

2021 - 2022, Fourth Grade, Science, Quarter 1

Big Ideas/Key Concepts:

- Photosynthesis is the process that enables plants to convert energy from the sun to produce matter.
- Energy flows through an ecosystem by means of photosynthesis and food chains on both land and water.
- All life is interdependent and interacts with the environment.
- Fossils provide information, especially about types of life and their environment in the past.

Standards	Student Friendly “I Can” Statements
<p><u>Ecosystems: Interactions, Energy, and Dynamics</u></p> <p>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.</p> <p>4.LS2.2 Develop models of terrestrial and aquatic food chains to describe the movement of energy among producers, herbivores, carnivores, omnivores, and decomposers.</p> <p>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 continuously able to meet their needs in a stable food web.</p>	<p><u>Ecosystems: Interactions, Energy, and Dynamics</u></p> <p>I can use evidence to explain that plants use <u>carbon dioxide from the air</u>, <u>water</u>, and <u>energy from the sun</u> to produce <u>sugars</u>, <u>plant materials</u>, and <u>waste (oxygen)</u>; and that this process is called <u>photosynthesis</u>.</p> <p>I can explain that plants use the process of photosynthesis to grow and make new plants.</p> <p>I can model a food chain to show how energy is transferred among living things within a <u>land</u> ecosystem and a <u>water</u> ecosystem. My food chain includes <u>producers</u>, <u>herbivores</u>, <u>carnivores</u>, <u>omnivores</u>, and <u>decomposers</u>.</p> <p>I can show how the living things which are part of a food chain are also part of a larger, interconnected food web. My food web includes <u>producers</u>, <u>consumers</u>, and <u>decomposers</u>.</p> <p>I can explain how living things are able to meet their needs in a stable food web.</p>

Standards	Student Friendly "I Can" Statements
<p>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.</p> <p>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.</p> <p><u>Biological Change: Unity and Diversity</u></p> <p>4.LS4.1 Obtain information about what a fossil is and ways a fossil can provide information about the past.</p>	<p>I can create models to show how adding or removing a species within an ecosystem can damage the ecosystem's balance.</p> <p>I can gather and interpret data about changes in the environment such as <u>land characteristics, water distribution, temperature, food, and other organisms.</u></p> <p>I can use gathered data to describe how organisms use their adaptations to survive and reproduce.</p> <p><u>Biological Change: Unity and Diversity</u></p> <p>I can research a variety of fossils and explain how fossils are formed.</p> <p>I can describe different ways that fossils give us information about the past (e.g., fossilized footprints vs a fossilized skeleton).</p>

Embedded K-8 TN Computer Science Standards:

- **AIT.1** Identify and define problems and form significant questions for investigation.
- **AIT.6** Collect, organize, analyze, and interpret data to identify solutions and/or make informed decisions.
- **AIT.7** Infer and predict or propose relationships with data.
- **DC.1** Advocate, demonstrate, and routinely practice safe, legal, and responsible use of information and technology.
- **DC.2** Exhibit a positive mindset toward using technology that supports collaboration, learning, and productivity.

2021 - 2022, Fourth Grade, Science, Quarter 2

Big Ideas/Key Concepts:

- The surface of Earth changes due to weathering, tectonic plate movement, organisms, and other natural phenomena.
- Erosion and deposition naturally occur over long periods of time and have changed landscapes and landforms.
- The Earth has four distinctive layers: crust, mantle, outer core, and inner core.
- There are renewable and nonrenewable resources found in nature that provide energy and/or fuel for human activities. ● Humans impact the environment in both positive and negative ways.

Standards	Student Friendly “I Can” Statements
<p><u>Earth’s Systems</u></p> <p>4.ESS2.4 Analyze and interpret data on the four layers of the Earth, including thickness, composition, and physical states of these layers.</p> <p>4.ESS2.2 Interpret maps to determine that the location of mountain ranges, deep ocean trenches, volcanoes, and earthquakes occur in patterns.</p> <p>4.ESS2.3 Provide examples to support the claim that organisms affect the physical characteristics of their regions.</p> <p>4.ESS2.1 Collect and analyze data from observations to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering (frost wedging, abrasion, tree root wedging) and are transported by water, ice, wind, gravity, and vegetation.</p>	<p><u>Earth’s Systems</u></p> <p>I can analyze and interpret data on the four layers of Earth, including thickness, composition, and physical states of these layers.</p> <p>I can use data to differentiate between the four layers of Earth: crust, mantle, outer core, and inner core.</p> <p>I can analyze and interpret maps of Earth’s mountain ranges, deep ocean trenches, the placement of volcanoes, and earthquakes to describe patterns of these features and their locations.</p> <p>I can defend the claim that organisms affect the physical characteristics of their regions by providing examples from research.</p> <p>I can collect and analyze evidence that rocks, soils, and sediments are broken into smaller pieces by mechanical weathering. (e.g. frost wedging, abrasion, tree root, wedging)</p> <p>I can describe how small pieces of rocks, soils, and sediments are transported by water, ice, wind, gravity, and vegetation.</p>

4.ESS1.1 Generate and support a claim with evidence that over long periods of time, erosion (weathering and transportation) and deposition have changed landscapes and created new landforms.

Earth and Human Activity

4.ESS3.1 Obtain and combine information to describe that energy and fuels are derived from natural resources and that some energy and fuel sources are renewable (sunlight, wind, water) and some are not (fossil fuels, minerals).

4.ESS3.2 Create an argument, using evidence from research, that human activity (farming, mining, building) can affect the land and ocean in positive and/or negative ways.

I can argue from evidence that erosion & deposition naturally occur over long periods of time, and that they can significantly impact landscapes and landforms.

Earth and Human Activity

I can gather information to describe that energy and fuels are derived from natural resources.

I can differentiate between renewable (sunlight, wind, water) and nonrenewable (fossil fuels, minerals) resources.

I can create an argument, using evidence from research, that human activity (i.e. farming, mining, and building) can affect the land and ocean in both positive and negative ways.

Embedded K-8 TN Computer Science Standards:

- **AIT.1** Identify and define problems and form significant questions for investigation.
- **AIT.2** Develop a plan to use technology to find a solution and create projects.
- **AIT.6** Collect, organize, analyze, and interpret data to identify solutions and/or make informed decisions.
- **AIT.7** Infer and predict or propose relationships with data.
- **DC.1** Advocate, demonstrate, and routinely practice safe, legal, and responsible use of information and technology.
- **DC.2** Exhibit a positive mindset toward using technology that supports collaboration, learning, and productivity.
- **DC.3** Exhibit leadership for digital citizenship.
- **DC.5** Explain responsible uses of technology and digital information; describe possible consequences of inappropriate use such as copyright infringement and piracy.

2020 - 2021, Fourth Grade, Science, Quarter 3

Big Ideas/Key Concepts:

- The interaction between Earth and the Sun causes a pattern of day and night as well as predictable changes in shadow length.
- Waves have properties, such as amplitude, wavelength, and direction.
- Light waves travel in straight lines, which in turn affects what is visible to our eyes.
- Light waves bend when they encounter a lens, and this principle can be used to develop technology to help humans see more clearly.

Standards	Student Friendly “I Can” Statements
<p><u>Earth’s Place in the Universe</u></p> <p>4.ESS1.2 Use a model to explain how the orbit of the Earth and sun cause observable patterns: a. day and night; b. changes in length and direction of shadows over a day.</p>	<p><u>Earth’s Place in the Universe</u></p> <p>I can use a model to explain how the orbit and rotation of the Earth causes a pattern such as day & night.</p> <p>I can investigate how the orbit and rotation of the Earth causes a pattern in the length & direction of shadows over a day.</p>
<p><u>Waves and their Application in Technologies for Information Transfer</u></p> <p>4.PS4.1 Use a model of a simple wave to explain regular patterns of amplitude, wavelength, and direction.</p> <p>4.PS4.2 Describe how the colors of available light sources and the bending of light waves determine what we see.</p> <p>4.PS4.3 Investigate how lenses and digital devices like computers or cell phones use waves to enhance human senses.</p>	<p><u>Waves and their Application in Technologies for Information Transfer</u></p> <p>I can use a model to explain the properties of a simple wave (i.e. amplitude, wavelength, direction).</p> <p>I can investigate the effects of different colored light sources on what is seen.</p> <p>I can model how light waves that travel in straight lines bend when they travel through a prism and/or lens.</p> <p>I can investigate how lenses and devices like computers or cell phones use waves to help humans see more clearly.</p>

Embedded K-8 TN Computer Science Standards:

- **AIT.1** Identify and define problems and form significant questions for investigation.
- **AIT.6** Collect, organize, analyze, and interpret data to identify solutions and/or make informed decisions.
- **AIT.7** Infer and predict or propose relationships with data.
- **DC.1** Advocate, demonstrate, and routinely practice safe, legal, and responsible use of information and technology.
- **DC.2** Exhibit a positive mindset toward using technology that supports collaboration, learning, and productivity.
- **DC.3** Exhibit leadership for digital citizenship.
- **DC.4** Recognize and describe the potential risks and dangers associated with various forms of online communications (e.g., cell phones, social media, digital photos).

DC.5 Explain responsible uses of technology and digital information; describe possible consequences of inappropriate use such as copyright infringement and piracy.

2020 - 2021, Fourth Grade, Science, Quarter 4

Big Ideas/Key Concepts:

- There is a cause and effect relationship between the speed of an object and the energy of an object.
- Two types of energy of motion are kinetic and potential, and they have an inverse relationship.
- Differences among these two types of energy can be predicted, measured, and described through an investigation.
- The Engineering Design Process is used to generate multiple solutions to a defined problem with criteria and constraints.
- Different engineering solutions are categorized according to their effectiveness in meeting a problem’s criteria and constraints.
- Tools and measurements, when used appropriately, can develop an accurate model of a solution to a problem.
- Engineers have improved existing technologies to increase their benefits, to decrease known risks, and to meet societal demands.
- Identify the parts and functions of the human skeletal and muscular systems to better understand human health. (WCS Standard)

Standards	Student Friendly “I Can” Statements
<p><u>Energy</u></p> <p>4.PS3.1 Use evidence to explain the cause and effect relationship between the speed of an object and the energy of an object.</p> <p>4.PS3.2 Observe and explain the relationship between potential energy and kinetic energy.</p> <p>4.PS3.3 Describe how stored energy can be converted into another form for practical use.</p> <p><u>Engineering Design</u></p> <p>4.ETS1.1 Categorize the effectiveness of design solutions by comparing them to specified criteria for constraints.</p>	<p><u>Energy</u></p> <p>I can explain by using evidence the cause and effect relationship between the speed of an object and the energy of an object.</p> <p>I can observe and explain the relationship between potential and kinetic energy. **Apply the Engineering Standards on the following page**</p> <p>I can carry out an investigation to demonstrate the difference between potential and kinetic energy. **Apply the Engineering Standards found on the following page**</p> <p>I can describe how stored energy can be converted into another form for practical use. **Apply the Engineering Standards found below**</p> <p><u>Engineering Design</u></p> <p>I can categorize how effective design solutions are by comparing them to specified criteria for constraints.</p>

<p><u>Links Among Engineering, Technology, Science, and Society</u></p> <p>4.ETS2.1 Use appropriate tools and measurements to build a model.</p> <p>4.ETS2.2 Determine the effectiveness of multiple solutions to a design problem given the criteria and the constraints.</p> <p>4.ETS2.3 Explain how engineers have improved existing technologies to increase their benefits, to decrease known risks, and to meet societal demands (artificial limbs, seatbelts, cell phones).</p>	<p>**Embed within the Energy Standards found above**</p> <p><u>Links Among Engineering, Technology, Science, and Society</u></p> <p>I can build a model to solve a problem using appropriate tools and measurements. **Embed within the Energy Standards found above**</p> <p>I can determine the effectiveness of multiple solutions to a design problem given the criteria and constraints. **Embed within the Energy Standards found above**</p> <p>I can explain how engineers have improved existing technologies to <u>increase their benefits</u> (i.e., artificial limbs).</p> <p>I can explain how engineers have improved existing technologies to <u>decrease known risks</u> (i.e., seatbelts).</p> <p>I can explain how engineers have improved existing technologies to <u>meet societal demands</u> (i.e., cell phones)</p>
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<p>4.PS3.3 Describe how stored energy can be converted into another form for practical use.</p> <p><u>Engineering Design</u></p> <p>4.ETS1.1 Categorize the effectiveness of design solutions by comparing them to specified criteria for constraints.</p> <p><u>Links Among Engineering, Technology, Science, and Society</u></p> <p>4.ETS2.1 Use appropriate tools and measurements to build a model.</p> <p>4.ETS2.2 Determine the effectiveness of multiple solutions to a design problem given the criteria and the constraints.</p> <p>4.ETS2.3 Explain how engineers have improved existing technologies to increase their benefits, to decrease known risks, and to meet societal demands (artificial limbs, seatbelts, cell phones).</p> <p><u>Human Body Systems</u></p> <p>4.WCE.SC.1 Identify the parts of the skeletal system and their functions. <i>Introduced after TCAP – this standard is not assessed.</i></p>	<p>I can describe how stored energy can be converted into another form for practical use. **Apply the Engineering Standards found below**</p> <p><u>Engineering Design</u></p> <p>I can categorize how effective design solutions are by comparing them to specified criteria for constraints. **Embed within the Energy Standards found above**</p> <p><u>Links Among Engineering, Technology, Science, and Society</u></p> <p>I can build a model to solve a problem using appropriate tools and measurements. **Embed within the Energy Standards found above**</p> <p>I can determine the effectiveness of multiple solutions to a design problem given the criteria and constraints. **Embed within the Energy Standards found above**</p> <p>I can explain how engineers have improved existing technologies to <u>increase their benefits</u> (i.e., artificial limbs).</p> <p>I can explain how engineers have improved existing technologies to <u>decrease known risks</u> (i.e., seatbelts).</p> <p>I can explain how engineers have improved existing technologies to <u>meet societal demands</u> (i.e., cell phones).</p> <p><u>Human Body Systems</u></p> <p>I can identify and investigate the parts of the skeletal system and their functions.</p>
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<p>4.WCE.SC.2 Identify the parts of the muscular system and their functions. <i>Introduced after TCAP – this standard is not assessed.</i></p>	<p>I can correctly label a diagram of the skeletal system including the following: skull, mandible, vertebrae, sternum, ribs, vertebral column, carpal, phalanges, tarsal, metatarsals, fibula, tibia, knee, femur, wrist, ulna, radius, elbow, humerus, scapula, and maxilla.</p> <p>I can identify and investigate the parts of the muscular system and their functions, including skeletal, smooth, and cardiac muscles.</p> <p>I can correctly label a diagram of the muscular system, including skeletal, smooth, and cardiac muscles.</p>
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Embedded K-8 TN Computer Science Standards:

- **AIT.1** Identify and define problems and form significant questions for investigation.
- **AIT.2** Develop a plan to use technology to find a solution and create projects.
- **AIT.5** Evaluate the accuracy, relevance, appropriateness, and bias of electronic information sources.
- **AIT.6** Collect, organize, analyze, and interpret data to identify solutions and/or make informed decisions.
- **DC.1** Advocate, demonstrate, and routinely practice safe, legal, and responsible use of information and technology.
- **DC.2** Exhibit a positive mindset toward using technology that supports collaboration, learning, and productivity.
- **DC.4** Recognize and describe the potential risks and dangers associated with various forms of online communications (e.g., cell phones, social media, digital photos).
- **DC.5** Explain responsible uses of technology and digital information; describe possible consequences of inappropriate use such as copyright infringement and piracy.