**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.

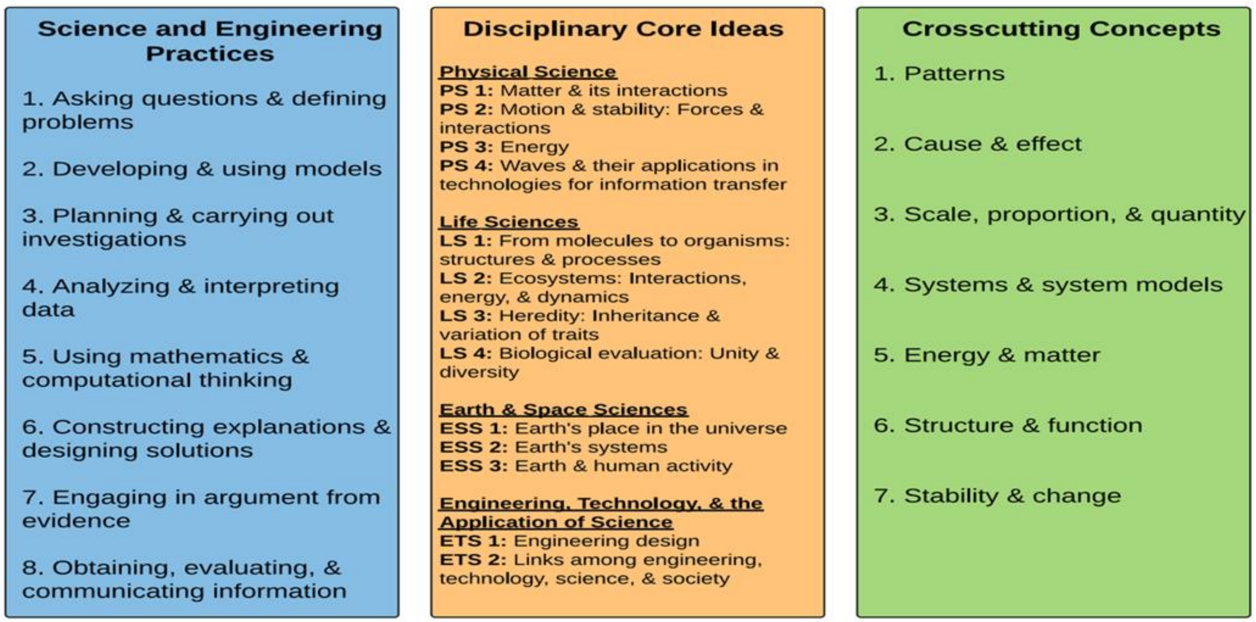
Our collective goal is to ensure our students graduate ready for college and career. Being College and Career Ready entails, many aspects of teaching and learning. We want our students to apply their scientific learning in the classroom and beyond. These valuable experiences include students being facilitators 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.

| 4th Grade Quarter 1 Curriculum Map<br>Quarter 1 Curriculum Map Feedback | | | | | | |
|---|---|---|---|---|---|---|
| **Quarter 1** | | Quarter 2 | | Quarter 3 | | Quarter 4 |
| Structure and Routine | **Unit 1<br>Interactions of Living Things** | Unit 2<br>Energy | Unit 3<br>Wave Patterns and Information Transfer | Unit 4<br>Earth and Its Resources | Unit 5<br>Earth and Its Changing Features | Unit 6<br>The Sun and Earth |
| 1 week | **8 weeks** | 4.5 weeks | 4.5 weeks | 3 weeks | 6 weeks | 9 weeks |

**UNIT 1: Interactions of Living Things (8 weeks)**

**Overarching Question(s)**

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

| Unit 1: Lesson 1 | Lesson Length | Essential Question | Vocabulary |
|---|---|---|---|
| Plants and Photosynthesis | 2 weeks | What do plants need to survive? | carbon dioxide, chlorophyll, chloroplast, oxygen, phloem, photosynthesis, sugar, transpiration, xylem |

| Standards and Related Background Information | Instructional Focus | Instructional Resources |
|---|---|---|
| **DCI(s)**<br>4.LS2 Ecosystems: Interactions, Energy, and Dynamics<br><br>**Standard(s)**<br>4.LS2.1: Support an argument with evidence that plants get the materials they need for growth and reproduction chiefly through a process in which they use carbon dioxide from the air, water, and energy from the sun to produce sugars, plant materials, and waste (oxygen); and that this process is called photosynthesis. | **Learning Outcomes**<br>Students will be able to argue from evidence to show what plants need to survive.<br><br>**Suggested Phenomena**<br>Phenomenon #1: The Growing Tree Video<br><br>*Click on the phenomenon picture to view the video.* | **Curricular Resources**<br>Engage<br>TE, p. 5-6<br>TE, p.5, Science in My World, Phenomenon<br>TE, p.6, Essential Question<br>TE, p.6, Science and Engineering Practices<br><br>Explore<br>TE, pp. 7<br>*(LAB)* Be a Scientist Notebook, p. 7, Inquiry Activity: Virtual Plant Simulation<br><br>Explain |

**Explanation and Support of Standard**
4.LS2.1
Matter exists in invisible forms called particles. Plants take in these invisible particles from the air. One of these invisible particles is called carbon dioxide. Carbon dioxide is a gas in most situations on Earth. Plants grow by taking this gas and turning it into plant materials.

Energy can be transferred from one place to another through by waves. Energy from the sun reaches the earth. Plants capture waves of energy from the sun (light) energy and store it in plant materials such as sugar to be used at a later time or transferred to other organisms.

Students can examine elodea plants in water to observe their production of gas (oxygen) under varying conditions. Bromothymol blue can be used as an indicator to show the conversion of carbon dioxide (blow bubbles into water) into oxygen by the elodea. In preparation for later grades, it should be emphasized that plant matter comes from carbon dioxide, not the soil or water.


Phenomenon #2: Sunflowers absorbing sunlight

Phenomena Explanation:
Plants make their own food. Plants use the food that they make as their source of energy to help them grow and make structural repairs.

TE, pp. 8-13
Be A Scientist Notebook, p. 8: Vocabulary
Science File: Plant Needs and Structures; Photosynthesis

Elaborate
TE, pp. 14-15
*(LAB)* Be a Scientist Notebook, p. 12, Inquiry Activity: Plant Investigation

Evaluate
TE, pp. 16-17
*(LAB)* Be A Scientist Notebook, p. 200 Performance Task: Solution for Survival
eAssessment

**Additional Resources**
Video: Photosynthesis | Educational Video for Kids
Video: Types of Plants
Video: Science - Amazing Process Of Photosynthesis

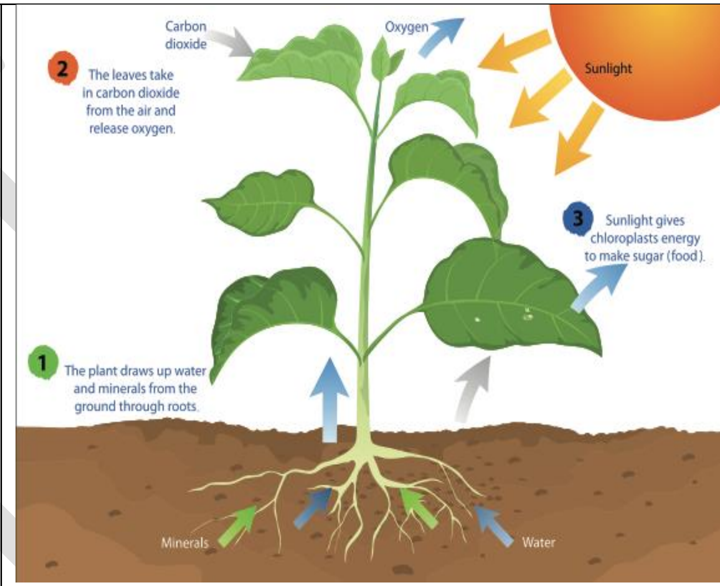
*Carbon dioxide is an exception to a general recommendation that microscopic particles should be referred to, generically, as particles in the 3-5 grade band*

**Suggested Science and Engineering Practice(s)**
Engaging in Argument from Evidence

**Suggested Crosscutting Concept(s)**
Energy and Matter
**Teacher Overview**
Just like other living things, plants must meet certain basic needs in order to grow. Most plants need sunlight, nutrients from the soil, clean air, and water. If these needs are not met, plants cannot thrive. Sunlight is important because it supplies the energy needed to drive the chemical reactions in photosynthesis. Photosynthesis requires carbon dioxide and water. Plants also require nutrients, such as nitrogen and potassium, for growth.

**Misconceptions**
Students may think that all plants have the exact same needs. In fact, plants' needs for various resources can vary greatly because plants are adapted to their environment. For example, cacti in the desert have a






Video: [Tomato Plant Turning Toward the Sun]
**Lesson:** [How do Plants Make their Own Food-Photosynthesis]

**ESL Supports and Scaffolds**
ESL & Alternatives
Writing connection- have students create a picture book to share with first graders, calling out how plants make food and receive energy.

- Challenge-What does it mean if a plant's leaves start to turn yellow?
- ESL

[WIDA Standard 4]

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| much lower need for water that banana trees, which require great deal of water. Epiphytes (plants that grow on other plants) do not require soil because they obtain nutrients and water directly from the air and rain. | | • The Language of Science<br><br>To support students in speaking, refer to this resource: WIDA Doing and Talking Science<br><br>Provide visual to support understanding of photosynthesis<br><br>To support students with the scientific explanation: **Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing.**<br><br>**In creating arguments, consider using these stems:**<br>**Evidence:**<br>The (data/graph/results) support the claim because….<br>The picture shows that…..<br>**Reason:**<br>This was caused by….<br>The fact that _____ was caused by _____ means ________.<br>Therefore, _______ explains why I support/reject the claim______.<br><br>Question Starters<br>What's the connection between….?<br>What link do you see between…<br>Why do you think…?<br>What is our evidence that….<br>Do we have enough evidence to make that claim?<br>But what about this other evidence that shows…?<br>But does your claim account for…(evidence) |

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| | | <u>Response Starters</u><br>I agree with you because of (evidence or reasoning)<br>I don’t agree with your claim because of (evidence or reasoning)<br>This evidence shows that…<br>Your explanation makes me think about ….. |

| 4th Grade Quarter 1 Curriculum Map<br>Quarter 1 Curriculum Map Feedback | | | | | | |
|---|---|---|---|---|---|---|
| **Quarter 1** | | Quarter 2 | | Quarter 3 | | Quarter 4 |
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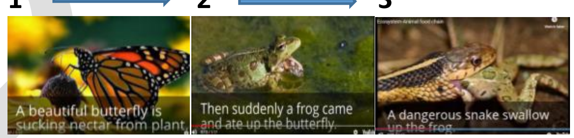
| 1 week | **8 weeks** | 4.5 weeks | 4.5 weeks | 3 weeks | 6 weeks | 9 weeks |

**UNIT 1: Interactions of Living Things (8 weeks)**

**Overarching Question(s)**

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

| Unit 1: Lesson 2 | Lesson Length | Essential Question | Vocabulary |
|---|---|---|---|
| Interactions in Ecosystems | 2 weeks | How does energy flow in an ecosystem? | biotic factor, abiotic factor, terrestrial, aquatic, producers, consumers, decomposers, food chain, food web |

| Standards and Related Background Information | Instructional Focus | Instructional Resources |
|---|---|---|
| **DCI(s)**<br>4.LS2 Ecosystems: Interactions Energy, and Dynamics<br><br>**Standard(s)**<br>4.LS2.2: Develop models of terrestrial and aquatic food chains to describe the movement of energy among producers, herbivores, carnivores, omnivores, and decomposers.<br><br>4.LS2.3: Using information about the roles of organisms (producers, consumers, decomposers), evaluate how those roles in food chains are interconnected in a food web, and communicate how the organisms are | **Learning Outcomes**<br>Students will be able to model how energy moves within a food chain and food web.<br><br>**Suggested Phenomenon**<br>Video: Ecosystem – Animal Food Chain<br>*Click on the phenomenon picture to view the video.*<br><br>**1st → 2nd → 3rd**<br><br><br>*Picture Description* | **Curricular Resources**<br>Engage<br>TE, pp. 19-20<br>TE, p. 19 Phenomenon, Science in My World<br>TE, p. 20, Essential Questions<br>TE, p. 20, Science and Engineering Practices<br><br>Explore<br>TE, pp. 21-22<br>*(LAB)* Be a Scientist Notebook, p. 21 Inquiry Activity: Foxes and Rabbits<br><br>Explain |

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| continuously able to meet their needs in a stable food web.<br><br>**Explanation and Support of Standard**<br>4.LS2.2<br>All ecosystems require organisms that are able to convert energy (such as waves of energy from the sun) into chemical energy. This energy is then passed along a chain of organisms. For most ecosystems on Earth, the Sun's energy is captured by photosynthetic organisms (producers) creating the foundation for energy transfer up the food chain. The sun's energy becomes potential energy stored as chemical energy. Consumers are organisms that eat other organisms. The chemical (stored) energy of the "food" organism is transferred to the consumer.<br><br>Based on their specific diet, consumers can be classified as either herbivores, carnivores, or omnivores. Decomposers fulfill a unique role by returning certain nutrients to the soil so that they can be reincorporated into the food chain at the producer level. There are far less substantial means of energy production, such as sulfur-reducing bacteria, that allow certain producers to obtain energy from abiotic sources. Within the biosphere, organisms have certain dietary habits that allow them to be organized in a manner that tracks the flow of energy through an ecosystem.<br><br>4.LS2.3 | *The butterfly sucks nectar from a plant, then a frog eats the butterfly. Afterwards, a snake swallows the frog.*<br><br>Phenomenon Explanation:<br>Matter and energy moves from organism to organism in an ecosystem. | TE, pp. 23-27<br>*(LAB)* Be a Scientist notebook, p. 23: Vocabulary<br>Science Handbook/eBook: Interactions of Living Things<br>Science Handbook/eBook: Producers, Consumers, and Decomposers<br>Science Handbook/eBook: Food Chains and Food Webs<br>Digital Interactive: Energy Flow in a Food Chain<br><br>Elaborate<br>TE, pp. 28<br>Science Handbook/eBook: Energy in a Salt Marsh Ecosystem<br><br>Evaluate<br>TE, pp, 28-29<br>*(LAB)* Be a Scientist Notebook, p. 29, Performance Task: Build a Food Web<br>eAssessment<br><br>**Additional Resources**<br>Lesson: Lesson on Ecosystem and Structure<br>Song:  You are what you eat song (Fatcat and Fishface 3:04 min)<br>Lab: Producers, Consumers, and Decomposers |

Food chains are useful for tracking energy in a linear manner. A food chain cannot show the relationships between a larger number of connected organisms in an ecosystem. A food web is made of a group of food chains that connect to each other in a number of ways to show the flow of matter and energy.

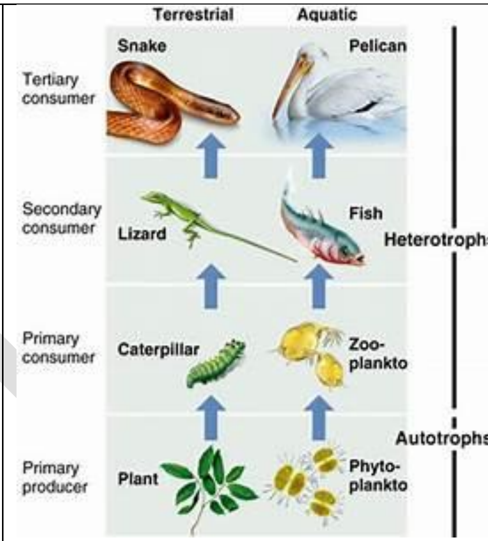
Both matter and energy can be traced back to plants in most food webs. In a stable food web, the needs of multiple species are met in a consistent manner.

An example of how roles of organisms are interconnected in a food web might include grass (producer) in a forest clearing, which produces its own food through photosynthesis. A rabbit (consumer-herbivore) eats the grass. A fox (consumer-carnivore) eats the rabbit. When the fox dies, decomposers such as worms and mushrooms break down its body, returning the matter and energy stored in the fox to the soil where it provides nutrients for plants like grass.

**Suggested Science and Engineering Practice(s)**
Developing and Using Models
Obtaining, Evaluating, and Communicating Information

**Suggested Crosscutting Concept(s)**
Systems and System Models

**Teacher Overview**




Video: The Food Chain
Video: The Animal Food Chain
Video: Food Web and Food Chain

**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

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| Energy cycles through ecosystems at different trophic (food-related) levels. Scientists show the energy at each level using a diagram called an energy pyramid. Only about 10 percent of all energy produced at one trophic level (also called a food chain level) goes to the next level. The remaining 90 percent is used during respiration, growth, reproduction, and nonpredatory death. Scientists illustrate the flow of energy in an ecosystem using food chains and food webs. Primary producers are at the first trophic level of any ecosystem. These organisms use solar energy to produce organic carbon during photosynthesis. Herbivores, which eat only plants, are at the next trophic level. Predators (carnivores, which eat only animals, and omnivores, which eat plants and animals) are at the highest trophic levels. Meanwhile, decomposers, which include bacteria, fungi, molds, worms, and insects, break down wastes in the ecosystem and return the nutrients to the soil.<br><br>**Misconceptions**<br>Some students may struggle with ideas such as predation. They might believe that all members of a group at a certain trophic level, such as predators, exhibit the same qualities or characteristics that only a few examples exhibit. Students might confuse a food chain with a food web. A food chain shows a single series of consumers and producers that rely on each other as sources of food. A food web shows the overlap or intersection of multiple food chains in an ecosystem. | | (**Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs**)<br>Pre-teach: movement of energy; meet needs; stable<br><br>Allow beginning level students to sort pictures of animals into categories.<br>Provide sentence frames and word banks to support Els in creating sentences about food chains:<br>Animals meet their needs by_____<br>Food chains are________<br>An example of a (role of animal in food chain) because________.<br><br>ESL- students demonstrate the difference between producers and consumers. Draw five pictures of living things and label them producer or consumer.<br><br>ESL- Students demonstrate an understanding of *energy pyramids.* Create three or four level pyramids with humans at the top. Compare and combine pyramids. |

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| 1 week | **8 weeks** | 4.5 weeks | 4.5 weeks | 3 weeks | 6 weeks | 9 weeks |
| **UNIT 1: Interactions of Living Things (8 weeks)** | | | | | | |
| **Overarching Question(s)** | | | | | | |
| How and why do organisms interact with their environment and what are the effects of these interactions? | | | | | | |

| Unit 1: Lesson 3 | Lesson Length | Essential Question | Vocabulary |
|---|---|---|---|
| Balance in Ecosystems | 2 weeks | How do changes affect ecosystems? | habitat, niche, limiting factor, competition, symbiosis, mutualism, commensalism, parasitism, invasive species |

| Standards and Related Background Information | Instructional Focus | Instructional Resources |
|---|---|---|
| **DCI(s)**<br>4.LS2 Ecosystems: Interactions, Energy, and Dynamics<br><br>**Standard(s)**<br>4.LS2.4: Develop and use models to determine the effects of introducing a species to, or removing a species from an ecosystem and how either one can damage the balance of an ecosystem.<br><br>**Explanation and Support of Standard**<br>4.LS2.4 | **Learning Outcomes**<br>Students will be able to model how the introduction or removal of organisms affects the stability of an ecosystem.<br><br>**Suggested Phenomenon**<br><br>*Click on the phenomenon picture to view the video.*<br><br>*Picture Below*: Invasive Species – Kudzu | **Curricular Resources**<br>Engage<br>TE, pp. 31-32<br>TE, pp. 33, Science in My World, Phenomenon<br>TE, pp. 34, Essential Questions<br>TE, pp. 34, Science and Engineering Practices<br><br>Explore<br>TE, pp. 33-34 |

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| Ecosystems can be threatened by invasive species which can outcompete native species for shared energy and resources in an otherwise stable food web. As a result of the inability to compete, the variety of native species decreases, reducing biodiversity. The reduced biodiversity presents the opportunity for more significant consequences from external factors, which are no longer damped by the ecosystem. When an ecosystem changes, some organisms survive while others do not, with less diversity, threats to single species prove more substantial. Models such as food webs can serve predictive functions. An example of introducing a species may include the introduction of tilapia and snakehead fish to countless streams, lakes, and rivers throughout the Indonesian Islands and other locations around the world, where these predatory fish almost always eat any native fish species to extinction. An example of removing a species might include prairie dogs, which are beneficial and contribute to the existence of the ecosystem in which they live. Without their existence, their ecosystem would be dramatically different or cease to exist altogether.<br><br>**Suggested Science and Engineering Practice(s)**<br>Developing and Using Models<br><br>**Suggested Crosscutting Concept(s)**<br>Systems and System Models | <br>Phenomenon Explanation:<br>Ecosystems can be threatened by invasive species which can outcompete native species for shared energy and resources. | Be a Scientist Notebook, p. 35 Inquiry Activity: Overfishing Simulation<br><br><u>Explain</u><br>TE, pp. 34-42<br>Be a Scientist notebook, p. 37: Vocabulary<br>Science Handbook/eBook: Habitats and Niches<br>Video: Habitats and Niches<br>Science Handbook/eBook: Resources in Ecosystems<br>Science Handbook/eBook: Symbiosis<br>Science Handbook/eBook: Invasive Species<br><br><u>Elaborate</u><br>TE, pp. 42-43<br>*(LAB)* Be a Scientist Notebook, p. 42, Inquiry Activity: Overfishing Simulation Revisit<br><br><u>Evaluate</u><br>TE, pp. 43-45<br>*(LAB)* Be a Scientist Notebook, p. 43, Performance Task: Solve for an Invasive Species<br>eAssessment<br><br>**Additional Resources** |

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| **Teacher Overview**<br>Groups of the same type of organism in an ecosystem are called populations. For example, all of the worms in a parcel of soil make up one population. All of the snails or all of the grubs each make up a separate population. Each population in an ecosystem is adapted for that environment. This is why polar bears are not naturally found in the bayous of Louisiana and why crocodiles are not found in the grasslands of Nebraska. Each organism lives in a place called a habitat. Organisms also have a special job or role in the community. What the organism does within an ecosystem is called its niche. Niches include things such as an organism's activities – when it is active, when it hunts, and what it hunts. For example, a barn owl hunts for mice at night. This activity affects other animals by keeping the mouse population from growing too rapidly.<br><br>**Misconceptions**<br>Students might not understand that ecosystems are dynamic and change as a result of both natural and human-influenced processes. Students might think that species coexist in ecosystems because they have similar needs and behaviors, and therefore they need to get along. Ensure that students understand that species compete for resources and feed on one another within an | | Lesson on the endangered Tree Octopus<br><br>Activity: Pop up Ecology Files activity<br>Invasive species ppt with speaker notes<br><br>Invasive Species Resource<br><br>Articles:<br>Green Invaders Article Lexile 1000L - 1100L<br><br>What Happens When a Top Predator is removed from the Ecosystem? Article 1200L - 1300L<br><br>Exit slip<br><br>Labs:<br>Environmental Change Lesson<br><br>Atmospheric Oxygen Manipulate the oxygen level to see the effects on the organisms.<br><br>**ESL Supports and Scaffolds**<br>WIDA Standard 4 |

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| ecosystem. Species live in the same ecosystem because they have similar adaptations to the environment. | | The Language of Science<br><br>To support students in speaking, refer to this resource:<br>WIDA Doing and Talking Science<br><br>**Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs**)<br>Pre-teach: niche, invasive, native<br><br>When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals<br><br>To support students with the scientific explanation: **Model speaking and writing expectations for Entering Level ELs. Consider using the recommended stems to support students in their discussions and writing.**<br><br>To support cause and effect relationship, model using the following signal words in speaking/writing: |

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| | | When applicable - use Home Language to build vocabulary in concepts. Spanish Cognates Interactive Science Dictionary with visuals<br><br>So • Because • Since • If ... Then ... • Therefore • This led to • Reason why • As a result • May be due to • Effect of • Consequently • For this reason<br><br>Sentence stems:<br>When_______entered the ecosystem_____changed______.<br>As a result_____________.<br>The reason why the ecosystem is off balance is due to_____________. |

| 4th Grade Quarter 1 Curriculum Map<br>Quarter 1 Curriculum Map Feedback | | | | | | | |
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| **Quarter 1** | | Quarter 2 | | Quarter 3 | | Quarter 4 |
| Structure and Routine | **Unit 1<br>Interactions of Living Things** | Unit 2<br>Energy | Unit 3<br>Wave Patterns and Information Transfer | Unit 4<br>Earth and Its Resources | Unit 5<br>Earth and Its Changing Features | Unit 6<br>The Sun and Earth |
| 1 week | **8 weeks** | 4.5 weeks | 4.5 weeks | 3 weeks | 6 weeks | 9 weeks |

| **UNIT 1: Interactions of Living Things (8 weeks)** | | | |
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| **Overarching Question(s)** | | | |
| How and why do organisms interact with their environment and what are the effects of these interactions? | | | |
| **Unit 1: Lesson 4** | **Lesson Length** | **Essential Question** | **Vocabulary** |
| Living Things Respond to Change | 2 weeks | How do organisms survive changes in their ecosystem? | structural adaptation, camouflage, mimicry, behavioral adaptation |

| Standards and Related Background Information | Instructional Focus | Instructional Resources |
|---|---|---|
| **DCI(s)**<br>4.LS2 Ecosystems: Interactions, Energy, and Dynamics<br><br>**Standard(s)**<br>4.LS2.5: Analyze and interpret data about changes (land characteristics, water distribution, temperature, food, and other organisms) in the environment and describe what mechanisms organisms can use to affect their ability to survive and reproduce.<br><br>**Explanation and Support of Standard**<br>4.LS2.5<br>Changes to the physical characteristics, temperature, or access to resources in an ecosystem can threaten some | **Learning Outcomes**<br>Students will be able to gathered information to explain how organisms survive changes in their ecosystems by using structural and behavioral adaptations.<br><br>**Suggested Phenomena**<br>*Below* ↓ | **Curricular Resources**<br>Engage<br>TE, pp. 47-48<br>TE, p. 47, Phenomenon<br>TE, p. 48, Essential Questions<br>TE, p. 48, Science and Engineering Practices<br><br>Explore<br>TE, pp. 48-50<br>*(LAB)* Be a Scientist Notebook, p. 49 Inquiry Activity: What habitat is Best?<br><br>Explain |

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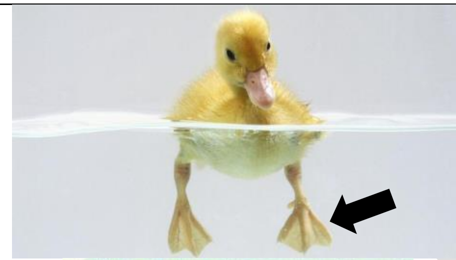
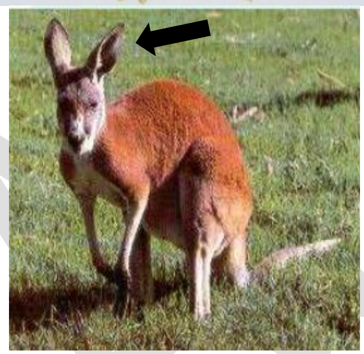
| species, while proving advantageous to others. When the ecosystem changes, some organisms will survive and reproduce while others may not. Those organisms who struggle in an environment after a change has occurred will either die off or may move to a new location. Changes to the environment may also provide opportunities for new organisms to establish themselves. In the instruction of this standard, it is important to introduce students to a variety of changes in the environment and make connections between these changes and the ability of the ecosystems to meet the needs of organisms<br><br>**Suggested Science and Engineering Practice(s)**<br>Analyzing and Interpreting Data<br><br>**Suggested Crosscutting Concept(s)**<br>Systems and System Models<br>**Teacher Overview**<br>Organisms have behaviors and characteristics that are suited for the habitats and environments in which they live. These qualities are known as adaptations. Adaptations are the result of natural selection, which is not covered in this lesson. Natural selection means that given genetic variations that happen naturally over the generations, those that help organisms to survive and thrive in their environment are more likely to be passed on to descendants, since such organisms will live longer and have more opportunity to reproduce. This process, repeated over countless generations, hones organisms' | <br><br><br>Video: Sidewinder Snake<br>*Click on the phenomenon picture to view the video.*<br><br> | TE, pp. 50-55<br>Be a Scientist notebook, p. 51: Vocabulary<br>Science Handbook/eBook: How Changes Affect an Ecosystem<br>Digital Interactive: Changes in Ecosystems<br>Science Handbook/eBook: Adaptations and Behaviors<br><br>Elaborate<br>TE, pp. 55-56<br>*(LAB)* Be a Scientist Notebook, p. 56, Inquiry Activity: Mimicry Model<br><br>Evaluate<br>TE, pp, 57-59<br>*(LAB)* Be a Scientist Notebook, p. 57, Performance Task: A Model Organism<br>eAssessment<br><br>**Additional Resources**<br>**Lesson:** Lesson on adaptation and camouflage<br><br>Video: Types Of Adaptations<br>Video: 12 Coolest Camouflage Animals and Insects<br>Video: Evolution of Camouflage 56 seconds<br>Article: What is Water Temperature Article 1100L - 1200L<br><br>**ESL Supports and Scaffolds** |

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| adaptations over long periods of time, giving them the habitat-specific characteristics we see today.<br><br>**Misconceptions**<br>Unfortunately, the term adaptation can cause confusion in students, who may believe that adaptations in organisms are those which the organisms try to have. To say that organisms respond to their environment by adaptation is not to say that organisms decide to have characteristics that will help them survive better in their habitats. Organisms, of course, are born with a given set of characteristics that they cannot change even if it were something they could aim to do. Rather, the process of adaptation is a natural one that involves selection over many, many generations. | Phenomena Explanation:<br>The organisms that are most likely to in survive in their environment may have lifestyles and structures that provide them advantages. | WIDA Standard 4<br>The Language of Science<br><br>To support students in speaking, refer to this resource:<br>WIDA Doing and Talking Science<br><br>Pre-teach the vocabulary: (**Consider teaching this vocabulary in addition to vocabulary addressed in the standard to support Entering Level ELs**)<br>Survive; characteristics; survive<br><br>Support Entering Level ELs by:<br>Highlighting main points that you would like them to use in explanations.<br><br>Use sentence stems such as:<br>The______helps the animal survive changes by__________.<br>As a result of _________the animal adapted by_______________. |