BARTLETT CITY SCHOOLS

6th Grade Science Curriculum Document Quarter 1

6.PS3: Energy

Time Frame	Learning Outcomes/Activities	Online Resources	Crosscutting Concepts (CCC) Science and Engineering Practices (SEP)
Standard: 6.PS3.1: Analyze the properties and compare the sources of kinetic, elastic potential, gravitational potential, electric potential, chemical, and thermal energy. **Pearson Lesson (s):** 1.1 and 1.2			
1 Week of Quarter 1	**Main Objective:** Students will analyze the properties and compare the sources of kinetic and potential energy by developing and using models. **Learning Outcomes:** 1. I can analyze the properties of kinetic, elastic potential, gravitational potential, electric potential, chemical, and thermal energy. 2. I can compare the sources of kinetic, elastic potential, gravitational potential, electric potential, chemical, and thermal energy. **Activities**: 1. For the bouncy ball phenomenon: Students develop an argument for how the evidence they collected supports their explanation for the causes of the ball bouncing lower with each bounce.	1. Forms of Energy Sort 2. Kinds of Energy 3. Energy Introduction Lesson 4. Bouncing Ball Lab 5. Energy Detectives	**CROSSCUTTING CONCEPT:** **Energy and Matter** *Students give general descriptions of different forms and mechanisms for energy storage within a system* **SCIENCE AND ENGINEERING PRINCIPLE:** **Developing and using models** *Students create models which are responsive and incorporate features that are not visible in the natural world but have implications on the behavior of the modeled systems and can identify limitations of their models.* **PHENOMENON:** A ball dropped from 1 m will bounce up but not return to the original height. Trampoline: Potential energy When you jump on a trampoline, different types of energy are present.

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6.PS3: Energy			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC) Science and Engineering Practices (SEP)**
Standard: 6.PS3.2: Construct a scientific explanation of the transformation between potential and kinetic energy. **Pearson Lesson(s):** 1.3			
1 Week of Quarter 1	**Main Objective:** Students will construct scientific explanations and design solutions of the transformation between potential and kinetic energy. **Learning Outcomes:** 1. I can construct a scientific explanation of the transformation between potential and kinetic energy. 2. I can define the law of conservation of energy. 3. I can explain how energy changes form. **Tasks:** 1. Create a model of transportation system and describe how kinetic and potential energy are converted in transportation system. 2. Design an experiment to demonstrate kinetic and potential energy and the factors that affect them. 3. Use a model of a pendulum and the data collected to explain how the force of gravity affects a falling object 4. Make a pendulum and explain how mechanical energy works during the movements. 5. Ball Drop Lab (page 62)	1. Energy and Energy Transformation Task Cards 2. Stations 3. Ball Drop Lab 4. Skate Park Energy Transformations 5. Pendulum lesson 6. Kinetic and Potential 7. Lesson comparing a bouncing ball to a roller coaster	**CROSSCUTTING CONCEPT:** **Energy and Matter** *Students track energy changes through transformations in a system.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Constructing explanations and designing solutions** *Students form explanations using source (including student developed investigations) which show comprehension of parsimony, utilize quantitative and qualitative models to make predictions, and can support or cause revisions of a particular conclusion.* **PHENOMENON:** If I throw a ball up in the air, it slows down as it ascends, stops at its maximum height, and then speeds up as it descends back towards the ground. Rollercoaster video: In the design of a rollercoaster, the first hill is the highest. Kinetic and potential energy pendulum: After the pendulum is dropped, it never returns to the same height. Energy transfer from Slow Mo Guys: Elastic potential energy is transferring into kinetic energy Sled Wars: The higher the sled's starting position is, the more snowmen it knocks over.

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6.PS3: Energy			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC) Science and Engineering Practices (SEP)**
Standard: 6.PS3.3: Analyze and interpret data to show the relationship between kinetic energy and the mass of an object and its speed. **Pearson Lesson(s):** 1.3			
1 Week of Quarter 1	**Main Objective:** I can analyze and interpret data to show the relationship between kinetic energy and the mass of an object and its speed. **Learning Outcomes:** 1. I can identify the mass and speed of an object. 2. I can calculate an object's kinetic energy given its mass and speed. 3. I can analyze data to show the relationship between kinetic energy and mass and speed. **Tasks:** 1. Create and interpret graphs describing the relationship of kinetic energy to mass and speed of an object. Reports should explain the results and integrate visual displays with in the text. 2. Using Mathematical and Computational Thinking (page 94)	1. Lab 2. Scholastic NASCAR Lesson 3. Making a Splash (Phenomenon-Based)	**CROSSCUTTING CONCEPT:** **Scale, Proportion, and Quantity** *Students create proportional and algebraic relationships from graphical representations* **SCIENCE AND ENGINEERING PRINCIPLE:** **Analyzing and interpreting data.** *Students should create and analyze graphical presentations of data to identify linear and non-linear relationships, consider statistical features within data and evaluate multiple data sets for a single phenomenon.* **PHENOMENON:** When an adult does a cannonball into the swimming pool, their splash is much larger than a kid's cannonball splash. Trampoline: Potential energy: The more you compress the trampoline, the higher you go. (Note: You will need to sign up for an account at https://awesome-table.com/ to access links under the Phenomenon section on several pages in this document.)

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6.PS3: Energy			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC) Science and Engineering Practices (SEP)**
Standard: 6.PS3.4: Conduct an investigation to demonstrate the way that heat (thermal energy) moves among objects through radiation, conduction, or convection. **Pearson Lesson(s):** 2.1, 2.2, 2.3			
1 Weeks of Quarter 1	**Main Objective:** Students will demonstration the way that heat moves among objecting through radiation, conduction, and convection by planning and carrying out investigations. **Learning Outcomes:** 1. I can conduct an investigation to demonstrate the way that thermal energy moves among objects through radiation, conduction, or convection. 2. I can explain how thermal energy moves. 3. I can distinguish among radiation, conduction, and convection. **Activity:** 1. Draw a storyboard in which several methods of thermal transfer are shown. Include captions that identify the methods of transfer and explain how the methods are related. 2. Heat Transfer Lab (page 50)	1. Study Jams: Heat 2. Article 3. Image Sort 4. Task Cards 5. Convection, Conduction, Radiation Oh My!	**CROSSCUTTING CONCEPT:** **Cause and Effect** *Students begin to connect their explanations for cause and effect relationships to specific scientific theory.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Planning and carrying out controlled investigations** *Students begin to investigate independently, select appropriate independent variables to explore a dependent variable and recognize the value of failure and revision in the experimental process.* **PHENOMENON:** Snow shadow: conduction and radiation: After an overnight snow shower, most of the snow has melted from the parking lot in the picture. The remaining snow seems to match the shape of a shadow cast by an adjacent building. Convection: The windmill is moving because of the rising and falling air.

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6.ETS1: Engineering Design			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC) Science and Engineering Practices (SEP)**
Standard: 6.ETS1.2: Design and test different solutions that impact energy transfer. **Pearson Lesson(s):** 1.3			
2 Weeks of Quarter 1	**Main Objective:** Students will design and test different solutions that impact energy transfer by planning and carrying out controlled investigations. **Learning Outcomes:** 1. I can design and test different solutions that impact energy transfer. 2. I can research how energy transfer is impacted by different solutions. 3. I can design a solution that impacts energy transfer. 4. I can test different solutions that impact energy transfer. **Activities:** 1. Rube Goldberg (Drawing, animation, or lab) 2. Construct an experiment to see how different materials impact how energy transfers.	1. Rube Goldberg Game 2. Dynamic Systems 3. Lab Activity 4. Working with Wind Energy 5. Developing Possible Solutions Video 6. Powering the Future Video	**CROSSCUTTING CONCEPT:** **Energy and Matter** *Students track energy changes through transformations in a system.* **SCIENCE AND ENGINEERING PRINCIPLE: Planning and carrying out controlled investigations** *Students can design tests which determine the effectiveness of a device under varying conditions.* **PHENOMENON:** Wind turbines: Electricity can be generated from wind as an alternative energy source. Mickey mouse solar panels: Solar panels help provide power to Walt Disney World.

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6.LS2: Ecosystems: Interactions, Energy, and Dynamics			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.LS2.1: Evaluate and communicate the impact of environmental variables on population size. **Pearson Lesson(s):** 7.4 and 7.6			
1 Week of Quarter 2	**Main Objective:** Students will evaluate and communicate the impact of environmental variables on population size while analyzing and interpreting data. **Learning Outcome:** 1. I can define carrying capacity and limiting factors. 2. I can identify environmental variables that impact population size. 3. I can explain how environmental variables affect population size. **Tasks**: 1. Article and Questions 2.Kaibab Lab 3. Create two models, one should have a high carrying capacity and the other show a low carrying capacity. Explain why the carrying capacity is high or low.	1. Food Fight Game 2. Article 3. Limiting Factors 4. Interactive: Carrying Capacity 5. Kaibab Lab 6. Oh Deer! Activity 7. Population Growth Patterns 8. Population Growth Limits	**CROSSCUTTING CONCEPT:** **Stability and Change** *Students explain that systems in motion or dynamic equilibrium can be stable.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Analyzing and interpreting data.** *Students should create and analyze graphical presentations of data to identify linear and non-linear relationships, consider statistical features within data and evaluate multiple data sets for a single phenomenon.* **PHENOMENON:** Certain types of plants survive in harsh conditions due to their adaptations. Drought tolerant plants

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6.LS2: Ecosystems: Interactions, Energy, and Dynamics			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard 6.LS2.2: Determine the impact of competitive, symbiotic, and predatory interactions in an ecosystem. **Pearson Lesson(s):** 3.2 and 3.3			
1/2 Week of Quarter 2	**Main Objective:** Students will determine the impact of competitive, symbiotic, and predatory interactions in an ecosystem by engaging in argument from evidence. **Learning Outcomes:** 1. I can determine the impact of competitive, symbiotic, and predatory interactions in an ecosystem. 2. I can explain how organisms compete for resources. 3. I can identify and explain the three types of symbiosis. 4. I can describe predatory interactions in an ecosystem. **Tasks:** 1.Symbiosis Want Ad 2. Stations: Lesson Plan Example 3. Engaging in Argument from Evidence (page 126) 4. Write a story about an organism that competes with another organism for food or a resource in their ecosystem.	1. Exploring Symbiosis 2. Exploring Relationships in an Ecosystem 3. WebQuest/Brochure 4. Symbiotic Strategies 5. Symbiotic Relationship Diagram Lesson	**CROSSCUTTING CONCEPT:** **Cause and Effect** *Students infer and identify cause and effect relationships from patterns.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Engaging in argument from evidence** *Students critique and consider the degree to which competing arguments are supported by evidence.* **PHENOMENON** A Group of Orca Whales -A group of whales work with one another, and their environment, in order to capture food. -By using the biotic and abiotic factors within their environment, Interactions between organism change in order to obtain energy and survive. Predation impact on Lizard Niche A new predator can cause devastating effects on the food web.

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6.LS2: Ecosystems: Interactions, Energy, and Dynamics			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.LS2.3: Draw conclusions about the transfer of energy through a food web and energy pyramid in an ecosystem. **Pearson Lesson(s):** 4.1			
1 Week of Quarter 2	**Main Objective:** Students will draw conclusions about the transfer of energy through a food web and energy pyramid in an ecosystem by developing and using models. **Learning Outcomes:** 1. I can draw conclusions about the transfer of energy through a food web and energy pyramid in an ecosystem. 2. I can distinguish among producers, consumers, scavengers, and decomposers. 3. I can identify the key components of a food web and energy pyramid. 4. I can explain how energy is transferred in a food web or energy pyramid. 5. I can explain the 10% energy rule. **Tasks:** 1. Make a food web diagram for a local ecosystem that can be used to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. 2. Stations 3. Symbaloo 4.WebQuest	1. 10% rule lab 2. Ecosystems Symbaloo and Digital Handout 3. Britannica Launch Packs 4. WebQuest 5. Biodome Engineering Design 6. Got Energy? Spinning a Food Web 7. Energy Pyramid Lab	**CROSSCUTTING CONCEPT:** **Energy and Matter** *Students track energy changes through transformations in a system.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Developing and using models** *Students create models which are responsive and incorporate features that are not visible in the natural world, but have implications on the behavior of the modeled systems and can identify limitations of their models.* **PHENOMONON:** Oceanic Feeding Frenzy: Oceanic feeding frenzy, in which predators interact to obtain food (energy), is a food web in action.

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6.LS2: Ecosystems: Interactions, Energy, and Dynamics			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.LS2.4: Using evidence from climate data, draw conclusions about the patterns of abiotic and biotic factors in different biomes, specifically the tundra, taiga, deciduous forest, desert, grasslands, rainforest, marine, and freshwater ecosystems. **Pearson Lesson(s):** 4.2			
1 Week of Quarter 2	**Main Objective:** Students will use evidence from climate data to draw conclusions about the abiotic and biotic factors in Earth's major biomes, while engaging in argument from evidence. **Learning Outcomes:** 1. I can distinguish between biotic and abiotic factors in biomes. 2. I can identify the key biotic and abiotic factors in Earth's major biomes and ecosystems. 3. I can analyze climate date to draw conclusions about Earth's major biomes and ecosystems. **Tasks:** 1.Investigate a specific biome and determine how climate has affected patterns associated with biotic and abiotic factors. 2. Students research specific organisms in a biome. Students will then create an adaptation chart for specific plants or animals found in that biome and explain how the adaptation helps it survive in that biome. 3. Biome sort- students analyze cards with the biome characteristics, biotic, and abiotic factors and interpret the information to determine which biome the data belongs in.	1. Biotic/Abiotic Sort 2. Britannica Launch Packs 3. Biome Project Ideas 4. Study Jams: Biomes 5. Biome Mural Project 6. Article 7. Mission Biome 8. Mission: To Plant or Not to Plant	**CROSSCUTTING CONCEPT:** **Pattern** *Students recognize, classify, and record patterns in data, graphs, and charts.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Engaging in argument from evidence** *Students form explanations using source (including student developed investigations) which show comprehension of parsimony, utilize quantitative and qualitative models to make predictions, and can support or cause revisions of a particular conclusion.* **PHENOMENON** Deciduous Forest: chipmunk adaptation Chipmunks stuff their cheeks with large amounts of food. Hibernation: Bears in certain climates go into hibernation.

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6.LS2: Ecosystems: Interactions, Energy, and Dynamics			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.LS2.5: Analyze existing evidence about the effect of a specific invasive species on native populations in Tennessee and design a solution to mitigate its impact. **Pearson Lesson(s):** 3.3			
1 Week of Quarter 2	**Main Objective:** Students will analyze existing evidence about the effect of a specific invasive species on native populations in Tennessee and design a solution to mitigate its impact by obtaining, evaluating, and communicating information. **Learning Outcomes:** 1. I can identify common invasive species in Tennessee. 2. I can explain how common invasive species impact native populations in Tennessee. 3. I can create a solution to reduce the impact of a specific invasive species in Tennessee. **Tasks:** 1.Construct a poster to inform the public about Tennessee invasive species of plant or animal and suggest possible ways in which the impact of the organisms on the ecosystem can be reduced. 2. Have students debate and make an argument using evidence on whether or not Tennessee should introduce the Kudzu bug to control the Kudzu plant population 3. Create a wanted poster identifying an invasive and non-invasive species that poses a threat to Tennessee. Explain the problems it poses. 4. Asking Questions (page 146) (Note: use graph on page 152 for questions on page 164, this may be updated to reflect the correct graph)	1. Invasive Species Info 2. Article 3. Lesson Idea for the Week 4. National Geographic: Invasive Species 5. TN Exotic Species and Responses 6. Classroom Takeover 7. Invasive Species Webquest	**CROSSCUTTING CONCEPT:** **Cause and Effect** *Students use cause and effect relationships to make predictions.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Obtaining, evaluating, and communicating information** *(Observe) Students can evaluate text, media, and visual displays of information with the intent of clarifying claims and reconciling explanations. Students can communicate scientific information in writing utilizing embedded tables, charts, figures, graphs* **PHENONOMON:** Kudzu was introduced to the south in the 1930's - 1950's to prevent soil erosion, causing it to grow uncontrollably and killing out natural species. Kudzu bugs were the answer to stopping the uncontrollable growth of the Kudzu Vines.

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6.LS2: Ecosystems: Interactions, Energy, and Dynamics			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.LS2.6: Research the ways in which an ecosystem has changed over time in response to changes in physical conditions, population balances, human interactions, and natural catastrophes. **Pearson Lesson(s):** 5.1			
1 Week of Quarter 3	**Main Objective:** Students will research the ways in which an ecosystem has changed over time in response to changes in physical conditions, population balances, human interactions, and natural catastrophes by developing and using models. **Learning Outcomes:** 1. I can identify how ecosystems change over time. 2. I can explain how natural catastrophes can change ecosystems. 3. I can describe how humans and other organisms can change ecosystems over time. **Tasks:** 1. Create a group presentation explaining the impact on biodiversity. (exotic species- nonnative species that affect an ecosystem in Tennessee, habitat preservation focusing on specific preserve or wilderness area) 2. Research an activity and use their findings to construct a persuasive essay on how their chosen activity effects biodiversity. Encourage students to take a stand on the issue, supporting the argument with facts from the research. Discuss whether they think the activity is harmful or helpful to the environment and why. 3. Research ways human impact has changed a specific biome and design a brochure educating classmates about 3 ways that human impact affects interdependent relationships in the biome based on your research. (include both positive and negative impacts)	1. Changes in Ecosystems 2. Population Balance 3. Ecosystems Unit Review 4. Foldable 5. Writing Project 6. Ecosystems Change	**CROSSCUTTING CONCEPT:** **Systems and System Models** *Students develop models to investigate scales that are beyond normal experiences.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Developing and using models** *Students create models which are responsive and incorporate features that are not visible in the natural world, but have implications on the behavior of the modeled systems and can identify limitations of their models.* **PHENONOMON** Wolves of Yellowstone: When the wolves of Yellowstone were missing and then later reintroduced there was an impact on the environment. How wolves change rivers: Wolves had a positive impact on the changing landscape of Yellowstone in many different interconnected ways.

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6.LS2: Ecosystems: Interactions, Energy, and Dynamics			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.LS2.7: Compare and contrast auditory and visual methods of communication among organisms in relation to survival strategies of a population. **Pearson Lesson(s):** 3.2 and 3.3			
1/2 Week of Quarter 2	**Main Objective:** Students will compare and contrast auditory and visual methods of communication among organisms in relation to survival strategies of a population by engaging in argument from evidence. **Learning Outcomes:** 1. I can describe how members of a population may communicate with each other. 2. I can explain how organisms use methods of communication to survive. **Tasks:** 1. Research a non-verbal communication in a group or colony of organisms and develop a simple, non-verbal method of communicating a set of 5 to 10 messages that a population would need to communicate with each other. Model this phenomenon to a classmate. 2. Have students present their non-verbal communication or other phenomena to students with a short explanation of it. Then ask the students to identify gaps or weaknesses in the communication method and how it explains the phenomena, based on their level of understanding.	1. Nature Works 2. Video 3. Animal Communication Project 4. Video: Animal Communication 5. Types of Animal Communication	**CROSSCUTTING CONCEPT:** **Cause and Effect** *Students infer and identify cause and effect relationships from patterns* **SCIENCE AND ENGINEERING PRINCIPLE:** **Engaging in argument from evidence** *Students present an argument based on empirical evidence, models, and invoke scientific reasoning.* **PHENONOMON** Hawaiian Crickets Go Silent Crickets are everywhere, but they are not making as much noise as they used to.

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6th Grade Science Curriculum Document Quarter 3

6.LS2: Ecosystems: Interactions, Energy, and Dynamics

Time Frame	Learning Outcomes/Activities	Online Resources	Crosscutting Concepts (CCC) Science and Engineering Practices (SEP)
Standard: 6.LS4.1: Explain how changes in biodiversity would impact ecosystem stability and natural resources. **Pearson Lesson(s):** 5.1 and 5.3			
1 Week of Quarter 3	**Main Objective:** I can explain how changes in biodiversity would impact ecosystem stability and natural resources. **Learning Outcomes:** 1. I can identify factors that affect biodiversity. 2. I can explain how humans affect biodiversity. 3. I can use evidence to explain how human activities can affect ecosystems and biodiversity. **Tasks:** 1.Students should gather information on how and why the biodiversity of an ecosystem might change. Give a detailed cause and effect of changes and how they affect the ecosystem. Create a poster describing to classmates the biodiversity of an ecosystem, the resources there that humans use (biotic and abiotic), and how changes to the biodiversity would impact ecosystem stability and natural resources. 2. Create a model of a food web that includes an endangered species. Then modify the model by crossing out the endangered species and consider how the food web would change without that organism. Write a paragraph explaining how biodiversity in the ecosystem would change due to the removal of the species from the ecosystem.	1. Article 2. WebQuest 3. How does biodiversity affect me and everyone else? 4. Consequences of changing biodiversity	**CROSSCUTTING CONCEPT:** **Stability and Change** *Students explain that systems in motion or dynamic equilibrium can be stable.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Engaging in argument from evidence** *Students present an argument based on empirical evidence, models, and invoke scientific reasoning.* **PHENONOMON** Loss of biodiversity impacts ecosystems. Over, 99% of all species that ever existed are today extinct.

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6.LS2: Ecosystems: Interactions, Energy, and Dynamics			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.LS4.2: Design a possible solution for maintaining biodiversity of ecosystems while still providing necessary human resources without disrupting environmental equilibrium. **Pearson Lesson(s):** 5.3			
1 Week of Quarter 3	**Main Objective:** Students will design a possible solution for maintaining biodiversity of ecosystems while still providing necessary human resources without disrupting environmental equilibrium by obtaining, evaluating and communicating information. **Learning Outcomes:** 1. I can use the engineering design process to design a dam. 2. I can identify and explain the risks and benefits of building a dam. **Tasks:** 1. Research a natural resource, a location where it is found, and a company or individual that focuses on reducing the environmental impact as the resource is obtained. Students will investigate what is being done to protect the environment and ensure the biodiversity of the ecosystem is maintained. 2. Conduct research on a natural resource found in Tennessee and develop solutions to use this resource while preserving the ecosystem and maintaining environmental equilibrium. Create a poster focusing on the key aspects of your research to present to a group.	1. Dam Lab 2. Humans and Biodiversity 3. Activity: Saving the World One Ecosystem at a Time 4. Design a Solution for Maintaining Biodiversity	**CROSSCUTTING CONCEPT:** **Systems and System Models** *Students develop models for systems which include both visible and invisible inputs and outputs for that system.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Obtaining, evaluating, and communicating information** *Students can communicate technical information about proposed design solutions using tables, graphs, and diagrams.* **PHENONOMON** Bananas Extinction: Farming practices have decreased the supply of bananas.

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6.ETS1: Engineering Design			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.ETS1.1: Evaluate design constraints on solutions for maintaining ecosystems and biodiversity. **Pearson Lesson(s):** 5.3			
1 Week of Quarter 3	**Main Objective:** Students will evaluate design constraints on solutions for maintaining ecosystems and biodiversity by asking questions and defining problems. **Learning Outcomes:** 1. I can research and evaluate different solutions for maintaining ecosystems and biodiversity. 2. I can explain how changes in biodiversity in an ecosystem can affect water quality. 3. I can create a water filter that meets the needs of a community affected by deforestation. **Tasks:** 1. Make an argument for how the ocean clean-up project is maintaining biodiversity 2.Water Filter Lab	1. Saving the World: One Ecosystem at a Time 2. You are What You Drink 3. Great Pacific Garbage Patch	**CROSSCUTTING CONCEPT:** **Systems and System Models** *Students develop models for systems which include both visible and invisible inputs and outputs for that system.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Asking questions (for science) and defining problems (for engineering)** *Students define design problems, invoking scientific background knowledge to define multiple criteria and constraints for solutions.* **PHENONOMON** Spray grass for soil erosion: Cover crops or fast-growing plants can be used to prevent soil erosion. Erosion and soil demo: design possible solutions from info learned in showing first 4:55 of video: Land with plants growing in the soil help to hold the soil in place and prevent erosion. The Ocean Clean Up Project: Technology developed with a floater and a screen are used to concentrate debris and lead it into a collection system.

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6.ESS2: Earth's Systems			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.ESS2.1: Gather evidence to justify that oceanic convection currents are caused by the sun's transfer of heat energy and differences in salt concentration leading to global water movement. **Pearson Lesson(s):** 5.1			
1 Week of Quarter 1	**Main Objective:** Students will gather evidence to justify that oceanic convection currents are caused by the sun's transfer of heat energy and differences in salt concentration leading to global water movement by constructing explanations and designing solutions. **Learning Outcomes:** 1. I can explain the cause of ocean currents. 2. I can describe how salinity affects the movement of ocean water. **Tasks:** 1.Plan an investigation demonstrating how temperature affects water movement. Describe how the investigation will generate relevant patterns that occur between the sun's heating and the movement of ocean water. 2. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the salinity of ocean water.	1. Article 2. Salinity Lab 3. Ocean Currents Lab 4. Convection Demo	**CROSSCUTTING CONCEPT:** **Cause and Effect** *Students use cause and effect relationships to make predictions.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Constructing explanations and designing solutions** *Students form explanations using source (including student developed investigations) which show comprehension of parsimony, utilize quantitative and qualitative models to make predictions, and can support or cause revisions of a particular conclusion.* **PHENONOMON**: Convection Currents: Convection is created by a circular pattern caused by uneven heating of the sun. Salinity in Water: The more salt in the water, the denser the water will be, and it will sink

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6.ESS2: Earth's Systems			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.ESS2.2: Diagram convection patterns that flow due to uneven heating of the earth. **Pearson Lesson(s):** 8.4			
1 Week of Quarter 1	**Main Objective:** Students will diagram convection patterns that flow due to uneven heating of the earth by developing and using models. **Learning Outcomes:** 1. I can describe the movement of ocean water. 2. I can explain how the sun causes wind. 3. I can compare and contrast land and sea breezes. **Tasks:** 1.Construct an explanation about wind formation, using the terms Coriolis effect, convection cells, and global pressure belts. Create a model showing how winds form. 2. Create a model illustrating how the sun's uneven heating causes convection cells in Earth's atmosphere and creates global winds. (include caption and labels explaining what the model is showing) Developing and Using Models (page 78)	1. Britannica Launch Packs: Ocean Currents 2. Types of Winds 3. Land and Sea Breeze Animation	**CROSSCUTTING CONCEPT:** **Energy and Matter** *Students give general descriptions of different forms and mechanisms for energy storage within a system.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Developing and using models** *Students create models which are responsive and incorporate features that are not visible in the natural world, but have implications on the behavior of the modeled systems and can identify limitations of their models.* **PHENOMENON:** Convection currents can be seen throughout the earth and play a huge role in our everyday lives.

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6th Grade Science Curriculum Document Quarter 2			
6.ESS2: Earth's Systems			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.ESS2.3: Construct explanation for how atmospheric flow, geographic features, and ocean currents affect the climate of a region through heat transfer. **Pearson Lesson(s):** 9.1			
1 Week of Quarter 2	**Main Objective:** Students will construct an explanation for how atmospheric flow, geographic features, and ocean currents affect the climate of a region through heat transfer by engaging in argument from evidence. **Learning Outcomes:** 1. I can identify and describe factors that influence climate. 2. I can explain how ocean currents affect climate. 3. I can describe how the geographic features of an area affect climate. **Tasks:** 1.5E: Modeling Ocean Currents Lesson 2. Develop a model to describe global winds and ocean surface currents. Label the components, interactions, and mechanism in each model. Write an explanation for each phenomenon using the model as supporting evidence.	1. Ocean Currents and their Global Impacts 2. Ocean Currents and Climate 3. Climate and Atmosphere 4. Factors Affecting Global Climate 5. Effect of Latitude on Climate 6. Ocean Currents and Climate Zones 7. Ocean Science Simulations	**CROSSCUTTING CONCEPT: Energy and Stability and Change** *Students explain that systems in motion or dynamic equilibrium can be stable.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Engaging in argument from evidence** *Students critique and consider the degree to which competing arguments are supported by evidence* **PHENOMENON:** "Melting Permafrost in the Arctic" video: Permafrost melting is releasing methane gas into the atmosphere.

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6.ESS2: Earth's Systems			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.ESS2.4: Apply scientific principles to design a method to analyze and interpret the impact of humans and other organisms on the hydrologic cycle. **Pearson Lesson(s):** 4.2			
1 Week of Quarter 3	**Main Objective:** Students will apply scientific principles to design a method to analyze and interpret the impact of humans and other organisms on the hydrologic cycle by obtaining, evaluating, and communicating information. **Learning Outcomes:** 1. I can describe how living things use water. 2. I can use data to describe how Earth's water is distributed. 3. I can explain how Earth's water moves through the water cycle. **Tasks:** **1.** Create a model of the water cycle, labeling the components and interactions in the model. Then illustrate the ways in which humans can impact the hydrologic cycle, in the model and write a description of what is shown in the drawing. 2.Water Cycle Demo or Lab 3.Human Water Cycle Engineering Lesson	1. Water Cycle Lab 2. Article 3. Water Cycle Demo 4. How is Climate Effecting the Water Cycle?	**CROSSCUTTING CONCEPT:** **SYSTEMS AND SYSTEM MODELS** *Students include relevant and exclude irrelevant factors when defining a system.* **SCIENCE AND ENGINEERING PRINCIPLE:** **OBTAINING, EVALUATING, AND COMMUNICATING INFORMATION** *(Observe) Students can evaluate text, media, and visual displays of information with the intent of clarifying claims and reconciling explanations. Students can communicate scientific information in writing utilizing embedded tables, charts, figures, graphs* **PHENOMENON:** Statues damaged over time: Natural causes such as wind and rain have eroded the statue, but human impact has increased the rate.

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6.ESS2: Earth's Systems			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.ESS2.5: Analyze and interpret data from weather conditions, weather maps, satellites, and radar to predict probable local weather patterns and conditions. **Pearson Lesson(s):** 8.7			
1 Week of Quarter 2	**Main Objective:** Students will analyze and interpret data from weather conditions, weather maps, satellites, and radar to predict probable local weather patterns and conditions. **Learning Outcomes:** 1. I can identify factors that meteorologist use to predict the weather. 2. I can use meteorological data to make predictions about the weather. 3. I can create a weather forecast. **Tasks:** 1. Record, analyze, and interpret daily weather measurements over an extended period of time using a variety of instruments (i.e., barometer, anemometer, sling psychrometer, rain gauge and thermometer) Describe a pattern or relationship they can infer from the observations. Compare how the representation s and analyses help them to identify patterns in the data. 2.Analyzing and Interpreting Data (page 170)	1. Study Jams: Weather and Climate 2. Weather Instruments 3. Weather 4. Weather Vocabulary Task Cards 5. How to Interpret Weather Data 6. Predict the Weather	**CROSSCUTTING CONCEPT:** **Cause and Effect** *Students use cause and effect relationships to make predictions.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Analyzing and interpreting data** *Students should create and analyze graphical presentations of data to identify linear and non-linear relationships, consider statistical features within data and evaluate multiple data sets for a single phenomenon* **PHENOMENON:** Earth's Changing Climate: Earth's climate changes over a long period of time and organisms adapt to live in the variety of climates that exist on Earth.

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6.ESS2: Earth's Systems			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.ESS2.6: Explain how relationships between the movement and interactions of air masses, high- and low-pressure systems, and frontal boundaries result in weather conditions and severe storms. **Pearson Lesson(s):** 8.5			
1 Week of Quarter 2	**Main Objective:** Students will explain how relationships between the movement and interactions of air masses, high and low-pressure systems, and frontal boundaries result in weather conditions and severe storms by developing and using models. **Learning Outcomes:** 1. I can distinguish between the four types of weather fronts. 2. I can identify types of severe weather. 3. I can identify common factors that result in severe weather. 4. I can explain how air masses interact. **Activities:** 1.Severe Weather Video Project 2. Use weather data from the local news to predict & draw conclusions about the changes in upcoming local weather. Present a two-day weather forecast that predicts temperature, pressure, humidity, precipitation, and wind. 3. WebQuest	1. Study Jams: Air Masses and Fronts 2. Convection/Wind Review WebQuest 3. Severe Weather Video Project 4. Quizlet Vocabulary 5. Create a Weather Map 6. What is Air Pressure?	**CROSSCUTTING CONCEPT:** **Systems and System Models** *Students develop models for systems which include both visible and invisible inputs and outputs for that system.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Developing and using models** *Students create models which are responsive and incorporate features that are not visible in the natural world, but have implications on the behavior of the modeled systems and can identify limitations of their models.* **PHENOMENON:** A Year of Weather: The cloud formation over the equator is more frequent than over the poles. Tornadoes: The greater the pressure difference in a tornado, the stronger and more destructive it will be.

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6.ESS3: Earth and Human Activity			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.ESS3.1: Differentiate between renewable and nonrenewable resources by asking questions about their availability and sustainability. **Pearson Lesson(s):** 6.1			
1 Week of Quarter 3	**Main Objective:** Students will differentiate between renewable and nonrenewable resources by asking questions about their availability and sustainability by obtaining, evaluating, and communicating information. **Learning Outcomes:** 1. I can identify and describe renewable and nonrenewable resources. 2. I can compare and contrast renewable and nonrenewable resources. **Tasks:** 1.Obtaining, Evaluating, and Communicating Information (page 106) 2. Research 2 forms of renewable energy available in Tennessee. Using the evidence, students will engage in an argumentative debate on the different forms of renewable energy researched answering the question which would best be utilized in Tennessee? Focus on the availability and sustainability. (i.e. nuclear, solar, wind, hydropower, geothermal, biomass, biofuels) 3. Create a Venn Diagram to compare and contrast the availability and sustainability of renewable and nonrenewable resources. Students will select a nonrenewable resource and construct an explanation describing how it effects the environment and come up with possible solutions for alternative resources.	1. Free Card Sort 2. Free Task Cards 3. Renewable and Nonrenewable Resources 4. Key Differences in Natural Resources	**CROSSCUTTING CONCEPT:** **Systems and System Models** *Students evaluate the sub-systems that may make up a larger system.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Obtaining, evaluating, and communicating information** *(Observe) Students can evaluate text, media, and visual displays of information with the intent of clarifying claims and reconciling explanations. Students can communicate scientific information in writing utilizing embedded tables, charts, figures, graphs* **PHENOMENON:** Earth's Resources: The earth has many natural resources that can be renewed in our lifetime, however, many cannot. How it Looks (Wind vs Nuclear): Earth's resources can have a different effect on the ecosystem.

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6.ESS3: Earth and Human Activity			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.ESS3.2: Investigate and compare existing and developing technologies that will utilize renewable and alternate energy sources. **Pearson Lesson(s):** 6.2			
1 Week of Quarter 3	**Main Objective:** Students will investigate and compare existing and developing technologies that will utilize renewable and alternate energy sources by engaging in argument from evidence. **Learning Outcomes:** 1. I can identify alternative energy sources. 2. I can compare alternative energy sources. 3. I can identify the risks and benefits of alternative energy sources. **Tasks:** 1. Students research to develop a report and use that information to create a two-column chart. The chart should contain pros and cons for the chosen renewable energy source including the benefits of renewable energy sources and their impacts on the environment and ecosystems. 2.Alternate Energy Mini Project (Free)	1. Alternate Energy Sources 2. Future Energy 3. Alternative Energy Research and Google Earth Tour 4. Alternative Energy for Transportation 5. Calculate your Human Footprint 6. Alternative Energy Timeline	**CROSSCUTTING CONCEPT:** **Energy and Matter** *Students track energy changes through transformations in a system.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Engaging in argument from evidence** *Students critique and consider the degree to which competing arguments are supported by evidence.* **PHENOMENON:** Project sunroof: solar savings estimator Using and harnessing solar energy can be more cost effective and cleaner than burning fossil fuels.

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6.ESS3: Earth and Human Activity			
Time Frame	**Learning Outcomes/Activities**	**Online Resources**	**Crosscutting Concepts (CCC)** **Science and Engineering Practices (SEP)**
Standard: 6.ESS3.3: Assess the impacts of human activities on the biosphere including conservation, habitat management, species endangerment, and extinction. **Pearson Lesson(s):** 5.2			
1 Week of Quarter 3	**Main Objective:** Students will assess the impacts of human activities on the biosphere including conservation, habitat management, species endangerment, and extinction by engaging in argument from evidence. **Learning Outcomes:** 1. I can describe how humans impact the biosphere. 2. I can explain how humans contribute to species endangerment and extinction. 3. I can define conservation and habitat management. **Tasks:** 1. Make a list of different techniques (including practices that are already in use, becoming developed, or may not exist yet) we employ (or could employ) to reduce our impact on the environment and lessen the habitat destruction. Ask students to sketch or describe a design approach that develops a possible solution to the problem, such as costs and benefits associated with these practices. 2.Conservation Island 3.Human Impact WebQuest 4.ReadWorks: Endangered Species	1. Human Impact on the Biosphere 2. Endangered Species Reporter Task 3. Conservation Island Activity 4. 6 Ways Human Activity is Changing the Planet 5. Extinction Prevention	**CROSSCUTTING CONCEPT:** **Cause and Effect** *Students use cause and effect relationships to make predictions.* **SCIENCE AND ENGINEERING PRINCIPLE:** **Engaging in argument from evidence** *Students critique and consider the degree to which competing arguments are supported by evidence.* **PHENOMENON:** The Ocean Clean Up video clip: Cleaning up the ocean is one way to conserve the different habitats in the ocean.