

Subject: Science

Grade Level: 6

Designed by: Tunkhannock Area Middle School

School District: Tunkhannock Area

School: Middle School

Brief Summary of Unit:

Biological Science:

- Structure and Function of Organisms
- Continuity of Life

Physical Science:

- Structure, Properties, and Interaction of Matter and Energy
- Forms, Sources, Conversion, and Transfer of Energy
- Ecological Behavior and Systems
- Principles of Motion and Force

Earth & Space Science:

- Earth's Features and Processes That Change Earth and Its Resources
- Composition and Structure of the Universe

Unit #: The Nature of Science Foss: Mixtures & Solutions, Solar Energy, Landforms

S6.A.1: Reasoning and Analysis

S6.A.1.1: Explain, interpret, and apply scientific, environmental, or technological Knowledge presented in a variety of formats (visuals, scenarios, graphs).

S.6.A.1.1.1 Explain how certain questions can be answered through scientific inquiry and/or technological design (e.g., consumer product testing, common usage of simple machines, modern inventions).

S.6.A.1.1.2 Use evidence to support inferences and claims about an investigation or relationship (e.g., common usage of simple machines).

S.6.A.1.1.3 Predict the outcome of an experiment based on previously collected data.

Overarching Understandings:

- How questions can be answered through scientific inquiry.

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Asking questions, which arise in a variety of ways, is essential to developing scientific habits of mind. 	<ul style="list-style-type: none"> • What kind of questions do scientists ask? • Questions can be crafted to provide direction and insight for construction of pragmatic solutions.
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: questions, concepts, investigate, interactions, formulate, solution, investigate, designed system • Questions arise from direct involvement with the material world, classroom interactions, written materials and observed phenomena. • Questions can be crafted to provide direction and insight for construction of pragmatic solutions. • Investigations involve asking and answering questions and comparing answers with what scientists already know about the world. • Scientists usually inquire about how physical, living or designed systems function. 	<ul style="list-style-type: none"> • Identify questions and concepts that can be investigated scientifically. • Formulate and refine questions that can be answered empirically. • Identify an unknown substance based on its characteristics including solubility.

Unit #: The Nature of Science Foss: Mixtures & Solutions

<p>S.6.A.2 Processes, Procedures, and Tools of Scientific Investigations</p> <p>S.6.A.2.1 Apply Knowledge of scientific investigation or technological design in different contexts to make inferences to solve problems.</p> <p>S.6.A.2.1.1 Use evidence, observations, or a variety of scales to describe relationships.</p> <p>S.6.A.2.1.2 Identify variables that cause changes in natural or human-made systems.</p>

<p><i>Overarching Understandings:</i></p> <ul style="list-style-type: none"> • Use scientific thinking processes to conduct investigations and build explanations: observing, communicating, comparing, organizing, and relating.

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Dependent variables must be measured and certain variables held constant 	<ul style="list-style-type: none"> • What are the steps of the scientific method • What is a constant? Variable? • How is a control used in an experiment?
Knowledge	Skills
<ul style="list-style-type: none"> • A dependent variable is one whose value depends upon another. • A variable whose value does not depend on another 	<ul style="list-style-type: none"> • Design and conduct an experiment to answer a question: (example) which brand of paper towel is the most absorbent? • Conduct the experiment to answer the question. • Record and analyze data. • Identify the constants, dependent and independent variables in an experiment. • Given a dry mixture students will separate using the techniques of filtration and evaporation. • Compare the solubility of materials in water • Identify an unknown material based on its solubility

Unit #: The Nature of Science

S.6.A.2 Processes, Procedures, and Tools of Scientific Investigations

S.6.A.2.2 Apply appropriate instruments for specific purposes and describe the information the instruments can provide.

S.6.A.2.2.1 Describe ways technology extends and enhances human abilities for specific purposes (e.g., make observations of cells with microscope and planets with a telescope).

Overarching Understandings:

- Employment of tools to gather, analyze, and interpret data.

Topical Understandings	Essential Questions
<ul style="list-style-type: none">• Investigations are designed and implemented either to systematically describe the world or to develop and test theories and explanations of how the world works.	<ul style="list-style-type: none">• How do scientists find out more about our world and how it functions?
Knowledge	Skills
<ul style="list-style-type: none">• Vocabulary: inquiry, resources, hypothesis, model, theory, results, fair test, controls, variables, independent, dependent, tools, techniques, analyze, interpret, data• Inquiry involves asking a simple question, completing an investigation, answering the question and presenting the results to others.• Scientists use different kinds of investigations depending on the questions they are trying to answer.• Experiments are guided by concepts and are performed to test ideas.• Scientific investigations are conducted in a variety of arenas.• Historic and current scientific knowledge influence the design of experiments.	<ul style="list-style-type: none">• Identify questions and concepts that can be investigated scientifically.• Formulate and refine questions that can be investigated with available resources and, when possible, frames a hypothesis based on a model or theory.• Design and conduct a fair test identifying relevant independent and dependent variables and, when appropriate, the need for controls.• Use appropriate tools and techniques to gather, analyze, and interpret data.

Unit #: The Nature of Science Foss: Solar Energy

S.6.A.3 Systems, Models, and Patterns

S.6.A.3.1 Explain the parts of a simple system, their roles, and their relationships to the system as a whole.
 S6.A.3.2 Apply Knowledge of models to make predictions, draw inferences, or explain technological concepts

S.6.A.3.1.1 Describe a system as a group of related parts with specific roles that work together to achieve an observed result.
 S.6.A.3.1 2 Explain how components of natural and human-made systems play different roles in a working system.
 S.6.A.3.2.1 Describe how scientists use models to explore relationships and make predictions about natural systems (e.g., weather conditions, the solar system).

- Overarching Understandings:**
- A system is a group of related parts with specific roles that work together to achieve an observed result.
 - Scientists use models to make predictions about natural systems.

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Scientists use models to represent current understandings, aid in developing questions and experiments, and to communicate ideas to others 	<ul style="list-style-type: none"> • How do scientists develop and use models?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: model, diagram, events, systems, phenomena, mathematical, technological, physical, • Scientists construct models of phenomena • Models can change. • Models can be physical, conceptual, mathematical, or technological. 	<ul style="list-style-type: none"> • Construct scale drawings or diagrams to represent objects, events, or systems. • Construct and use a model to test a design, or aspects of a design or system. • Select and use simulations (simple, computer, or otherwise) to understand and investigate aspects of a system.

Unit #: Biological Sciences

<p>S.6.B.1 Structure and Function of Organisms</p> <p>S.6.B.1.1 Explain how the cell is the basic unit of structure and function for all living things.</p> <p>S.6.B.1.1.1 Describe how cells carry out the many functions needed to sustain life.</p> <p>S.6.B.1.1.2 Identify examples of unicellular and multi-cellular organisms (i.e., plants, fungi, bacteria, protists, and animals).</p> <p>S.6.B.1.1.3 Explain how many organisms are unicellular and must carry out all life functions in one cell.</p>
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<p>Overarching Understandings:</p> <ul style="list-style-type: none">• Living things are similar to each other yet different from nonliving things. The cell is a basic unit of structure and function of living things (cell theory). For all living things, life activities are accomplished at the cellular level.
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Topical Understandings	Essential Questions
<ul style="list-style-type: none">• The cell is the basic unit of structure and function for all living things.• All organisms are made of cells and can be characterized by common aspects of their structure and functioning.	<ul style="list-style-type: none">• How can one cell function as an organism?• How do organisms live, grow respond to their environment, and reproduce?
Knowledge	Skills
<ul style="list-style-type: none">• Vocabulary: unicellular, multi-cellular, systems, subsystem, genetic, photosynthesis, sexual reproduction, asexual reproduction, pollination transfer, metabolism, food webs, ecosystem• Unicellular organisms, like multi-cellular organisms, survive by obtaining food, water, a way to dispose of waste, and an environment in which they can live.• In multi-cellular organisms, the body is a system of multiple interacting subsystems.• Organisms are affected by both genetic factors and local conditions.• Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring.• Animals and plants alike generally need to take in air and water; animals must take in food, and plants need light and minerals.• Plants reproduce in a variety of ways including using animals,	<ul style="list-style-type: none">• Identify characteristics of all living things and the resources they need• Compare unicellular and multi-cellular organisms• Compare asexual and sexual reproduction• Identify cell components and their functions• Investigate unicellular and multi-cellular organism survival (obtaining food and water, disposing of waste, and having an environment in which to live)• Construct models and representations of body systems to demonstrate how multiple interacting subsystems and structures work together to accomplish specific functions.• Use evidence to support an explanation of how environmental and genetic factors affect the growth of organisms.• Gather evidence to explain the relationship among specialized structures, specific behaviors, and the successful reproduction.

wind, and water as a means of seed transfer and pollination.

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none">• Formative assessments (observations, questioning, exit/admit slips, response logs, graphic organizers, visual representations, four corners, think-pair-share)• Summative assessment Teacher-generated quizzes and tests	<ul style="list-style-type: none">• diagram a cell and label its organelles• compare unicellular & multicellular organisms• Construct and communicate models of food webs that demonstrate the transfer of matter and energy among organisms within an ecosystem.• draw conclusions about an animal's characteristics and its niche in its environment• summarize methods plants utilize to disperse seeds

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none">• Available classroom resources• Additional teacher resources	<ul style="list-style-type: none">• Reference for teacher & student use• Skill building, reinforcement of material, assessment of topic

Unit #: Biological Sciences

<p>S.6.B.2 Continuity of Life</p> <p>S.6.B.2.1 Explain how certain inherited traits and/or behaviors allow some organisms to survive and reproduce more successfully than others.</p> <p>S.6.B.2.1.1 Distinguish between instinctive and learned animal behaviors that relate to survival.</p> <p>S.6.B.2.1.2 Recognize that extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival.</p> <p>S.6.B.3.1.1 Describe the behavioral and physical responses of organisms to environmental changes and how those responses affect survival.</p>

<p><i>Overarching Understandings:</i></p> <ul style="list-style-type: none"> Organisms inherit genetic information that result in continuity of structure and function between parents and offspring. Every organism requires a set of instructions for specifying its traits. Evolution is the change in a species over time. Species acquire many of their unique characteristics through natural selection. Species may become extinct if their environment changes and they are unable to adapt.
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Topical Understandings	Essential Questions
<ul style="list-style-type: none"> Populations of organisms evolve by natural selection. Heredity refers to specific mechanisms by which characteristics or traits are passed from one generation to the next via genes, and explains why offspring resemble, but are not identical to, their parents. Biological evolution explains both the unity and diversity of species and provides a unifying principle for the history and diversity of life on Earth. 	<ul style="list-style-type: none"> What allows some populations of organisms to change and survive while others cannot? How and why do organisms interact with their environment and what are the effects of these interactions? How are the characteristics of one generation passed to the next? How can individuals of the same species and even siblings have different characteristics? How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms? How does biodiversity affect humans?
Knowledge	Skills
<ul style="list-style-type: none"> Vocabulary: species, genes, biodiversity, adapt, terrestrial, marine biodiversity, terrestrial, marine, anatomical, fossil record, natural selection, adapt, adaptations: structural, behavioral, physiological, migration, hibernation, learned behaviors, instinctual behaviors In sexually reproducing organisms, each parent contributes half of 	<ul style="list-style-type: none"> Use models to demonstrate that offspring acquire genes from each parent. (Punnett squares) Use models to explain biodiversity in ecosystems. Construct explanations for the anatomical similarities and differences between fossils of once living organisms and organisms living today.

<p>the genes acquired (at random) by the offspring.</p> <ul style="list-style-type: none"> • Biodiversity is the wide range of existing life forms that have adapted to the variety of conditions on Earth from terrestrial to marine ecosystems. • Changes in biodiversity can influence humans' resources. • Anatomical similarities and differences between various organisms living today, and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. • In all environments, organisms with similar needs may compete with one another for resources. • Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to permit its survival. • Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. 	<ul style="list-style-type: none"> • Categorize behaviors as being learned or instinctive. • Explain why species become extinct.
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Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Formative assessments (observations, questioning, exit/admit slips, response logs, graphic organizers, visual representations, four corners, think-pair-share) • Summative assessment Teacher-generated quizzes and tests 	<ul style="list-style-type: none"> • Completion of Punnett squares showing probability of offspring inheriting given traits. • Identify characteristics of diverse environment. • Compare an organism living today with an ancestor from its fossil record.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • Available classroom resources • Additional teacher resources 	<ul style="list-style-type: none"> • Reference for teacher & student use • Skill building, reinforcement of material, assessment of topic

Unit #: Physical Science Foss Making & Separating Mixtures & Reaching Saturation

<p>S.6.C.1 Structure, Properties, and Interaction of Matter and Energy</p> <p>S.6.C.1.1 Explain that matter has observable physical properties.</p> <p>S.6.C.1.1.1 Describe how characteristic physical properties of matter can be used to distinguish one substance from another (e.g., boiling point, freezing/melting points).</p> <p>S.6.C.1.1.2 Explain that materials are characterized by having a specific amount of mass in each unit of volume (density).</p>
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<p>Overarching Understandings:</p> <ul style="list-style-type: none"> • Matter is anything that takes up space and has mass. Matter is classified as a substance or a mixture of substances. Matter is composed of elements which are made of small particles called atoms. All living and nonliving material is composed of these elements or combinations of these elements.
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Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Matter is anything that takes up space and has mass. • Matter is classified as a substance or a mixture of substances. • Matter is composed of elements which are made of small particles called atoms. • All living and nonliving material is composed of these elements or combinations of these elements. • Matter has observable physical properties and the potential to mix and form new materials. • Density is the relationship between the mass of an object and its volume. 	<ul style="list-style-type: none"> • How do scientists identify and sort materials? • What are physical properties? Chemical properties? • What is the relationship between density, mass, and volume?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: matter, element, mixture, compound, physical properties, mass, volume, density, malleability, conductivity, solubility, • A mixture combines two or more materials that retain their own properties. • A solution is a mixture in which one material dissolves in another. 	<ul style="list-style-type: none"> • define physical and chemical properties. • categorize physical and chemical properties. • measure the solubility of given materials • calculate and compare the density of objects given their mass and volume

<ul style="list-style-type: none"> • A crystal is the solid phase of a material that forms in an identifiable shape or pattern. • All matter is made up of atoms. Atoms are far too small to see with a light microscope. • The atoms of any one element are different from the atoms of other elements. • There are more than 100 elements. Elements combine in a multitude of ways to produce compounds that account for all living and nonliving substances. Few elements are found in their pure form. • The periodic table is one useful model for classifying elements. The periodic table can be used to predict properties of elements (metals, nonmetals, noble gases). • A solution is a mixture in which one material seems to disappear in another. • Temperature affects the solubility of some substances in water. • A crystal is the solid phase of a material that forms in an identifiable shape or pattern. 	
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Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Formative assessments (observations, questioning, exit/admit slips, response logs, graphic organizers, visual representations, four corners, think-pair-share) • Summative assessment (teacher-generated quizzes and tests) • Lab work including report 	<ul style="list-style-type: none"> • identification of physical and chemical properties • comparison of the solubility of given materials • calculation of the density of selected objects given their mass and volume • use of periodic table to locate and identify properties of given elements

Materials and Resources

Source	Description of Use
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- Foss: Mixtures & Solutions Kit
- Foss Mixtures & Solutions Science Stories
- Periodic Table of Elements
- Available classroom resources
- Additional teacher resources

- Reference for teacher & student use
- Skill building, reinforcement of material, assessment of topic materials to make and observe mixtures, solutions and compounds
- nonfiction readings to support learning objectives and standards

Unit #: Physical Science Foss Making & Separating Mixtures & Fizz Quiz

S.6.C.1 Structure, Properties, and Interaction of Matter and Energy

S.6.C.1.2 Describe that matter can undergo chemical and physical changes.

S.6.C.1.2.1 Describe how water changes from one state to another.

S.6.C.1.2.2 Identify differences between chemical and physical changes of matter.

Overarching Understandings:

- Matter is anything that takes up space and has mass. Matter is classified as a substance or a mixture of substances. Matter is composed of elements which are made of small particles called atoms.

Topical Understandings	Essential Questions
<ul style="list-style-type: none">● During a physical change a substance keeps its chemical composition and properties.● During a chemical change, substances react in characteristic ways to form new substances with different physical and chemical properties.● The Law of Conservation of Mass states that during an ordinary chemical reaction matter cannot be created or destroyed. In chemical reactions, the total mass of the reactants equals the total mass of the products.● Substances are often placed in categories if they react in similar ways. Examples include metals, nonmetals, and noble gases.	<ul style="list-style-type: none">● What are physical changes? Chemical changes?● What is the Law of Conservation of Mass?● What is the difference between an element, mixture and compound?
Knowledge	Skills
<ul style="list-style-type: none">● A solution is a mixture in which one material seems to disappear in another.● Mixtures are physical combinations of materials and can be separated by physical means.● Interactions among atoms and/or molecules result in chemical reactions.● A change that results from mixing two or more materials that change is a chemical reaction.	<ul style="list-style-type: none">● define physical and chemical properties.● categorize physical and chemical properties.● investigate the meaning of mass, weight, and density by looking at how each might be measured.● review the states of matter, as well as their properties.● compare the differences between physical and chemical changes.

<ul style="list-style-type: none"> • Reactants are the active chemicals in a reaction. • A precipitate is the solid material that sometimes forms as a product of a reaction. Gas is sometimes a product of a reaction. 	<ul style="list-style-type: none"> • compare the differences between pure substances and mixtures.
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Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Formative assessments (observations, questioning, exit/admit slips, response logs, graphic organizers, visual representations, four corners, think-pair-share) • Summative assessment (teacher-generated quizzes and tests) • Lab work including report 	<ul style="list-style-type: none"> • identification of physical and chemical changes • describe differences between physical and chemical changes • describe the criteria necessary for water to change state (liquid to gas, gas to liquid, solid to liquid, solid to gas)

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • Foss: Mixtures & Solutions Kit • Foss Mixtures & Solutions Science Stories • Available classroom resources • Additional teacher resources 	<ul style="list-style-type: none"> • Reference for teacher & student use • Skill building, reinforcement of material, assessment of topic • materials to make and observe physical and chemical changes • nonfiction readings to support learning objectives and standards

Unit #: Physical Science Foss: Solar Energy

<p>S.6.C.2 Forms, Sources, Conversion, and Transfer of Energy S.6.B.3 Ecological Behavior and Systems</p> <p>S.6.C.2.1 Explain how energy can be transformed from one form to another and describe the results of the transformation. S.6.B.3.2 Explain how renewable and nonrenewable resources provide for human needs.</p> <p>S.6.C.2.1.1 Describe how heat moves in predictable ways from warmer objects to cooler ones until they reach the same temperature. S.6.C.2.1.2 Describe the effect of heat on particle motion during phase changes. S.6.C.2.1.3 Compare various energy sources (i.e., oil, coal, natural gas, solar, wind, and moving water) and describe how these energy sources are transformed into useful forms of energy. S.6.B.3.2.1 Compare the usage of fossil fuels and alternative energy resources (e.g., oil, natural gas, coal, wind, solar, water).</p>
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<p>Overarching Understandings:</p> <ul style="list-style-type: none"> • Law of Conservation of Energy: energy cannot be created or destroyed. Energy can be transformed from one form to another. • Energy resources can be renewable (wind, solar, water, heat) or nonrenewable (petroleum, natural gas, coal) and transformed into forms useful to humans
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Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Energy is neither created nor destroyed. Energy can be transformed from one form to another, but transformation between forms often results in the loss of useable energy through the production of heat. 	<ul style="list-style-type: none"> • How is energy (heat) transferred from one object to another? • What are the different types of energy? • Which forms of energy are renewable and which are nonrenewable?
Knowledge	Skills
<ul style="list-style-type: none"> • The Sun is a major source of energy for Earth. Other sources of energy include nuclear and geothermal energy. • Fossil fuels contain stored solar energy and are considered nonrenewable resources. • Solar energy, wind, moving water, and biomass are some examples of renewable energy resources. • Most activities in everyday life involve one form of energy being transformed into another. Energy, in the form of heat, is almost always one of the products of energy transformations. • Different forms of energy include heat, light, electrical, mechanical, 	<ul style="list-style-type: none"> • Use a thermometer to measure the temperature of selected objects/materials • Measure the temperature changes of various materials • Categorize types of energy as being kinetic or potential. • Analyze the different types of energy resources and determine which is most appropriate for our area.

<p>sound, nuclear, and chemical.</p> <ul style="list-style-type: none"> • Energy can be considered to be either kinetic energy or potential energy. • Heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature. • Heat can be transferred through matter by the collisions of atoms and/or molecules (conduction) or through space (radiation). In a liquid or gas, currents will facilitate the transfer of heat (convection). • During a phase change, heat energy is absorbed or released. Energy is absorbed when a solid changes to a liquid and when a liquid changes to a gas. Energy is released when a gas changes to a liquid and when a liquid changes to a solid. • Most substances expand when heated and contract when cooled. Water is an exception, expanding when changing to ice. 	
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Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Formative assessments (observations, questioning, exit/admit slips, response logs, graphic organizers, visual representations, four corners, think-pair-share) • Summative assessment (teacher-generated quizzes and tests) • energy resource project 	<ul style="list-style-type: none"> • measuring temperature of selected materials using a thermometer • categorizing energy resources as renewable or nonrenewable • describe how humans use energy resources such as heat, light, electrical, mechanical, sound, nuclear, and chemical as well as kinetic and potential • evaluate the advantages and disadvantages of energy resources

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • Foss: Solar Energy Kit • Foss Solar Energy Science Stories • Energy Resource Project Materials • Available classroom resources • Additional teacher resources 	<ul style="list-style-type: none"> • Reference for teacher & student use • Skill building, reinforcement of material, assessment of topic • nonfiction readings to support learning objectives and standards • reference materials for project work

Unit #: Physical Science FOSS Solar Energy

<p>S.6.C.3 Principles of Motion and Force</p> <p>S.6.C.3.1 Explain why an object’s motion is the result of all forces acting on it.</p> <p>S.6.C.3.1.1 Compare speed and velocity.</p> <p>S.6.C.3.1.2 Explain why gravitational force depends on how much mass the objects have and the distance between them.</p>
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<p><i>Overarching Understandings:</i></p> <ul style="list-style-type: none"> • .The motion of an object results from an interaction of energy and matter.

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • An object’s motion is the result of all forces acting on it. • The motion of an object can be described by its position, direction of motion, and speed. • An object that is not being subjected to a force will continue to move at a constant speed and in a straight line. 	<ul style="list-style-type: none"> • What is the difference between speed and velocity? • What causes objects to move?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: motion, speed, acceleration, velocity, gravity, Newton, Laws of Motion, • The motion of an object is always judged with respect to some other object or point. • An object’s motion is the result of the combined effect of all forces acting on the object. A moving object that is not subjected to a force will continue to move at a constant speed in a straight line. An object at rest will remain at rest. • Force is directly related to an object’s mass and acceleration. • For every action there is an equal and opposite reaction. • Friction is a force that opposes motion. • Every object exerts gravitational force on every other object. Gravitational force depends on how much mass the objects have and on how far apart they are. 	<ul style="list-style-type: none"> • Compare speed and velocity. • Analyze the relationship of velocity to acceleration. • Identify examples of forces and their effect on an object. • Compare balanced and unbalanced forces. • Explain how friction can be both harmful and helpful. • Explain the Law of Universal Gravitation.

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> ● Formative assessments (observations, questioning, exit/admit slips, response logs, graphic organizers, visual representations, four corners, think-pair-share) ● Summative assessment (teacher-generated quizzes and tests) 	<ul style="list-style-type: none"> ● Explain why objects move. ● Compare speed and velocity. ● Identify the two factors that affect gravitational force and predict how gravity changes as the factors change.

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> ● Available classroom resources ● Additional teacher resources 	<ul style="list-style-type: none"> ● Reference for teacher & student use ● Skill building, reinforcement of material, assessment of topic

Unit #: Physical Science

<p>S.6.C.3 Principles of Motion and Force</p> <p>S.6.C.3.2 Describe how magnets and electricity produce related forces.</p> <p>S.6.C.3.2.1 Describe how moving electric charges produce magnetic forces and moving magnets produce electric forces.</p> <p>S.6.C.3.2.2 Describe the relationships between voltage, current, and resistance (Ohm's Law).</p> <p>S.6.C.3.2.3 Distinguish between gravity and electromagnetism.</p>
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<p>Overarching Understandings:</p> <ul style="list-style-type: none"> Electricity is a form of energy resulting from the flow of electrons. Electromagnets are a useful tool humans use in a variety of ways.

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> define magnetic poles and describe the interaction between like and unlike magnetic poles. 	<ul style="list-style-type: none"> How is electricity produced? What is the difference between voltage and current? What is an electromagnet? How are they used?
Knowledge	Skills
<ul style="list-style-type: none"> Vocabulary: magnetism, magnetic pole, magnetic field, nucleus, proton, electron, , permanent magnet, electromagnet, voltage, current, resistance Electric currents and magnets can exert a force on each other. 	<ul style="list-style-type: none"> define magnetic poles and describe the interaction between like and unlike magnetic poles. define magnetic fields. show places where an electromagnet could be useful.

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> Formative assessments (observations, questioning, exit/admit slips, response logs, graphic organizers, visual representations, four corners, think-pair-share) Summative assessment 	<ul style="list-style-type: none"> describe how electricity is produced. create a design for an electromagnet

(teacher-generated quizzes and tests) • energy resource project	
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Materials and Resources

Source	Description of Use
<ul style="list-style-type: none">• Available classroom resources• Additional teacher resources	<ul style="list-style-type: none">• Reference for teacher & student use• Skill building, reinforcement of material, assessment of topic

Unit #: Earth & Space Sciences Foss: Solar Energy & Landforms

S.6.D.1 Earth Features and Processes That Change Earth and Its Resources

S.6.D.1.1 Describe how constructive and destructive natural processes can influence different biomes.

S.6.D.1.1.1 Describe how soil fertility, composition, resistance to erosion, and texture are affected by many factors.

S.6.D.1.1.2 Identify the three basic rock types and describe their formation (i.e., igneous [granite, basalt, obsidian, and pumice]; sedimentary [limestone, sandstone, shale, and coal]; and metamorphic [slate, quartzite, marble, and gneiss]).

Overarching Understandings:

- Landforms are a result of a combination of constructive and destructive forces. Constructive forces include crustal deformation, faulting, volcanic eruption and deposition of sediment, while destructive forces include weathering and erosion.

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> three major interacting components: lithosphere, hydrosphere, and atmosphere. Processes act within and among the three components on a wide range of time scales to bring about continuous change in Earth's crust. 	<ul style="list-style-type: none"> What is the rock cycle? What are the three categories of rock? What factors influence the characteristics of soil, such as fertility, composition, resistance to erosion, and texture What causes earthquakes? Volcanoes? Erosion? What are the effects of earthquakes, volcanic eruptions and erosion on Earth's surface?
Knowledge	Skills
<ul style="list-style-type: none"> Vocabulary: core, mantle, crust, inner core, outer core, mesosphere, asthenosphere, lithosphere, rock cycle, sedimentary rock, metamorphic rock, igneous rock, weathering, erosion, tectonic plate, plate boundaries, seismic waves, Rocks are composed of minerals. Only a few rock-forming minerals make up most of the rocks of Earth. Minerals are identified on the basis of physical properties such as streak, hardness, and reaction to acid. Fossils are usually found in sedimentary rocks. Fossils can be used to study past climates and environments. The processes that wear away Earth's surface include weathering 	<ul style="list-style-type: none"> Categorize rocks as being sedimentary, metamorphic or igneous Compare the formation of each type of rock Label and describe the structural and compositional layers of Earth Compare the types of volcanic eruptions and their effects on the earth's surface. Compare the types and effects of plate boundaries: convergent, divergent, transform Describe the effects of weathering & erosion

<p>and erosion.</p> <ul style="list-style-type: none"> • The process of weathering breaks down rocks to form sediment. Soil consists of sediment, organic material, water, and air. • Erosion is the transport of sediment. Gravity is the driving force behind erosion. • Gravity can act directly or through agents such as moving water, wind, and glaciers. • The interior of Earth is hot. Heat flow and movement of material within Earth cause sections of Earth's crust to move. This may result in earthquakes, volcanic eruption, and the creation of mountains and ocean basins. • Earth's layers, crust, mantle, outer core, and inner core have distinct properties. • Continents fitting together like puzzle parts and fossil correlations provided initial evidence that continents were once together. • The Theory of Plate Tectonics explains how the solid lithosphere consists of a series of plates that float on the partially molten section of the mantle. • Plates may collide, move apart, or slide past one another. Most volcanic activity and mountain building occur at the boundaries of these plates, often resulting in earthquakes. • Rocks are classified according to their method of formation. The three classes of rocks are sedimentary, metamorphic, and igneous. Most rocks show characteristics that give clues to their formation conditions. • The rock cycle model shows how types of rock or rock material may be transformed from one type of rock to another. 	
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Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Formative assessments (observations, questioning, exit/admit slips, response logs, graphic organizers, visual representations, four corners, think-pair- 	<ul style="list-style-type: none"> • identify and describe the structural & compositional layers of the earth • explain/model how the tectonic plates move at convergent, divergent and transform boundaries • describe the effect of tectonic plate movement on the earth's surface

share) • Summative assessment (teacher-generated quizzes and tests)	• describe the rock cycle and how each type of rock forms
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Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • Foss: Solar Energy & Landforms Kit • Foss Solar Energy & Landforms Science Stories • Available classroom resources • Additional teacher resources 	<ul style="list-style-type: none"> • Reference for teacher & student use • Skill building, reinforcement of material, assessment of topic • nonfiction readings to support learning objectives and standards

Unit #: Earth & Space Sciences

S.6.D.3 Composition and Structure of the Universe

S.6.D.3.1 Explain the relationships between objects in the universe.

S.6.D.3.1.1 Compare the size and surface features of the planets that comprise the solar system as well as the objects orbiting them.

S.6.D.3.1.2 Describe how the size, composition, and surface features of the planets are influenced by their distance from the Sun.

- Overarching Understandings:**
- Physical characteristics of components of the solar system and universe - specifically, the sun, stars, planets, moons, comets, asteroids, and meteors
 - Earth's rotation causes the day and night cycle and Earth's revolution causes the yearly cycle of seasons
 - The relative positions of Earth, the moon, and the sun are responsible for the moon phases, eclipses, and tides

Topical Understandings	Essential Questions
<ul style="list-style-type: none"> • Earth's Sun is an average-sized star. The Sun is more than a million times greater in volume than Earth. • The Sun and the planets that revolve around it are the major bodies in the solar system. Other members include comets, moons, and asteroids. • Gravity is the force that keeps planets in orbit around the Sun and the Moon in orbit around the Earth. • Most objects in the solar system have a regular and predictable motion. These motions explain such phenomena as a day, a year, phases of the Moon, eclipses, tides, meteor showers, and comets. • Moons are seen by reflected light. The phases repeat in a cyclic pattern in about one month. • The apparent motions of the Sun, Moon, planets, and stars across the sky can be explained by Earth's rotation and revolution. 	<ul style="list-style-type: none"> • Who were the early astronomers? Why did they study the stars? What did they theorize regarding the stars and planets? • How did the galaxy form? • How do stars form and change during their life cycle? • What are constellations and why did people name them? • How does Earth move? How do Earth's movements affect us? • How do the terrestrial planets differ from the gas giants? • Why are objects in the solar system different from each other?
Knowledge	Skills
<ul style="list-style-type: none"> • Vocabulary: astronomy, Ptolemy, Copernicus, Brahe, Kepler, Galileo, Newton, planet, star, constellation, light-year, solar system, nebula, astronomical unit, corona, chromospheres, photosphere, 	<ul style="list-style-type: none"> • Compare the life cycle of small/medium sized stars with that of large stars, showing the stages from nebula - protostar - main sequence star – red giant, supergiant – white dwarf, supernova – black dwarf,

<p>convection zone, radiative zone, core, nuclear fusion, terrestrial planets, gas giants, galaxy, big bang theory</p> <ul style="list-style-type: none"> • Star patterns or constellations appear as they do because of Earth's position in space. Most stars that appear close together are actually very far apart. • The solar system formed out of a vast cloud of cold gas and dust. The central mass of the nebula became the sun. Planets formed from the surrounding disk of material. • The sun produces energy in its core by nuclear fusion. • The tilt of Earth's axis of rotation and the revolution of Earth around the Sun cause seasons on Earth. The length of daylight varies depending on latitude and season. 	<p>neutron star – black hole.</p> <ul style="list-style-type: none"> • Compare and contrast the terrestrial planets and the gas giants.
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Assessment

Evaluation Criteria	Evidence of Understanding
<ul style="list-style-type: none"> • Formative assessments (observations, questioning, exit/admit slips, response logs, graphic organizers, visual representations, four corners, think-pair-share) • Summative assessment (teacher-generated quizzes and tests) 	<ul style="list-style-type: none"> • identify the major accomplishment of astronomers such as Ptolemy, Copernicus, Brahe, Kepler, Galileo, Newton • create a model of the life cycle of a star

Materials and Resources

Source	Description of Use
<ul style="list-style-type: none"> • Foss: Solar Energy Kit • Foss Solar Energy Science Stories • Extreme Stars: video from Discovery • Available classroom resources • Additional teacher resources 	<ul style="list-style-type: none"> • Reference for teacher & student use • Skill building, reinforcement of material, assessment of topic nonfiction readings to support learning objectives and standards