of Standard
5.LS4.2

Suggested Science and Engineering Practice(s)
Arguing from Evidence Constructing Explanations and Designing Solutions

Suggested Crosscutting Concept(s)
Cause and Effect

Teacher Overview
Natural selection is a process by which organisms that are best suited to their environment survive and pass on their genetic traits. These traits become more common in successive generations. At the same time, organisms without some of these traits reproduce at a lower rate. These organisms become less common. This concept is known as survival of the fittest. All species have variations in traits. Some variations help a species survive in its environment. If the environment changes, the traits better suited for survival may change. This variation insures the survival of the species. Adaptations result from mutations to DNA. Contrary to popular belief, mutations are not always harmful, though most are. A mutation may be

Tiger Variation

Phenomenon Explanation:
All animal groups have variation in what traits they possess because of the random inheritance of traits and infrequent mutations. If a trait helps an animal survive in an environment, that animal will be more likely to live to pass that trait on to their offspring, and over time more of the animals in a population will develop that trait.

Explain
TE, pp. 64-67
Be a Scientist Notebook, p. 69: Vocabulary
Science Handbook/eBook: Variations and Natural Selection
Digital Interactive: Adaptations Help Living Things
Video: Responding to the Environment

Elaborate
TE, pp. 68
(LAB) Be a Scientist Notebook, p. 73, Inquiry Activity: Changes Cause Natural Selection

Evaluate
TE, pp. 68-71
(LAB) Be A Scientist Notebook, p. 74, Performance Task: Traits and Survival
eAssessment

Additional Resources
Lesson: Colorful Clams
Video: Living Things Change
Video: Chameleon Changing Colors

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

harmful, benign, or beneficial, depending on the environment in which the organism lives and how that environment changes. **Misconceptions** Students might have the misconception that organisms can influence or choose their traits based on what is best at the time. All variations of traits come from mutations in DNA and occur over many generations. A variation of a trait must be present in some individuals in the population before its commonality within the population can occur. Students may believe that survival of the fittest means that only the strongest or fastest organisms survive, but different environments may favor small or slow organisms, depending on environmental pressures.		To support students when they design their device: **Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing.** To support students when they design their device: **Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing.** This is the same as… because ... This is different than… because … All these are because …. , , and all have/are . Use graphic organizers, narratives or concept maps to identify part/ whole or cause–and–effect relationships. Use relationship verbs such as *contain*, *consist of*. As , then . When I changed … , then… happened. The more/less… ,then...