Course: ***Science*** **Grade:** ***4***	**Overview of Course** (Briefly describe what students should understand and be able to do as a result of engaging in this course)**:** ***As a result of this course, the students will gain an understanding of the basic knowledge of Life, Earth, and Physical Science. They will be able to show this knowledge through inquiry-based activities using the scientific method as a guide. The use of scientific inquiry will help ensure that students develop a deep understanding of science content, processes, knowledge and understanding of scientific ideas and the work of scientists.***

Overarching Big Ideas, Enduring Understandings, and Essential Questions
(These "spiral" throughout the entire curriculum.)

Big Idea (A Big Idea is typically a noun and always transferable within and among content areas.)	**Standard(s) Addressed** (What Common Core Standard(s) and/or PA Standard(s) addresses this Big Idea?)	**Enduring Understanding(s)** (SAS refers to Enduring Understandings as "Big Ideas." EUs are the understandings we want students to carry with them after they graduate. EUs will link Big Ideas together. Consider having only one or two EUs per Big Idea.)	**Essential Question(s)** (Essential Questions are broad and open ended. Sometimes, EQs can be debated. A student's answer to an EQ will help teachers determine if he/she truly understands. Consider having only one or two EQs per Enduring Understanding.)
(The first overarching Big Idea goes here.)	(The Common Core Standard(s) and/or PA Standard(s) that addresses the first overarching Big Idea goes here.)	(The Enduring Understanding(s) for the first overarching Big Idea goes here.)	(The Essential Question(s) for the Enduring Understanding(s) for the first overarching Big Idea goes here.)
Systems	3.4.4.A2. Understand that systems have parts and components that work together. 3.4.4.E4. Explain how information and communication systems allow information to be transferred from human to human. 3.4.4.E5. Recognize that a transportation system has many parts that work together to help people travel and to move goods from place to place. 4.1.4.B. Identify how matter cycles through an ecosystem. 4.2.4.A. Identify water systems and their components as either lotic or lentic. 4.4.4.B. Describe how humans rely on the food and fiber system. 4.1.4.B. Identify how matter cycles through an ecosystem.	A system is a whole that is composed of parts arranged in an orderly manner according to some plan or function. A system is made of many parts that work together to get a job done. Nature is composed of many interrelated systems. There are many systems that rely on each other in our world.	Why are relationships between organisms important? What are the relationships among parts of a system (e.g. digestive system, simple machines, water systems, fiber system)? How do parts within a system work together? How do different systems work together in nature?

	S4.A.3.1.1: Categorize systems as either natural or human-made (e.g., ballpoint pens, simple electrical circuits, plant anatomy, water cycle). S4.A.3.1.2: Explain a relationship between the living and nonliving components in a system (e.g., food web, terrarium). S4.A.3.1.3: Categorize the parts of an ecosystem as either living or nonliving and describe their roles in the system.		
Cycles/ Processes	3.1.4.A3. Identify differences in the life cycles of plants and animals. 3.1.4.A8. Construct and interpret models and diagrams of various animal and plant life cycles. 3.3.4.A1 Recognize that the surface of the earth changes due to slow processes and rapid processes. S4.A.3.3.1. Identify and describe observable patterns (e.g., growth patterns in plants, weather, water cycle).	Cycles are patterns that regularly occur and reoccur in nature. Cycles, like the water cycle, usually never end. There are similarities and differences between living things and their life processes. There are many living things that are like other living things. Cycles of nonliving things can be compared and contrasted to the cycles of living things. Both living things and nonliving things have similarities and differences in their cycles.	Why are cycles essential for living things and nonliving things? What kinds of patterns can be identified in nature? How can you make predictions based on the cycles of things in nature?
Classification	3.1.4.A1. Classify plants and animals according to the physical characteristics that they share. 3.2.4.A1. Identify and classify objects based on their observable and measurable physical properties. S4.B.1.1 - Identify and describe similarities and differences between living things and their life processes. S4.C.1.1.2. Categorize/group objects using physical characteristics.	Living things can be grouped based on their similarities and differences. We can sort organisms according to their characteristics. All living things are made of parts that have specific functions. Organisms have parts that do special tasks. Nonliving things can be classified by their properties. We group nonliving things based on physical	How do the structures and functions of living things allow them to meet their needs? What are some ways to classify living things? How can you use the characteristics of a nonliving thing to classify it?

		elements.	
Models	3.1.4.A8. Construct and interpret models and diagrams of various animal and plant life cycles. 3.2.4.A5. Use models to demonstrate the physical change as water goes from liquid to ice and from liquid to vapor. 3.3.4.A6. Identify basic landforms using models and simple maps. S4. A.3.2. Use models to illustrate simple concepts and compare the models to what they represent. S4.A.3.2.1. Identify what different models represent (e.g., maps show physical features, directions, distances; globes represent Earth; drawings of watersheds depict terrain; dioramas show ecosystems; concept maps show relationships of ideas). S4.A.3.2.3. Use appropriate, simple modeling tools and techniques to describe or illustrate a system (e.g., two cans and string to model a communications system, terrarium to model an ecosystem). S4.D.1.1.2. Identify various Earth structures (e.g., mountains, watersheds, peninsulas, lakes, rivers, valleys) through the use of models.	Models are used in science to represent other things that might be difficult to see or measure. To make them easier to understand, we can represent things in our world with models. Nature is predictable and we can use evidence and models to develop explanations to understand our world. Models can help clarify unclear things in nature. A model is a representation of a part of nature that helps us understand our world. A model illustrates our environment for us.	What are the limitations to using models? What are the strengths associated with using models? How can models illustrate parts of our environment to show relationships between them?
Change	3.1.4.C1. Describe how environmental changes can cause extinction in plants and animals. 3.2.4.A3. Demonstrate the conservation of mass during physical changes such as melting or freezing. 3.2.4.B1. Explain how an object's change in motion can be observed and measured. 3.3.4.A1. Recognize that the surface of the earth changes due to slow processes and rapid processes. 3.3.4.A6. Identify simple changes in the earth system as air, water, soil and rock interact. 4.1.4.E. Explain that ecosystems change over time due to natural and/ or human influences.	Measurements can be used to document changes and consistency over time. We can record things that change and things that don't to understand patterns in our world. Nature is constantly changing but there are many repeating patterns. Interestingly, our world changes and stays the same simultaneously. Natural events and human activities can change the environment.	Why do changes in one part of a system affect the whole system? What predictable patterns of change can be observed on and from earth? What are some examples of how change can be positive and/or negative?

		Both humans and nature cause changes in the world.	
Diversity	3.1.4.B5. Identify observable patterns in the physical characteristics of plants or groups of animals. S4.B.1.1. Identify and describe similarities and differences between living things and their life processes. S4.B.2.1.1. Identify characteristics for plant and animal survival in different environments (e.g., wetland, tundra, desert, prairie, deep ocean, forest).	All organisms have their own distinctive characteristics and so there is a great deal of diversity in nature. Our world contains a variety of living and nonliving things. Organisms are diverse and nature selects the characteristics (adaptations) of organisms that provide advantages for survival. "Natural Selection" In order to survive, an organism must be well-appointed. Organisms best adapted to compete for the available resources will be successful and pass their adaptations (traits) to their offspring. "Survival of the Fittest" The traits that help a living thing survive are passed on to offspring.	How do the structures and functions of living things allow them to meet their needs? What are the advantages and disadvantages of having individual differences? Why is diversity essential to achieving a balanced world?
Inquiry	3.4.4.D1. Investigate how things are made and how they can be improved. 3.4.4.D3. Investigate and assess the influence of a specific technology or system on the individual, family, community, and environment. S4. A.2.1. Apply skills necessary to conduct an experiment or design a solution to solve a problem. S4. A.2.1.3. Observe a natural phenomenon (e.g., weather changes, length of daylight/night, movement of shadows, animal migrations, growth of plants), record observations, and then make a prediction based on those observations.	There are organized ways of finding answers and solving problems. If you want to explain something, you should follow a plan. There are certain skills that are used to solve a problem or answer a question. There are particular things you need to do to answer a question. Finding answers to questions about our world will help us understand it.	Why is it important to follow steps in a method to find answers or solve a problem? Why should we ask questions about our world? How is investigation important to discovery?

	4.4.4.C Use scientific inquiry to investigate the composition of various soils.	We get to know our world when we answer our questions.	

Big Ideas, Enduring Understandings, and Essential Questions Per Unit of Study
(These do NOT "spiral" throughout the entire curriculum, but are specific to each unit.)

Month of Instruction (In what month(s) will you teach this unit?)	**Title of Unit**	**Big Idea(s)** (A Big Idea is typically a noun and always transferable within and among content areas.)	**Standard(s) Addressed** (What Common Core Standard(s) and/or PA Standard(s) addresses this Big Idea?)	**Enduring Understanding(s)** (SAS refers to Enduring Understandings as "Big Ideas." EUs are the understandings we want students to carry with them after they graduate. EUs will link Big Ideas together. Consider having only one or two EUs per Big Idea.)	**Essential Question(s)** (Essential Questions are broad and open ended. Sometimes, EQs can be debated. A student's answer to an EQ will help teachers determine if he/she truly understands. Consider having only one or two EQs per Enduring Understanding.)	**Common Assessment(s)*** (What assessments will all teachers of this unit use to determine if students have answered the Essential Questions?)	**Common Resource(s)* Used** (What resources will all teachers of this unit use to help students understand the Big Ideas?)
August – November	Life Science	**Inquiry** **Systems** **Cycles/Processes** **Change/Continuity**	3.1.4.A1. Classify plants and animals according to the physical characteristics that	A system is a whole that is composed of parts arranged in an orderly manner according to	How do the structures and functions of living things allow them to meet their needs?		**Food Chemistry kit**

		Models **Classification** **Diversity** Adaptation Abundance/Scarcity Environments Migration/Hibernation Measurement Genetics	they share. 3.1.4.A2: Describe the different resources that plants and animals need to live. 3.1.4.A3. Identify differences in the life cycles of plants and animals. 3.1.4.A5: Describe common functions living things share to help them function in a specific environment. 3.1.4.A8. Construct and interpret models and diagrams of various plant and animal life cycles. 3.1.4.B1. Describe features that are observable in both parent and offspring. 3.1.4.B2. Recognize that reproduction is necessary for the continuation of life. 3.1.4.C1. Identify different characteristics of plants and animals that help some populations survive and reproduce in	some plan or function. A system is made of many parts that work together to get a job done. All living things are made of parts that have specific functions. Organisms have parts that do special tasks. Living things can be grouped based on their similarities and differences. We can sort living things based on what's the same about them and what's different. All living things must compete for Earth's limited resources; organisms best adapted to compete for the available resources will be successful and pass their adaptations (traits) to their offspring. "Survival of the Fittest" The traits that help a living thing survive are	What are some ways to classify living things? What features help plants make their own food and reproduce? How do organisms interact with each other and with their environment? How do changes in ecosystems affect our world? How do the body's smallest and largest parts work together? What are the stages in the life cycles of plants and animals? How do changes in the environment affect the ability of living things to meet their basic needs? How do the living and		

			greater numbers. Describe how environmental changes can cause extinction in plants and animals. 3.1.4.C2. Describe plant and animal adaptations that are important to survival. 4.1.4.A. Explain how living things are dependent on other living and nonliving things for survival. 4.1.4.C. Explain how most life on earth gets its energy from the sun.	passed on to offspring. The survival of living things is dependent upon their adaptations and ability to respond to natural changes in and human influences on the environment. Organisms must adjust to the world around them in order to live. Living things depend on other living things and non-living things to provide for their basic needs. Organisms need a variety of things to survive.	nonliving parts of ecosystems change over time?		
December – March	Earth Science	**Inquiry** **Systems** **Cycles/Processes** **Change/Continuity** **Models** **Classification** **Diversity** Natural Resources Environments Production/Consumption Technology Measurement	3.3.4.A1 Describe basic landforms. Identify the layers of the Earth. Recognize that the surface of the Earth changes due to slow processes and rapid processes. 3.3.4.A2: Identify basic properties and uses of Earth's materials	The earth system changes constantly as air, water, soil, and rock interact. Nonliving things change constantly. Soils develop by the breakdown of rocks by weathering and the addition of organic material. Soil also	How does Earth's water affect weather? How do storms affect Earth's air, water, land, and living things? How can rocks tell us about Earth's past, present, and future?		**March- Begin the Electric Circuits kit**

		Energy	including rocks, soils, water, and gases of the atmosphere. 3.3.4.A3: Recognize that fossils provide evidence about the plants and animals that lived long ago and the nature of the environment at that time. 3.3.4.A4: Recognize Earth's different water resources, including both fresh and saltwater. Describe phase changes in the forms of water on Earth. 3.3.4.A5: Describe basic weather elements. Identify weather patterns over time. 3.3.4.A6. Identify basic landforms by using models and simple maps. Identify simple changes in the earth system as air, water, soil, and rock interact. Explain how basic	contains many living organisms. Soil contains rocks, living creatures, and decomposing organisms. Natural events and human activities can change the environment. Both humans and nature cause changes in the world. Rock is composed of different combinations of minerals. Minerals are the ingredients in rocks. Basic weather conditions change in predictable patterns. We can predict the weather because it tends to follow a pattern. When liquid water disappears, it turns into a gas (water vapor) in the air. It can reappear as a liquid when cooled or as a solid when	How is soil formed? How is Earth's surface shaped and reshaped? How can living things always have the natural resources they need? What are the stages in the water cycle? What are the stages in the rock cycle?		

			weather elements are measured. 4.3.4.A: Identify ways humans depend on natural resources for survival.	cooled further. Clouds and fog are made up of tiny water droplets or ice crystals. When such droplets or crystals get large enough, they fall as precipitation. Evaporation, condensation, and precipitation are parts of the Water Cycle. Weather variables such as temperature, barometric pressure, wind direction and speed, cloud type, cloud cover, and precipitation can be observed, measured and recorded to identify patterns. Basic weather conditions change in predictable patterns. Scientists use many observations to predict the weather. All living things are dependent upon natural resources. Organisms can't survive without natural			

				resources.			
April – June	Physical Science	**Inquiry** **Systems** **Change/Continuity** **Models** **Classification** **Diversity** Production/Consumption Technology Energy Force	3.2.4.B1. Explain how an object's change in motion can be observed and measured. 3.2.4.B2. Identify types of energy and their ability to be stored and changed from one form to another. 3.2.4.B3. Understand that objects that emit light often emit heat. 3.2.4.B4. Apply knowledge of basic electrical circuits to the design and construction of simple direct current circuits. Compare and contrast series and parallel circuits. Demonstrate that magnets have poles that attract and repel each other. 3.2.4.B6. Give examples of how energy can be transformed from one form to another.	Energy exists in many forms and can be changed from one form to another (transformed) as it moves through a system. Energy is moved from one thing to another. Magnets and electricity produce related forces. Magnets can make electricity and vice versa. A force is required to change an object's speed or direction. A force is needed to make something move. Humans use tools, technology, and devices to help them to do a variety of things. All forms of technology make our lives easier.	How does heat energy move from one object to another? What are some ways that energy can be changed from one type to another? What causes motion and how does it affect us? How do simple machines make work easier? In what ways do humans create, use, and modify technologies?		**Continue with Electric Circuits kit**