Attachment 4: Science Scope and Sequence, 6th Grade

Curriculum Scope & Sequence

School: Pike Creek Charter Middle School Grade or Course 6th Grade Teacher _____

nit Order unit title and/or time me	Learning Targets Content Standards, Grade Level Expectations, Proficiency Level Expectations, or Grade Cluster Benchmarks	Theme/Big Idea/Concept	Essential Questions Student Learning Targets
nit 1: My Body and e weeks ɔrmative ssessments: vestigations udent Science urnal Entries lf sessments/reflections ummative ssessments: rformance task ubrics st-instruction sessments	**Standard 1: The Nature and Application of Science and Technology** ***Understandings and Abilities of Scientific Inquiry*** A. Understand that: Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations. The current body of scientific knowledge guides the investigation. B. Understand that: A valid investigation controls variables. Different experimental designs and strategies can be developed to answer the same question. C. Understand that: In a scientific investigation, data collection involves making precise measurements and keeping accurate records so that others can replicate the experiment. D. Understand that: There is much experimental and observational evidence that supports a large body of knowledge. The scientific community supports known information until new experimental evidence arises that does not match existing explanations. This leads to the evolution of the scientific body of knowledge. E. Understand that: Evaluating the explanations proposed by others involves examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Conflicting data or conflicting interpretations of the same data suggest the need for further investigation. Continued investigation can lead to greater understanding and resolution of the conflict. F. Understand that: Scientific habits of mind and other sources of knowledge and skills are essential to scientific inquiry. Habits of mind include tolerance of ambiguity, skepticism, openness to new ideas, and objectivity. Other knowledge and skills include mathematics, reading, writing, and technology. ***Science, Technology, and Society*** A. Advances in technology can expand the body of scientific knowledge. Technological tools allow people to observe objects and phenomena that	Unit Concepts: Systems: The human body has interrelated systems that are composed of related organs and other components. Systems and organs are part of the way people organize living systems from cells to tissues, organs, to organ systems to organisms. Investigations: There are multiple methods of solving problems in science. There are trade-offs associated with various methods of collecting data. Evidence: People use observations and data to support scientific explanations. Models: Models are used to study body systems and understand how they function. Structure and function: The structure of body systems and organs is related to the function in a complementary manner. Big Ideas: Scientific inquiry of human body systems involves asking scientifically oriented questions, collecting evidence, forming explanations	Essential Questions: What makes a question scientific? What constitutes evidence? When do you know you have enough evidence? Why is it necessary to justify and communicate an explanation? What ethical issues arise when studying people scientifically? How do science and technology influence each other in studying people scientifically? How have past scientific contributions influenced current scientific understanding of the world? How does structure relate to function in human body organs and systems? How do responses to internal and external cues aid in an organism's survival? What can we do to benefit the health of humans and other organisms? Student Learning Targets Describe and use scientific problem solved and experimental design Compare and contrast different ways scien is used to study people

	otherwise would not be possible. Technology enhances the quality, accuracy, speed and analysis of data gathered. B. Science and technology in society are driven by the following factors: economical, political, cultural, social, and environmental. Increased scientific knowledge and technology create changes that can be beneficial or detrimental to individuals or society through impact on human health and the environment. ***History and Context of Science*** A. Over the course of human history, contributions to science have been made by different people from different cultures. Studying some of these contributions and how they came about provides insight into the expansion of scientific knowledge. Standard 6: Life Processes ***Structure/Function Relationship*** B. Living systems in all kingdoms demonstrate the complementary nature of structure and function. Important levels of organization for structure and function include cells, tissues, organs, organ systems, and organisms. F. The human body has systems that perform functions necessary for life. Major systems of the human body include the digestive, respiratory, reproductive, and circulatory systems ***Regulation and Behavior*** A. Regulation of an organism's internal environment involves sensing external changes in the environment and responding physiologically to keep conditions within the range required for survival (e.g., increasing heart rate with exertion). ***Life Processes and Technology Application*** A. Technological advances in medicine and improvements in hygiene have helped in the prevention and treatment of illness. B. The functioning and health of organisms are influenced by many factors (i.e., heredity, diet, lifestyle, bacteria, viruses, parasites, and the environment). Certain body structures and systems function to protect against disease and injury.	connecting explanations to prior scientific knowledge and theory, and communicating and justifying the explanation. There are several ways to problem solve in science, not just one scientific method. Science and technology work together to drive each other forward. Understanding past contributions is essential in building scientific knowledge. Human body systems, from tissues to organ systems, demonstration the complementary nature of structure and function. Organisms respond to internal and eternal cues, which aids in their survival. The life processes of organisms are affected by their interactions with other organisms and with their environment. They may be altered by human manipulation. Life style decisions impact the health of the body.	Design and conduct an investigation using elements of good experimental design. Use a variety of models to illustrate the components, functions and interactions of circulatory, digestive and respiratory systems. Evaluate a nutritional label to determine th nutritional value of the source of food as pa of a balanced diet. Evaluate and use qualitative and quantitati data to form explanations and make decisions. Choices can then be made known that are appropriate to various situations. Use specific equipment to measure various circulatory and respiratory functions. Use knowledge of human body systems to synthesize research data and make informe decisions regarding personal and public health. Research and report on how body systems are affected by lifestyle choices such as diet or exercise. Explain that human body systems are comprised of organs that perform specific functions within one or more systems. Label and describe the functions of the basi parts of the circulatory system including th heart, arteries, veins and capillaries. Labels and describe the functions of the bas parts of the male and female reproductive systems. Label and describe the functions of the basi part of the respiratory system including the trachea, bronchi and lungs.

			Label and describe the functions of the basi parts of the digestive tract including the mouth, esophagus, stomach, small intestin liver, large intestine (colon), rectum and anus. Express how the human circulatory, respiratory and digestive systems work together to carry out life processes. Trace how the circulatory, respiratory and digestive systems interact to transport the food and oxygen required to provide energy for life processes. Conduct simple investigations to determine how the systems in 12 of the human organisms respond to various external stimuli to maintain stable internal conditions. Use knowledge of human body systems to synthesize research data and make informe decisions regarding personal and public health. Research and report on how body systems are affected by lifestyle choices such as diet or exercise.
nit 2: Force and otion weeks ɔrmative ssessments: udent Journal ıtries tivity Pages lf assessment and flection ımmative ssessments:	**Standard 1: The Nature and Application of Science and Technology** ***Understandings and Abilities of Scientific Inquiry*** A. Understand that: Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations. The current body of scientific knowledge guides the investigation. B. Understand that: A valid investigation controls variables. Different experimental designs and strategies can be developed to answer the same question. C. Understand that: In a scientific investigation, data collection involves making precise measurements and keeping accurate records so that others can replicate the experiment.	**Big Ideas:** Motion can be characterized by an object's speed and direction of travel. An object's average speed can be calculated from knowledge of distance and time. Balanced forces do not cause a change in the motion of an object; unbalanced forces do cause a change in the motion of an object. The impact of forces on the motion (or change in motion) of	**Essential Questions:** How is speed measured and why is speed important? How can dot patterns and graphs be used t determine if something is moving at consta speed or not constant speed? What is gravity and what factors affect the strength of the pull of gravity? How are mass and weight different? How can you use the direction of motion to

rformance tasks ıbrics	D. Understand that: There is much experimental and observational evidence that supports a large body of knowledge. The scientific community supports known information until new experimental evidence arises that does not match existing explanations. This leads to the evolution of the scientific body of knowledge. E. Understand that: Evaluating the explanations proposed by others involves examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Conflicting data or conflicting interpretations of the same data suggest the need for further investigation. Continued investigation can lead to greater understanding and resolution of the conflict. F. Understand that: Scientific habits of mind and other sources of knowledge and skills are essential to scientific inquiry. Habits of mind include tolerance of ambiguity, skepticism, openness to new ideas, and objectivity. Other knowledge and skills include mathematics, reading, writing, and technology. ***Science, Technology, and Society*** A. Advances in technology can expand the body of scientific knowledge. Technological tools allow people to observe objects and phenomena that otherwise would not be possible. Technology enhances the quality, accuracy, speed and analysis of data gathered. B. Science and technology in society are driven by the following factors: economical, political, cultural, social, and environmental. Increased scientific knowledge and technology create changes that can be beneficial or detrimental to individuals or society through impact on human health and the environment. ***History and Context of Science*** A. Over the course of human history, contributions to science have been made by different people from different cultures. Studying some of these contributions and how they came about provides insight into the expansion of scientific knowledge. **Standard 3: Energy and Its Effects** ***The Forms and Sources of Energy*** B. Mechanical energy comes from the motion (kinetic energy) and position (potential energy) of objects. Gravitational potential energy and elastic potential energy are important forms of potential energy that contribute to the mechanical energy of objects. ***Forces and the Transfer of Energy***	an object can be displayed and analyzed using graphical means. Gravity is a force that acts between masses over large distances and can influence the motion (or change in motion) of an object. Gravity act vertically downward on the local scale and vertically inward on the global scale. Forces that influence the motion (or change in motion) of objects can be identified and combined to determine the overall effect of these forces. Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy), and types of energy associated with the position of mass and with energy fields (potential energy). Changes take place because of the transfer of energy. Energy is transferred to matter through the action of forces. Different forces are responsible for the transfer of the different forms of energy. Energy readily transforms from one form to another, but these transformations are not always reversible. The details of these transformations depend on the initial form of the energy and the properties of the materials involved. Energy may transfer into or out of a system and it	help determine the direction of a force such as air resistance and friction? Why is the direction of force important? How can you determine the total force? What affect do forces have on the motion o objects? Student Learning Targets: Design and conduct an experiments to determine the speed of a moving object. Compare the speeds of two moving objects qualitatively and quantitatively. Measure time in seconds and distance in centimeters. Collect data from multiple trails. Calculate average speed Conduct investigations to compare constan speed and non-constant speed. Make distance versus time graphs using a c car and using a motion detector. Analyze graphs to describe how the speed c an object changes. Use models to illustrate the direction gravit acts at different points on Earth. Identify the forces of gravity, supporting forces, air resistance, elastic forces and tension forces. Identify the force, whether it is a push or pu force, the direction of force and justify the choice using evidence. Create force diagrams using arrows to

	A. When the forces acting on an object are balanced, its motion will not change. Unbalanced forces will cause the object's motion to change. Changes in motion depend upon the size and direction of the total unbalanced force exerted on the object. B. Gravity is a force that acts between masses over very large distances. Near the Earth's surface, gravity pulls objects and substances vertically downward.	may change forms, but the total energy cannot change.	illustrate the direction and amount of force List, as basic forms of energy, light, heat, sound, electrical and energy of motion. Conduct investigations on a moving object and make measurements of time and distance traveled and determines the avera speed of moving objects. Graph and interpret distance versus time graphs for constant speed. Use the graphs to describe how the positior of an object changes in a time interval. Describe how the speed of an object depenc on the distance traveled and the travel time Explain how the motion of an object can be described by its position, speed and directi of motion. Give examples of objects at rest, and identi the forces that act on an object while it remains at rest. Explain that if the object is not moving, it must have at least two forces acting on it th are balanced. Give examples of moving objects and ident the forces that act on these objects. Select examples where only one force acts on the object and examples where two or more forces act on the object. Explain that unbalanced forces acting on a object will change its speed, direction of motion or both. Conduct investigations to describe how the relative directions of forces simultaneously acting on an object will determine how strongly the combination of these forces

			influences the motion of the object. Conduct investigations and describe how a force can be directed to increase the speed o an object, decrease the speed of the object o change the direction in which the object moves. Explain that an object that feels the effects balanced forces may be at rest or may be moving in a straight line with a speed that does not change. Explain that the earth will pull on all object with a force called gravity that is directed inward toward the center of Earth.
nit 3: Electrical nergy **weeks** **ormative ssessments:** udent Science urnal entries udent self sessment and flection **mmative ssessments:** rformance tasks reate diagrams of ectric circuits onstruct electric rcuit ubrics	**Standard 1: The Nature and Application of Science and Technology** ***Understandings and Abilities of Scientific Inquiry*** A. Understand that: Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations. The current body of scientific knowledge guides the investigation. B. Understand that: A valid investigation controls variables. Different experimental designs and strategies can be developed to answer the same question. C. Understand that: In a scientific investigation, data collection involves making precise measurements and keeping accurate records so that others can replicate the experiment. D. Understand that: There is much experimental and observational evidence that supports a large body of knowledge. The scientific community supports known information until new experimental evidence arises that does not match existing explanations. This leads to the evolution of the scientific body of knowledge. E. Understand that: Evaluating the explanations proposed by others involves examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Conflicting data or conflicting interpretations of the same data suggest the need for further investigation. Continued investigation can lead to greater understanding and resolution of the conflict.	Big Ideas: For energy to flow in a circuit, the circuit must be a closed loop. When two or more devices are included in a circuit their performance will depend upon how they are connected to the energy source (series/parallel) and therefore the amount of energy delivered to each device. There are two types of electrical charges, positive and negative. Objects can become "charged" and as a result can attract or repel other objects. Negative charges move freely through the circuit and carry energy from the energy source to the device(s) in the circuit. The charges are never used up, nor changed in anyway.	**Essential Questions:** How do we know that things have energy? How can energy be transferred from one material to another? What happens to a material when energy is transferred to it? What happens to this energy in a system- where does this energy come from, how is changed within the system, and where does it ultimately go? How does the flow of energy affect the materials in the system? What is a responsible use of energy? Are there alternative forms of energy that will serve our needs or better ways of using traditional forms of energy? Student Learning Targets:

	F. Understand that: Scientific habits of mind and other sources of knowledge and skills are essential to scientific inquiry. Habits of mind include tolerance of ambiguity, skepticism, openness to new ideas, and objectivity. Other knowledge and skills include mathematics, reading, writing, and technology. ***Science, Technology, and Society*** A. Advances in technology can expand the body of scientific knowledge. Technological tools allow people to observe objects and phenomena that otherwise would not be possible. Technology enhances the quality, accuracy, speed and analysis of data gathered. B. Science and technology in society are driven by the following factors: economical, political, cultural, social, and environmental. Increased scientific knowledge and technology create changes that can be beneficial or detrimental to individuals or society through impact on human health and the environment. ***History and Context of Science*** A. Over the course of human history, contributions to science have been made by different people from different cultures. Studying some of these contributions and how they came about provides insight into the expansion of scientific knowledge. **Standard 3: Energy and Its Effects** ***The Forms and Sources of Energy*** E. Electrical energy is a form of energy that can be transferred by moving charges through a complete circuit. ***Forces and the Transfer of Energy*** H. Electrical systems can be designed to perform a variety of tasks. Series or parallel circuits can be used to transfer electrical energy to devices. Electrical circuits require a complete loop through which the electrical charges can pass. I. Moving electric charges produce magnetic fields. ***Energy Interacting With Materials; the Transformation and Conservation of Energy*** A. Energy can be transformed from one form into another. Energy transformations often take place while energy is being transferred to another object or substance. Energy transformations and energy transfers can be used to explain how energy flows through a physical system (e.g., photosynthesis, weathering, electrical circuits). ***The Production, Consumption and Application of Energy*** B. Technological advances throughout history have led to the discovery and use	Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy), and types of energy associated with the position of mass and with energy fields (potential energy). Changes take place because of the transfer of energy. Energy is transferred to matter through the action of forces. Different forces are responsible for the transfer of the different forms of energy. Energy readily transforms from one form to another, but these transformations are not always reversible. The details of these transformations depend upon the initial form of the energy and the properties of the material involved. Energy may transfer into or out of a system and it may change forms, but the total energy cannot change. People utilize a variety of resources to meet the basic and specific needs of life. Some of these resources cannot be replaced. Other resources can be replenished or exist in such vast quantities they are in no danger of becoming depleted. Often the energy stored in	Classify circuit diagrams as complete or incomplete and justify the classification. Describe basic series and parallel circuits and their components. Create drawings of series and parallel circuits including those with multiple devices. Construct series and parallel circuits that contain two or three devices. Use evidence to prove that the devices are part of the working circuit. Compare and contrast parallel and series circuits in terms of energy. Troubleshoot an incomplete circuit. Compare the power usage in an incandesce and fluorescent light bulb. Discuss which device requires less energy and which wou be the better buy. Describe electric charges and the forces tha charges exert on each other. Describe the difference between electricall neutral and electrically charged objects and describe how forces act on objects to move charges from one object to the other. Use a model to explain the importance of electric charge, batteries and electrical energy in circuits. Explain the difference between an electrica conductor and an insulator.

	of different forms of energy, and to more efficient use of all forms of energy. These technological advances have led to increased demand for energy and have had both beneficial and detrimental effects on society.	resources must be transformed into more useful forms and transported over great distances before it can be helpful to us.	Predict and describe the performance of light bulbs and motors in series and paralle circuits. List, as basic forms of energy, light hear sound, electrical and energy of motion. Explain that electrical energy is a form of energy that is transferred through circuits t devices that are designed to make use of th form of energy. Describe the role of electrical charge in circuits by using a model of electrical circuits. Relate that electric energy carried by charg in a circuit is transferred to devices in the circuit and is usually changed into differen kinds of energy by these devices. Trace the flow of energy from electrical energy to other forms of energy such as light. Expres whether energy was transferred, transform or both. Construct both series and parallel circuits t investigate and describe how multiple devices in series or parallel perform. Describe how the way the devices are connected affects the functioning of the device, and relate this to how much electri energy is received. Moving electric charges produce magnetic fields. Show how electrical energy carried by currents in wires can be used to create magnetic fields.
nit 4: Simple	**Standard 1: The Nature and Application of Science and**	Unit Concepts:	**Essential Questions:**

achines **weeks** **ormative** **ssessments:** vestigation flections udent science urnal entries lf assessments and flections **mmative** **ssessments:** rformance tasks ubrics nit Assessment	**Technology** ***Understandings and Abilities of Scientific Inquiry*** A. Understand that: Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations. The current body of scientific knowledge guides the investigation. B. Understand that: A valid investigation controls variables. Different experimental designs and strategies can be developed to answer the same question. C. Understand that: In a scientific investigation, data collection involves making precise measurements and keeping accurate records so that others can replicate the experiment. D. Understand that: There is much experimental and observational evidence that supports a large body of knowledge. The scientific community supports known information until new experimental evidence arises that does not match existing explanations. This leads to the evolution of the scientific body of knowledge. E. Understand that: Evaluating the explanations proposed by others involves examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Conflicting data or conflicting interpretations of the same data suggest the need for further investigation. Continued investigation can lead to greater understanding and resolution of the conflict. F. Understand that: Scientific habits of mind and other sources of knowledge and skills are essential to scientific inquiry. Habits of mind include tolerance of ambiguity, skepticism, openness to new ideas, and objectivity. Other knowledge and skills include mathematics, reading, writing, and technology. ***Science, Technology, and Society*** A. Advances in technology can expand the body of scientific knowledge. Technological tools allow people to observe objects and phenomena that otherwise would not be possible. Technology enhances the quality, accuracy, speed and analysis of data gathered. B. Science and technology in society are driven by the following factors: economical, political, cultural, social, and environmental. Increased scientific knowledge and technology create changes that can be beneficial or detrimental to individuals or society through impact on human health and the environment. ***History and Context of Science***	Simple machines are used to transfer energy in order to complete a task. Simple machines may change the direction of an applied force (directional advantage) or the size of the force that is applied (mechanical advantage) but that the amount of energy transferred by the simple machine is equal to the amount of energy transferred to the simple machine. The effort force and the effort distance from an inverse relationship (sometimes described in terms of "trade-off"). This relationship stems from the fact that it takes a specific amount of energy to complete a given task. Big Ideas: Changes take place because of the transfer of energy. Energy is transferred to matter through the action of forces. Different forces are responsible for the transfer of the different forms of energy.	What makes a question scientific? What constitutes evidence? When do you know you have enough evidence? Why is it necessary to justify and communicate an explanation? How can energy be transferred from one materi to another? What happens to a material when energy is transferred to it? **Student Learning Targets:** Determine where to place the effort force and fulcrum in order to lift an object with the least amount of effort force. Read a spring scale to measure the amount of effort force Recognize and describe how levers used in dail life. Describe the relationship between the effo force and the effort distance. Collect data in a single and a double pulley system. Make observations of pulley systems and draw conclusions using data Use multiplication skills to complete a data tab Draw conclusions about data from previous inquires to use with present investigations. Identity the effort force and effort distance in a inclined plane system. Make observations about inclined plan systems collect data in an inclined plane system and dra conclusions

	A. Over the course of human history, contributions to science have been made by different people from different cultures. Studying some of these contributions and how they came about provides insight into the expansion of scientific knowledge. **Standard 3: Energy and Its Effects** ***Forces and the Transfer of Energy*** A. When the forces acting on an object are balanced, its motion will not change. Unbalanced forces will cause the object's motion to change. Changes in motion depend upon the size and direction of the total unbalanced force exerted on the object. B. Gravity is a force that acts between masses over very large distances. Near the Earth's surface, gravity pulls objects and substances vertically downward. C. Forces can be used to transfer energy from one object to another. Simple machines are used to transfer energy in order to simplify difficult tasks.		Apply knowledge of inclined plan systems to practice applications. Identify how the screw is an example of an inclined plane. Conduct investigations using simple machines t demonstrate how forces transfer energy. Explain that simple machines may change the direction of an applied force or the size of the force that is applied but that the amount of ener transferred by the simple machine is equal to th amount of energy transferred to the simple machine. Conduct investigations using simple machines t demonstrate how forces transfer energy. Design a device that relies on the directional and/or mechanical advantage of a simple machi to perform a task. Identify the forces and motions involved, the source of the energy used to complete the task and how the energy is used by the simple machine.
nit 5: Earth istory weeks **ormative ssessments:** eacher observations udent lab sheets uick writes bservation of udent notes udent self sessment and flections	**Standard 1: The Nature and Application of Science and Technology** ***Understandings and Abilities of Scientific Inquiry*** A. Understand that: Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations. The current body of scientific knowledge guides the investigation. B. Understand that: A valid investigation controls variables. Different experimental designs and strategies can be developed to answer the same question. C. Understand that: In a scientific investigation, data collection involves making precise measurements and keeping accurate records so that others can replicate the experiment. D. Understand that: There is much experimental and observational evidence that	**Unit Concepts:** Observations of present processes (weathering, erosion and deposition) and evidence of these processes (ex. Grain size and shape, landforms, layering). Using present observations and evidence to make inferences. Change over time of Earth's crust. Processes that shape the Earth. The Earth as interacting systems. Cycling of rock material.	**Essential Questions:** How are observations and inferences essential i understanding Earth's history today and in the past? How can observations of sedimentary rocks lea to inferences about the environment in which th sediments were deposited? How do these observations lead to inferences o how present processes of weathering and erosic will affect the sedimentary rocks? How is Earth's timeline similar and different th your own personal timeline?

ımmative **ssessments** ɾrformance Task ıbrics ıit Assessment	supports a large body of knowledge. The scientific community supports known information until new experimental evidence arises that does not match existing explanations. This leads to the evolution of the scientific body of knowledge. E. Understand that: Evaluating the explanations proposed by others involves examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Conflicting data or conflicting interpretations of the same data suggest the need for further investigation. Continued investigation can lead to greater understanding and resolution of the conflict. F. Understand that: Scientific habits of mind and other sources of knowledge and skills are essential to scientific inquiry. Habits of mind include tolerance of ambiguity, skepticism, openness to new ideas, and objectivity. Other knowledge and skills include mathematics, reading, writing, and technology. ***Science, Technology, and Society*** A. Advances in technology can expand the body of scientific knowledge. Technological tools allow people to observe objects and phenomena that otherwise would not be possible. Technology enhances the quality, accuracy, speed and analysis of data gathered. B. Science and technology in society are driven by the following factors: economical, political, cultural, social, and environmental. Increased scientific knowledge and technology create changes that can be beneficial or detrimental to individuals or society through impact on human health and the environment. ***History and Context of Science*** A. Over the course of human history, contributions to science have been made by different people from different cultures. Studying some of these contributions and how they came about provides insight into the expansion of scientific knowledge. **Standard 5: Earth's Dynamic Systems** ***Components of Earth*** C. The formation of sediment and soil requires a long period of time as rocks are weathered, eroded and deposited. ***Interactions Throughout Earth's Systems*** D. Constructive processes that build up the land and the destructive processes of weathering and erosion shape and reshape the land surface. The height of Earth landforms is a result of the difference between the rate of uplift and the rate of erosion at a particular location.	Using a model to understand events of the past. Using patterns to infer changes over geologic time. Big Ideas: Scientific inquiry involves asking scientifically oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. The development of technology and advancement in science influence and drive each other forward. Understanding past processes and contributions is essential in building scientific knowledge. Earth's systems can be broken down into individual components which have observable measureable properties. Earth's components form systems. These systems continually interact at different rates of time, affecting the Earth locally and globally.	Can index fossils provide a complete picture of Earth's history? Are the continents in fixed positions? How do you know? Student Learning Targets: Making Observations Generating evidence Communicating results Conducting a critical review Comparing observations Conducting tests for calcium carbonate Identify sandstone, shale and limestone Correlate rock layers horizontally across locatic Explain how physical and chemical weathering act on rocks to form sediments that form sandstone shale and limestone. Model the formation of sandstone, shale and limestone. Create a geologic timeline of Earth's history Use index fossils to correlate rock layers. Identify evidence that supports the theory that t continents were once together and have moved their present positions. Describe the rock cycle. Describe how the surface of the Earth is constantly changing through the processes of weathering, erosions and deposition. Cite three lines of evidence such as the fit of

	K. Past geological events and environments can be reconstructed by interpreting fossilized remains and successive layering of sedimentary rocks. L. The fit of continental coastlines, the similarity of rock types and fossilized remains provide evidence that today's continents were once a single land mass. The continents moved to their current positions on plates driven by energy from Earth's interior.		coastlines, the similarity of rock type and contiguousness of bedding areas and similarity fossilized remains that indicate that the contine were once a large land mass.

Attachment 4: Science Scope and Sequence, 7th Grade

Curriculum Scope & Sequence

School: Pike Creek Charter Middle School Grade or Course 7th Grade Science Teacher _____

Unit Order By unit title and/or time frame	**Learning Targets** Content Standards, Grade Level Expectations, Proficiency Level Expectations, or Grade Cluster Benchmarks	**Theme/Big Idea/Concept**	**Enduring Understandings and/or Essential Questions**
Unit 1: Properties of Matter **6 weeks** **Formative Assessment:** Observations Student Science Journal Entries Pre-tests Graphic Organizers Participation in lab work Note Taking **Summative Assessments:** Tests/Quizzes Written Reports Lab Reports Presentations	**Standard 1: The Nature and Application of Science and Technology** ***Understandings and Abilities of Scientific Inquiry*** A. Understand that: Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations. The current body of scientific knowledge guides the investigation. B. Understand that: A valid investigation controls variables. Different experimental designs and strategies can be developed to answer the same question. C. Understand that: In a scientific investigation, data collection involves making precise measurements and keeping accurate records so that others can replicate the experiment. D. Understand that: There is much experimental and observational evidence that supports a large body of knowledge. The scientific community supports known information until new experimental evidence arises that does not match existing explanations. This leads to the evolution of the scientific body of knowledge. E. Understand that: Evaluating the explanations proposed by others involves examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Conflicting data or conflicting interpretations of the same data suggest the need for further investigation. Continued investigation can lead to greater understanding and resolution of the conflict. F. Understand that: Scientific habits of mind and other sources of knowledge and skills are essential to scientific inquiry. Habits of mind include tolerance of ambiguity, skepticism, openness to new ideas, and objectivity. Other	**Unit Concepts:** The three phases of matter (solid, liquid, gas) are determined by the arrangement, motion and interaction of molecules. The particle model is useful in showing how matter behaves under a variety of conditions. An increase or decrease in energy alters the behavior of the particles and thus the material. The law of conservation of matter applies to physical changes. Changes in temperature, pressure, or volume of a gas result in predictable changes in the other properties. Some physical properties such as mass and volume depend upon the amount of material; others such as density and melting point are characteristic properties and are independent of the quantity and are unique to the material. Mixtures have component parts and consist of a variety of	**Essential Questions:** How do the properties of materials determine their use? How can the properties of the components of a mixture be used to separate the mixture? How do the components determine the properties of mixtures? How does conservation of mass app to the interaction of materials in a closed system? How do you know which material i best for a particular product or need What determines if new materials need to be developed? Why should people consider the ris and benefits before the production o new materials and/or the implementation of a new process? **Student Learning Targets:** Design and conduct investigations with controlled variables to test hypotheses.

	knowledge and skills include mathematics, reading, writing, and technology. ***Science, Technology, and Society*** A. Advances in technology can expand the body of scientific knowledge. Technological tools allow people to observe objects and phenomena that otherwise would not be possible. Technology enhances the quality, accuracy, speed and analysis of data gathered. B. Science and technology in society are driven by the following factors: economical, political, cultural, social, and environmental. Increased scientific knowledge and technology create changes that can be beneficial or detrimental to individuals or society through impact on human health and the environment. ***History and Context of Science*** A. Over the course of human history, contributions to science have been made by different people from different cultures. Studying some of these contributions and how they came about provides insight into the expansion of scientific knowledge. **Standard 2: Materials and their Properties** ***Properties and Structure of Materials*** A. All matter consists of particles too small to be seen with the naked eye. The arrangement, motion, and interaction of these particles determine the three states of matter (solid, liquid, and gas). Particles in all three states are in constant motion. In the solid state, tightly packed particles have a limited range of motion. In the liquid state, particles are loosely packed and move past each other. In the gaseous state, particles are free to move. B. A phase change may occur when a material absorbs or releases heat energy. Changes in phase do not change the particles but do change how they are arranged. C. Some physical properties, such as mass and volume, depend upon the amount of material. Other physical properties, such as density and melting point, are independent of the quantity of material. Density and melting point are unique physical properties for a material. Tools such as microscopes, scales, beakers, graduated cylinders, Celsius thermometers, and metric rulers are used to measure physical properties.	components in a wide range of concentrations. These components can be separated and analyzed by using their physical properties (by filtering, paper chromatography, evaporations etc.) The properties of matter determine the reasonable use of materials. Solutions are homogeneous mixtures. The properties of a solution depend upon the nature and concentration of the solute(s) and the nature of the solvent(s). Water is termed the "universal solvent" and dissolves many substances. Some substances do not dissolve in water. The production of new material depends up an understanding of the physical properties of materials. **Big Ideas:** The structures of materials determine their properties. The properties of a mixture are based on the properties of its components. When materials interact within a closed system, the total mass of the system remains the same. People develop new materials as	Accurately collect data through the selection and use of tools and techniques appropriate to the investigation. Construct tables, diagrams and graphs showing relationships between two variables, to display a facilitate analysis of data. Compare and question results with and from other students. Form explanations based on accura and logical analysis of evidence. Communicate scientific procedures data and explanations to enable the replication of results. Analyze results and discuss nature and source of experimental error. Recognize that all matter consists o particles and how the particles are arranged determines the physical state. Use the particle model to describe solids, liquids, and gases i terms of the packing and motion of particles. Measure and record the temperature of ice water as it is heated. Plot the graph of measurements taken and interpret change of phase graph usi the particle model, identify where water is a solid, liquid or gas, is freezing/melting or evaporating/condensing. Relate the states of matter to the changes of

	E. Exposure to energy, such as light and heat, may change the physical properties of materials. ***Mixtures and Solutions*** A. Mixtures can be homogeneous or heterogeneous. Mixtures may be solids, liquids, and/or gases. Most materials are physical mixtures consisting of different components in varying concentrations. The individual components can be separated using the components' unique physical properties. B. Solutions are homogenous mixtures of two or more components. The properties of a solution depend on the nature and concentration of the solute(s) and the nature of the solvent(s). C. The rate of solubility is influenced by temperature and the surface area of the solute. D. Temperature of the solvent can affect the saturation point of the solution. E. In mixtures, individual components move from areas of higher concentration to areas of lower concentration to eliminate concentration differences. Diffusion is the movement of individual components. ***Conservation of Matter*** A. The total mass of the mixture is equal to the sum of the masses of the components. Total mass is conserved when different substances are mixed. ***Material Technology*** A. Synthetic materials and/or modified natural materials are produced to make products used in everyday life. B. The production of new materials has social, environmental, and other implications that require analyses of the risks and benefits.	a response to the needs of society and the pursuit of knowledge. This development may have risks and benefits to humans and the environment.	energy in the system. Design an inquiry to test prediction about what happens to mass of wate when it freezes and discuss the results. Begin to distinguish between a "pure" substance and a mixture. Discuss that when a solution is mad the solute and solvent particles intermingle and that mass is conserved. Design and conduct an experiment approximately measure solubility o two different substances. Design and conduct an experiment determine how solubility is affected by changes in temperature. Describe solubility and saturation point using the particle model. Use terms such as dissolve, soluble, insoluble, solution, solvent and solu to describe the process of dissolving Determine whether a substance is soluble or insoluble. Discuss how solubility can be used help identity substances. Determine the relationship between particle size and temperature of the solvent to the rate of solubility.

			Use physical properties to distingui and separate one substance or material from another. Design and conduct an inquiry to obtain a clean sample of salt from crushed rock salt. Observe the effect of concentration on properties of solution Apply chromatography to perform a comparative analysis of solutions. Calculate the density of various soli materials Use density to predict whether an object will sink or float water. Given the density of various solids and liquids, create a density column and explain the arrangemen in terms of density. Select a manufactured item and identity its component materials. Explain how the physical properties of the material contribute to the function of the item.
Unit 2:Diversity of Life **6 weeks** **Formative Assessment:** Observations Student Science Journal Entries Pre-tests Graphic	**Standard 1: The Nature and Application of Science and Technology** ***Understandings and Abilities of Scientific Inquiry*** A. Understand that: Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations. The current body of scientific knowledge guides the investigation. B. Understand that: A valid investigation controls variables. Different experimental designs and strategies can be developed to answer the same question. C. Understand that: In a scientific investigation, data collection involves	**Unit Concepts:** Living systems at all levels or organization demonstrate the complementary nature of structure and function. Important levels include cells, tissues, organs, organ systems, and whole organisms. All organisms are composed of cells- the fundamental unit of	**Essential Questions:** How does structure relate to functio in living systems from the cellular t the organismic level? How is matter transferred and energ transferred/transformed in living systems? How does natural selection encoura inter and intra-specific diversity ov

Organizers Participation in lab work Note Taking **Summative Assessments:** Tests/Quizzes Written Reports Lab Reports Presentations	making precise measurements and keeping accurate records so that others can replicate the experiment. D. Understand that: There is much experimental and observational evidence that supports a large body of knowledge. The scientific community supports known information until new experimental evidence arises that does not match existing explanations. This leads to the evolution of the scientific body of knowledge. E. Understand that: Evaluating the explanations proposed by others involves examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Conflicting data or conflicting interpretations of the same data suggest the need for further investigation. Continued investigation can lead to greater understanding and resolution of the conflict. F. Understand that: Scientific habits of mind and other sources of knowledge and skills are essential to scientific inquiry. Habits of mind include tolerance of ambiguity, skepticism, openness to new ideas, and objectivity. Other knowledge and skills include mathematics, reading, writing, and technology. ***Science, Technology, and Society*** A. Advances in technology can expand the body of scientific knowledge. Technological tools allow people to observe objects and phenomena that otherwise would not be possible. Technology enhances the quality, accuracy, speed and analysis of data gathered. B. Science and technology in society are driven by the following factors: economical, political, cultural, social, and environmental. Increased scientific knowledge and technology create changes that can be beneficial or detrimental to individuals or society through impact on human health and the environment. ***History and Context of Science*** A. Over the course of human history, contributions to science have been made by different people from different cultures. Studying some of these contributions and how they came about provides insight into the expansion of scientific knowledge. Standard 6: Life Processes	life. Most organisms are single cells; other organisms are multicellular. Cells carry on the many functions needed to sustain life. Specialized cells perform specialized functions in multicellular organisms. All organisms must be able to obtain and use resources, grow, reproduce, and maintain stale internal conditions while living in a constantly changing environment. Behavior is one of a kind response an organism can make to an internal or environmental stimulus. Millions of species of animals, plants and microorganisms are live today. **Big Ideas:** Living systems, from the organismic to the cellular level, demonstrate the complementary nature of structure and function. All organisms transfer matter and convert energy from one form to another. Both matter and energy are necessary to build and maintain structures within the organism. The diversity and changing of life forms over many generations	time? **Student Learning Targets:** Sort materials into living and non-living groups Investigate materials for evidence o life. Demonstrate proper use of the microscope when studying layers ir sample and structure of a living organism. Draw scale representations of imag viewed in a microscope estimating size accurately. Observe structures and behaviors o single-celled microorganisms with microscope. Compare paramecium to Elodea cel Prepare a wet mount slide to observ cheek scrapings. Dissect seeds to discover their structures. Compare and contrast the early development of monocots and dicot Investigate the effect of light germinated seeds. Dissect and mount structures of a simple flower and examine a variet of seed dispersal mechanisms.

	Structure/Function Relationship A. Living organisms share common characteristics that distinguish them from non-living, dead, and dormant things. They grow, consume nutrients, exchange gases, respond to stimuli, reproduce, need water, eliminate waste, and are composed of cell(s). B. Living systems in all kingdoms demonstrate the complementary nature of structure and function. Important levels of organization for structure and function include cells, tissues, organs, organ systems, and organisms. C. Most organisms are single celled while others are multi-cellular. Multi-cellular organisms consist of individual cells that cannot survive independently, while single-celled organisms are composed of one cell that can survive independently. D. The cell is the fundamental unit of life. Cells have basic needs for survival. They use energy, consume materials, require water, eliminate waste, and reproduce. E. Most cells contain a set of observable structures called organelles which allow them to carry out life processes. Major organelles include vacuoles, cell membrane, nucleus, and mitochondria. Plant cells have a cell wall and chloroplasts. ***Matter and Energy Transformations*** A. All organisms require energy. A general distinction among organisms is that plants use solar energy to make their own food (sugar) and animals acquire energy directly or indirectly from plants. B. Plants use the energy from sunlight, carbon dioxide, and water to produce sugars (photosynthesis). Plants can use the food (sugar) immediately or store it for later use. C. Most living things use sugar (from food) and oxygen to release the energy needed to carry out life processes (cellular respiration). Other materials from food are used for building and repairing cell parts. **Standard 7: Diversity and Continuity of Living Things** ***Diversity and Evolution***	is the result of natural selection, in which organisms with advantageous traits survive, reproduce, and pass those traits to offspring.	Inoculate sterile nutrient agar with bacteria; inoculate break with fungu and observe bacterial and fungal growth. Calculate the reproductive potential of bacteria.

	E. There is a wide diversity of organisms on Earth. These organisms may be classified in a number of ways. One classification system places organisms into five kingdoms (monera, protista, fungi, plantae, animalia) based on similarities in structure. F. The great variety of body forms and structures found in different species enable organisms to survive in diverse environments.		
Unit 3: Genetics **6 weeks** **Formative Assessment:** Observations Student Science Journal Entries Pre-tests Graphic Organizers Participation in lab work Note Taking **Summative Assessments:** Tests/Quizzes Written Reports Lab Reports Presentations	**Standard 1: The Nature and Application of Science and Technology** ***Understandings and Abilities of Scientific Inquiry*** A. Understand that: Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations. The current body of scientific knowledge guides the investigation. B. Understand that: A valid investigation controls variables. Different experimental designs and strategies can be developed to answer the same question. C. Understand that: In a scientific investigation, data collection involves making precise measurements and keeping accurate records so that others can replicate the experiment. D. Understand that: There is much experimental and observational evidence that supports a large body of knowledge. The scientific community supports known information until new experimental evidence arises that does not match existing explanations. This leads to the evolution of the scientific body of knowledge. E. Understand that: Evaluating the explanations proposed by others involves examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Conflicting data or conflicting interpretations of the same data suggest the need for further investigation. Continued investigation can lead to greater understanding and resolution of the conflict. F. Understand that: Scientific habits of mind and other sources of knowledge and skills are essential to scientific inquiry. Habits of mind include tolerance of ambiguity, skepticism, openness to new ideas, and objectivity. Other	**Unit Concepts:** Each individual is unique and the individuality results from the aggregation of many characteristics of development. The environment plays a part in individuality. Similarities and differences within and between families are observable evidence of the transmission of characteristics from generation to generation. Chromosomes and genes come in pairs and chromosomes are composed of many genes. Genes determine the traits of individuals and are pass by either sexual or asexual reproduction to offspring. Sexually produced offspring are never identical to their parents. There are different modes of inheritance and awareness of these yields some predictability regarding inheritance.	**Essential Questions:** What are the advantages and disadvantages of different reproductive strategies? How do organisms change as they g through their life cycles? How does the understanding and manipulation of genetics, reproduction, development and evolution affect the quality of huma life? **Student Learning Targets:** Describe the relationship between genes, chromosomes, DNA and trai Compare and contrast sexual and asexual reproduction. Use models/diagrams/organisms to identify the structures of a flowerin plant and explain the sexual reproduction of the plant. Distinguish between dominant and recessive traits. Use models to show how genetic material is transmitted from cell to

	knowledge and skills include mathematics, reading, writing, and technology. ***Science, Technology, and Society*** A. Advances in technology can expand the body of scientific knowledge. Technological tools allow people to observe objects and phenomena that otherwise would not be possible. Technology enhances the quality, accuracy, speed and analysis of data gathered. B. Science and technology in society are driven by the following factors: economical, political, cultural, social, and environmental. Increased scientific knowledge and technology create changes that can be beneficial or detrimental to individuals or society through impact on human health and the environment. ***History and Context of Science*** A. Over the course of human history, contributions to science have been made by different people from different cultures. Studying some of these contributions and how they came about provides insight into the expansion of scientific knowledge. **Standard 7: Diversity and Continuity of Living Things** ***Reproduction, Heredity and Development*** A. Reproduction is a characteristic of all living systems and is essential to the continuation of every species. B. Some organisms reproduce asexually involving one parent. Asexual reproduction results in offspring that are genetically identical to the parent organism (clones). This process is advantageous in maintaining the genetic make-up of organisms that are successful in a specific environment. C. Some organisms reproduce sexually involving two parents. Sexual reproduction results in offspring that have greater genetic diversity than those resulting from asexual reproduction. One-half of the offspring's genetic information comes from the "male" parent and one-half comes from the "female" parent. These genetic differences help to ensure the survival of offspring in varied environments. D. In sexual reproduction after the egg is fertilized, each of the new cells in the developing organism receives an exact copy of the genetic information contained in the nucleus of a fertilized egg.	Variation is greater between species than within species. There is an orderly progression in human growth and development. Development is influenced by genetics, environment, and experience. Selective breeding has been used for beneficially for millennia but also raises ethical issues. **Big Ideas:** Organisms reproduce, develop, have predictable life cycles, and pass on heritable traits to their offspring. The development of technology has allowed us to apply our knowledge of genetics, reproduction, development and evolution to meet human needs and wants.	cell and from parent to offspring. Construct Punnett square and pedigree charts to demonstrate how single gene traits are transmitted. Show how incidence of traits can b predicted using Punnett's squares a pedigree charts.

	E. Organisms have different reproductive strategies to ensure their offspring's survival. Some organisms produce many offspring and provide little parental care. Other organisms produce few offspring and invest much time and energy in care of their offspring. F. Chromosomes are found in the nucleus of the cell and contain genes that are made of DNA. Inherited traits of individuals are controlled by genes. G. Chromosomes can be arranged in pairs (one-half of each pair from each parent). These pairs are approximately the same size and shape, and have similar sequences of genes. Humans have 23 pairs (46) of chromosomes. Other organisms may have different numbers of chromosomes. H. In humans, gender is determined by a pair of sex chromosomes. Females possess two X chromosomes; males an X and a Y chromosome. The sex of an embryo is determined by the sex chromosome found in the sperm cell. I. Alternative versions of genes (different alleles) account for variations in inherited characteristics (i.e., flower color). Pairs of chromosomes that have the same allele present on both chromosomes are homozygous. Pairs of chromosomes with different alleles are heterozygous. J. A dominant trait will be expressed if the organism is heterozygous or homozygous for the trait. A recessive trait will only be expressed if the organism is homozygous for the trait. K. Mendelian genetics can be used to predict genotypes and phenotypes of offspring resulting from sexual reproduction. ***Technology Applications*** A. Selective breeding is used to cultivate plants and domesticated animals with desirable traits. B. Knowledge gained from research in genetics is being applied to areas of human health. Geneticists and genetic counselors may use pedigrees and Punnett squares to help predict the possibility of genetic disorders in future generations.		
Unit 4:	**Standard 2: Materials and Their Properties**	**Unit Concepts:**	**Essential Questions:**

Attachment 4: Science Scope and Sequence, 7th Grade

Delaware Watersheds **8 weeks** **Formative Assessment:** Observations Student Science Journal Entries Pre-tests Graphic Organizers Participation in lab work Note Taking **Summative Assessments:** Tests/Quizzes Written Reports Lab Reports Presentations	***Properties and Structures of Materials*** A: All matter consists of particles too small to be seen with the naked eye. The arrangement, motion, and interaction of these particles determine the three states of matter (solid, liquid, and gas). Particles in all three states are in constant motion. In the solid state, tightly packed particles have a limited range of motion. In the liquid state, particles are loosely packed and move past each other. In the gaseous state, particles are free to move. ***Mixtures and Solutions*** A: Mixtures can be homogeneous or heterogeneous. Mixtures may be solids, liquids, and/or gases. Most materials are physical mixtures consisting of different components in varying concentrations. The individual components can be separated using the components' unique physical properties. B: Solutions are homogenous mixtures of two or more components. The properties of a solution depend on the nature and concentration of the solute(s) and the nature of the solvent(s). **Standard 5: Earth's Dynamic Systems** ***Components of the Earth*** A: Water exists on the Earth in reservoirs (on orwithin the Earth's surface and atmosphere). The total amount of water in these reservoirs does not change, however, the ratio of water in solid, liquid, or gaseous form varies over time and location. B: The movement of water among the geosphere, hydrosphere and atmosphere affects such things as weather systems, ocean currents, and global climate. ***Interactions Throughout Earth's Systems*** A: Water cycles from one reservoir to another through the processes of evaporation, transpiration, condensation and precipitation. Energy transfers and/or transformations are associated with each of these processes. B: Water within a watershed travels over and through the land at various speeds based on the rate of change in elevation and the permeability and porosity of the soil. Water carries with it products of human activity. C: Surface water always flows downhill. Areas of higher elevation separate watersheds. In Delaware, this water eventually reaches the Delaware River, the Delaware Bay, the Atlantic Ocean or the Chesapeake Bay. ***Technology and Applications*** B: Water from some natural sources is unfit to drink and requires the use of specialized technology to analyze and purify it.	Observation and Evidence (to identify variables that affect a given watershed) Reasoning and Explanation (of observations to support predictions about watershed health) Investigation (variables that affect watersheds) Process Skills (in selecting tools and processes that can be used to collect water quality data) Properties of Materials (particle model, solutions, mixtures) Comparison of data and observations to support predictions on a large scale (not just individual results) Data Organization to visually represent/present results (data tables, graphing, project reports) **Big Ideas:** Students will understand that… Potable water is a limited Resource Humans use and abuse water resources regularly.	How do humans use water? Where is water found on the Earth? What is the role of water in the Eart System? How is a safe and useable water supply ensured for human populations? **Student Learning Targets:** Frame and refine questions that can be investigated scientifically, and generate testable hypotheses. Design and conduct investigations with controlled variables to test hypotheses. Accurately collect data through the selection and use of tools and techniques appropriate to the investigation Construct tables, diagrams and graphs, showing relationships between two variables, to display a facilitate analysis of data. Compare and question results with and from other students. Form explanations based on accura and logical analysis of evidence. Revise the explanation using alternative descriptions, predictions models and knowledge from other sources as well as results of further

	Standard 6: Life Processes ***Matter and Energy Transformation*** B: Plants use the energy from sunlight, carbon dioxide, and water to produce sugars (photosynthesis). Plants can use the food (sugar) immediately or store it for later use. **Standard 8: Ecology** ***Human Impact*** A: Humans can alter the biotic and abiotic factors within an ecosystem thereby creating changes to the overall system. C: Individuals and policymakers make decisions regarding the use of resources based on estimated personal and societal benefits and risks. Impacts on environmental systems result from these decisions.	Water conservation practices can help ensure a source of potable water for the future. Water is recycled through Earth's system as energy from the sun drives phase changes that allow water to travel from one reservoir to another. The porosity of an Earth material can affect water flow through that material…larger pore spaces allow faster water flow. Water always flows downhill and picks up and/or dissolves materials as it goes. The boundaries of a watershed can be identified by finding the highest points around a given body of water Land use affects water quality because water the flows over the land and into a given body of water will pick up and/or dissolve materials left behind by human activity Water chemistry can be tested to evaluate the overall health of a given watershed Riparian buffers and wetlands are useful lines of defense around bodies of water.	investigation. Communicate scientific procedures data, and explanations to enable the replication of results. Use computer technology to assist i communicating these results. Critic review is important in the analysis these results. Use mathematics, reading, writing, and technology when conducting scientific inquiries. Create models that simulate the amount of salt, frozen, fresh, and potable water available on Earth's surface. Compare total water supply on Eart to the amount of potable water available for human use. Calculate the ratio/percent of water generally found in solid, liquid and gaseous form on or within the Earth surface and use this ratio to compar the amounts of water stored in different states Use diagrams of the hydrologic cyc to show and describe the circulatior of water through the Earth's crust, oceans, and atmosphere. Use the particle model to describe solids, liquids, and gases in terms o the packing, motion of particles, an energy gain or loss.

			Apply this to the processes of evaporation, condensation, and precipitation in the water cycle. Explain how heat energy drives the water cycle. Use models or diagrams to explain how water stored underground (groundwater and aquifers) and wat stored above ground (lakes, rivers, air, etc.) interact to form a continuo cycle. Investigate, through the use of models, how water acts as a solvent and as it passes through the water cycle it dissolves minerals, gases, a pollutants and carries them to surfa water and ground water supplies. Conduct investigations and use the data to describe the extent to which the permeability and porosity of a s sample affect the rate of water percolation. Describe the role of wetlands and streamside forests (riparian) in filtering water as it runs off into loc streams, rivers, and bays or seeps ir ground water. Use topographic maps to locate Delaware watersheds and to identif the bodies of water into which they drain. Analyze and describe the relationsh

			between elevation of land and the flow rate of water in a watershed. Conduct tests including temperature pH, salinity, dissolved oxygen, turbidity, nitrate, and phosphate to determine the potability of local water samples. Identify macro-invertebrates in a local stream and apply this identification in determining the stream's ecological health. Explain the impact of human activities (e.g., building roads, fertilizing golf courses, etc.) on the quality of Delaware's waters. Research and report on the processe used by municipalities to ensure water taken from local reservoirs is safe to return to the environment. Investigate and report on legislatior such as the Clean Water Act and its impact on the quality of Delaware water List ways in which human intervention can help maintain an adequate supply of fresh water for human consumption. Apply knowledge and skills learned about water as a resource to study local sources of drinking water and devise a water quality stewardship plan.

Curriculum Scope & Sequence

School: Pike Creek Charter Middle School Grade or Course _8th Grade__ Teacher _____

nit Order unit title and/or ne frame	Learning Targets Content Standards, Grade Level Expectations, Proficiency Level Expectations, or Grade Cluster Benchmarks	Theme/Big Idea/Concept	Enduring Understandings and/or Essential Questior
nit 1: cosystems weeks ormal sessments; acher bservation aphic ganizers udent Journal ıtries e-tests rticipating it Tickets ımmative ssessments: sts and Quizzes ojects esentations ubrics	**Standard 1: The Nature and Application of Science and Technology** ***Understandings and Abilities of Scientific Inquiry*** A. Understand that: Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations. The current body of scientific knowledge guides the investigation. B. Understand that: A valid investigation controls variables. Different experimental designs and strategies can be developed to answer the same question. C. Understand that: In a scientific investigation, data collection involves making precise measurements and keeping accurate records so that others can replicate the experiment. D. Understand that: There is much experimental and observational evidence that supports a large body of knowledge. The scientific community supports known information until new experimental evidence arises that does not match existing explanations. This leads to the evolution of the scientific body of knowledge. E. Understand that: Evaluating the explanations proposed by others involves examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Conflicting data or conflicting interpretations of the same data suggest the need for further investigation. Continued investigation can lead to greater understanding and resolution of the conflict. F. Understand that: Scientific habits of mind and other sources of knowledge and skills are essential to scientific inquiry. Habits of mind include tolerance of ambiguity, skepticism, openness to new ideas, and objectivity. Other knowledge and skills include mathematics, reading, writing, and technology. ***Science, Technology, and Society*** A. Advances in technology can expand the body of scientific knowledge. Technological tools allow people to observe objects and phenomena that otherwise would not be possible. Technology enhances the quality, accuracy, speed and analysis of data gathered. B. Science and technology in society are driven by the following factors: economical, political, cultural, social, and environmental. Increased scientific knowledge and technology	Unit Concepts: The scientific process is different than other forms of investigation and has specific characteristics that relate causes to effects and develop relationships based on evidence. Critical analysis skills learned in the classroom can be applied to judge the validity of claims made in everyday life. An ecosystem consists of all the organisms that live together and interact with each other and their physical environment. Populations consist of all individuals of a species that occur together in a given place and time. These populations can be scientifically estimated. Interactions in an ecosystem results from the transfer of matter and energy from producers to consumers and eventually to decomposers. The total amount of matter and energy in the system remains the same even though its form and location changes. Changes in the physical or biological conditions of an ecosystem can alter the diversity of species in the system. As the ecosystem changes, the populations of organisms must adapt to these changes, move to another ecosystem, or become extinct.	Enduring Understandings Essential Questions: What makes a question scientific What constitutes evidence? When do you know you have enough evidence? Why is it necessary to justify and communicate an explanation? How can change in one part of an ecosystem affect change in other parts of the ecosystem? How does natural selection encourage inter and intra-specific diversity over time? How do matter and energy link organisms to each other and their environments? Why is sunlight essential to life on Earth? How do humans have an impact the diversity and stability of ecosystems? Student Learning Targets Identification of reasonable, relevant, and testable questior

	create changes that can be beneficial or detrimental to individuals or society through impact on human health and the environment. ***History and Context of Science*** A. Over the course of human history, contributions to science have been made by different people from different cultures. Studying some of these contributions and how they came about provides insight into the expansion of scientific knowledge. Standard 8: Ecology ***Interactions within the Environment*** A. All populations living together (biotic factors) and the physical factors with which they interact (abiotic factors) compose an ecosystem. B. Ecosystems do not have precise boundaries. All ecosystems ultimately exchange materials with one another and all influence one another. C. The Delaware Estuary is a semi-enclosed tidal body of water with a free connection to the ocean. This richly productive system, including the associated marshes, provides a variety of habitats for diverse species. This system is biologically and economically important. D. A population consists of all individuals of a species that occur together at a given place and time. A species is a distinct biological grouping of organisms whose members interbreed in nature and produce fertile offspring. E. The size of populations may change as a result of the interrelationships among organisms. These may include predator/prey ratios, availability of resources, and habitat changes. F. In all environments organisms with similar needs may compete with one another for resources including food, water, air, space and shelter. This competition results in natural population fluctuations. G. Overpopulation can lead to depletion of resources and potential extinction of species. H. Organisms within an ecosystem may interact symbiotically through mutualism, parasitism, and commensalism. **Standard 7: Diversity and Continuity of Things** ***Diversity and Evolution*** B. Natural selection is the process by which some individuals with certain traits are more likely to survive and produce greater numbers of offspring than other organisms of the same species. Competition for resources and mates and conditions in the environment can affect which individuals survive, reproduce and pass their traits on to future generations.	The number of individuals in a population increases, or decreases as a result of interrelationships among organisms, availability of resources, natural disasters, habitat changes and pollution. The supply of natural resources such as water and petroleum are finite. Decisions about the use of natural resources can affect the stability of ecosystems. Big Ideas: Scientific inquiry involves asking scientifically-oriented questions, collecting evidence, forming explanations, connecting explanations to scientific knowledge and theory, and communicating and justifying the explanation. Organisms and their environments are interconnected. Changes in one part of the system will affect other parts of the system. The diversity and changing of life forms over many generations is the result of natural selection, in which organisms with advantageous traits survive, reproduce, and pass those traits to offspring. Matter needed to sustain life is continually recycled among and between organisms and the environment. Energy from the Sun flows irreversibly through ecosystems and is conserved as organisms use and transform it. Humans can alter the living and non-living factors within an ecosystem, thereby	that can be answered through scientific investigations. Form logical explanations abo the cause and effect relationsh in an investigation. Explain what make science different from other discipline Scientifically estimate populations that can not practically be individually counted. Describe factors that limit the number of organisms an ecosystem can support and graph the population fluctuations that result from environmental changes. Trace the flow of matter and energy through a food web. Describe how specific traits ca give selective advantage Show how genetic adaptions differ from short-term physiological adaptions. Show how an ecosystem can change over time both by natural forces and by man-made influences Explain economic and environmental trade-offs of resource management plans.

	C. Small genetic differences between parents and offspring accumulate over many generations, and ultimately new species may arise. D. Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival. Most of the species that have lived on Earth no longer exist. F. The great variety of body forms and structures found in different species enable organisms to survive in diverse environments. **Standard 8: Ecology** ***Energy Flow and Material Cycles in the Environment*** A. In most ecosystems, energy enters as sunlight and is transformed by producers into a biologically usable form of matter through photosynthesis. That matter and energy then passes from organism to organism through food webs. Some energy is released from the system as heat. B. Over time, matter is transferred repeatedly from one organism to another and between organisms and their physical environment. As in all material systems, the total amount of matter remains constant, even though its form and location change. C. All organisms, including humans, are part of and depend on food webs. Food webs recycle matter continuously as organisms are decomposed after death to return food materials to the environment where it re-enters a food web. ***Human Impact*** A. Humans can alter the biotic and abiotic factors within an ecosystem thereby creating changes to the overall system. B. The introduction of competing species, removal of natural habitat, alteration of native landscapes due to urban, industrial and agricultural activities, over-harvesting of species, alteration of waterways and removal of natural predators, etc., are actions that have a lasting impact on ecosystems. C. Individuals and policymakers make decisions regarding the use of resources based on estimated personal and societal benefits and risks. Impacts on environmental systems result from these decisions.	creating changes to the overall system.	
nit 2: ransformatio of Energy	**Standard 1: The Nature and Application of Science and Technology** ***Understandings and Abilities of Scientific Inquiry*** A. Understand that: Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations. The current body of scientific	Unit Concepts: A clear definition of energy does not exist; therefore, we "define" energy by looking at its effects.	Essential Questions: How do we know that things hav energy? What happens to the energy in a

weeks **ormative ssessments** eacher servations raphic rganizers urnal Entries WLs e-Tests bservations uickwrites ckets in/out of e door rticipation in o work otetaking **mmative ssessments** st and Quizzes ritten Reports b Reports ojects esentations odel of Key eas Rubrics	knowledge guides the investigation. B. Understand that: A valid investigation controls variables. Different experimental designs and strategies can be developed to answer the same question. C. Understand that: In a scientific investigation, data collection involves making precise measurements and keeping accurate records so that others can replicate the experiment. D. Understand that: There is much experimental and observational evidence that supports a large body of knowledge. The scientific community supports known information until new experimental evidence arises that does not match existing explanations. This leads to the evolution of the scientific body of knowledge. E. Understand that: Evaluating the explanations proposed by others involves examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Conflicting data or conflicting interpretations of the same data suggest the need for further investigation. Continued investigation can lead to greater understanding and resolution of the conflict. F. Understand that: Scientific habits of mind and other sources of knowledge and skills are essential to scientific inquiry. Habits of mind include tolerance of ambiguity, skepticism, openness to new ideas, and objectivity. Other knowledge and skills include mathematics, reading, writing, and technology. ***Science, Technology, and Society*** A. Advances in technology can expand the body of scientific knowledge. Technological tools allow people to observe objects and phenomena that otherwise would not be possible. Technology enhances the quality, accuracy, speed and analysis of data gathered. B. Science and technology in society are driven by the following factors: economical, political, cultural, social, and environmental. Increased scientific knowledge and technology create changes that can be beneficial or detrimental to individuals or society through impact on human health and the environment. ***History and Context of Science*** A. Over the course of human history, contributions to science have been made by different people from different cultures. Studying some of these contributions and how they came about provides insight into the expansion of scientific knowledge. Standard 3: Energy and Its Effects ***The Forms and Sources of Energy*** A. Energy from the Sun takes the form of electromagnetic waves such as infrared, visible, and ultraviolet electromagnetic waves. The radiation from the sun consists of a range of energies in the electromagnetic spectrum.	Energy can be categorized into many forms. These include kinetic, potential, heat, and electromagnetic energies. Energy can be transferred and/or transformed. In many cases the energy is transferred to particles that are too small for us to see. An energy chain can be used to diagram the flow of energy in a physical system. Temperature is a measure of the average kinetic energy of the particles in a substance. Heat energy is the total amount of random vibrational, kinetic energy of the particles in a substance. Heat energy and temperature are not synonyms. Heat energy can be transferred by conduction, by convention and/or by radiation. Energy can be carried by the action of waves. Mechanical waves carry mechanical energy while electromagnetic waves carry electromagnetic energy. Waves transfer energy without transferring mass. The amount of energy transferred by a wave depends upon its amplitude, frequency and wavelength. Different materials transfer energy at different rates. Big Ideas: Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy), and types of energy	system — where does this energy come from, how is it changed within the system, and where doe it ultimately go? How does the flow of energy affect the materials in the system How can energy be transferred from one material to another? What happens to a material when energy is transferred to it? What is a "responsible" use of energy? Are there alternative forms of energy that will serve our needs, better ways of using traditional forms of energy? Student Learning Targets Explain that kinetic energy is the energy an object has because of its motion and identify that kinetic energy depends upon the object's speed and mass. Design and carry out investigations to determine ho changing the mass of an objec or changing its speed changes its kinetic energy. Explain that gravitational potential energy (GPE) is the energy of position (above the Earth's surface) and that it depends on the object's mass

	B. Mechanical energy comes from the motion (kinetic energy) and position (potential energy) of objects. Gravitational potential energy and elastic potential energy are important forms of potential energy that contribute to the mechanical energy of objects. C. Sound energy is the energy that takes the form of mechanical waves passing through objects or substances. The energy delivered by a wave in a given unit of time is determined by the amplitude and frequency of the wave. D. Heat energy comes from the random motion of the particles in an object or substance. Temperature is a measure of the motion of the particles. ***Energy Interacting With Materials; the Transformation and Conservation of Energy*** A. Energy can be transformed from one form into another. Energy transformations often take place while energy is being transferred to another object or substance. Energy transformations and energy transfers can be used to explain how energy flows through a physical system (e.g., photosynthesis, weathering, electrical circuits). B. When a substance absorbs heat energy, or when a different form of energy is absorbed by the substance and is transformed into heat energy, the substance usually expands. The particles within the substance do not expand but the space between the particles increases. C. Materials may absorb some frequencies of light but not others. The selective absorption of different wavelengths of white light determines the color of most objects. ***Forces and the Transfer of Energy*** B. Gravity is a force that acts between masses over very large distances. Near the Earth's surface, gravity pulls objects and substances vertically downward. C. Forces can be used to transfer energy from one object to another. Simple machines are used to transfer energy in order to simplify difficult tasks. D. When energy from the sun is transferred to objects and substances, it can be transformed into a variety of energy forms. E. Light energy radiates from a source and travels in straight lines. Light is reflected, refracted, transmitted, and absorbed differently by different materials. To see an object, light energy emitted or reflected from the object must enter the eye. F. The addition or removal of heat energy from a material changes its temperature or its physical state. G. Heat energy is transported by conduction, convection, and radiation. Heat energy transfers from warmer substances to cooler substances until they reach the same temperature. ***The Production, Consumption and Application of Energy***	associated with the position of mass and with energy fields (potential energy). Energy readily transforms from one form to another, but these transformations are not always reversible. The details of these transformations depend upon the initial form of the energy and the properties of the materials involved. Energy may transfer into or out of a system and it may change forms, but the total energy cannot change. People utilize a variety of resources to meet the basic and specific needs of life. Some of these resources cannot be replaced. Other resources can be replenished or exist in such vast quantities they are in no danger of becoming depleted. Often the energy stored in resources must be transformed into more useful forms and transported over great distances before it can be helpful to us. Changes take place because of the transfer of energy. Energy is transferred to matter through the action of forces. Different forces are responsible for the transfer of the different forms of energy. People utilize a variety of resources to meet the basic and specific needs of life. Some of these resources cannot be replaced. Other resources can be replenished or exist in such vast quantities they are in no danger of becoming depleted. Often the energy stored in resources must be transformed into more useful forms and transported over great distances before it can be helpful to us.	and height above the ground. Relate that lifted objects have GPE and that the size of an object's GPE depends on its mass and the vertical distance was lifted. Explain that the mechanical energy of an object is the sum of its kinetic energy and its potential energy at any point i time. Accurately construct, interpre and analyze tables, diagrams and graphs, showing relationships between two variables relating to energy.

	A. Energy sources can be renewable or finite. Most energy used by industrial societies is derived from fossil fuel sources. Such sources are inherently limited on the Earth and are unevenly distributed geographically. Renewable energy sources vary in their availability and ease of use. B. Technological advances throughout history have led to the discovery and use of different forms of energy, and to more efficient use of all forms of energy. These technological advances have led to increased demand for energy and have had both beneficial and detrimental effects on society. C. Responsible use of energy requires consideration of energy availability, efficiency of its use, the environmental impact, and possible alternate sources.		
nit 3: **'eather** Weeks **ormative** **ssessments** acher servations aphic ganizers urnal Entries VLs e-Tests bservations uickwrites ckets in/out of e door rticipation in o work otetaking **immative** **ssessments** st and Quizzes ritten Reports b Reports ojects	**Standard 1: The Nature and Application of Science and Technology** ***Understandings and Abilities of Scientific Inquiry*** A. Understand that: Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations. The current body of scientific knowledge guides the investigation. B. Understand that: A valid investigation controls variables. Different experimental designs and strategies can be developed to answer the same question. C. Understand that: In a scientific investigation, data collection involves making precise measurements and keeping accurate records so that others can replicate the experiment. D. Understand that: There is much experimental and observational evidence that supports a large body of knowledge. The scientific community supports known information until new experimental evidence arises that does not match existing explanations. This leads to the evolution of the scientific body of knowledge. E. Understand that: Evaluating the explanations proposed by others involves examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Conflicting data or conflicting interpretations of the same data suggest the need for further investigation. Continued investigation can lead to greater understanding and resolution of the conflict. F. Understand that: Scientific habits of mind and other sources of knowledge and skills are essential to scientific inquiry. Habits of mind include tolerance of ambiguity, skepticism, openness to new ideas, and objectivity. Other knowledge and skills include mathematics, reading, writing, and technology. ***Science, Technology, and Society***	**Unit Concepts:** The Earth heats unevenly due to varying directness of the sun's rays, different surfaces (water, soil, sand), different altitudes, and different lengths of day (exposure to the sun's energy). Uneven heating causes uneven air pressure resulting in air movement (wind). The warmer the air the more water vapor it can hold. The atmosphere has properties that can be measured and observed and recorded in station models. Heat energy from the sun causes water to change state and be continually recycled. Climate is the average of the weather over many decades. Big Ideas: Earth's components form systems. These systems continually interact at different rates of time, affecting the Earth locally	**Essential Questions:** How do changes in one part of th Earth system affect other parts of the system? In what ways can Earth processe be explained as interactions amo spheres? How does technology extend human senses and understanding **Student Learning Target** Investigate the rate at which different Earth materials abso heat. Explain how these differences in heat absorption causes air pressure difference that result in convection currents (i.e., local land and s breezes). Use a variety of models, chart diagrams, or simple investigations to explain how the Sun's energy drives the cycling of water through the Earth's crust, oceans, and

esentations odel of Key eas Rubrics	A. Advances in technology can expand the body of scientific knowledge. Technological tools allow people to observe objects and phenomena that otherwise would not be possible. Technology enhances the quality, accuracy, speed and analysis of data gathered. B. Science and technology in society are driven by the following factors: economical, political, cultural, social, and environmental. Increased scientific knowledge and technology create changes that can be beneficial or detrimental to individuals or society through impact on human health and the environment. ***History and Context of Science*** A. Over the course of human history, contributions to science have been made by different people from different cultures. Studying some of these contributions and how they came about provides insight into the expansion of scientific knowledge. **Standard 5: Earth's Dynamic Systems** ***Interactions Throughout Earth's Systems*** F. The atmosphere has properties that can be observed, measured, and used to predict changes in weather and to identify climatic patterns. H. Energy from the Sun heats the Earth unevenly causing pressure differences and air movements (convection currents) resulting in changing weather patterns. I. Ocean currents, global winds, and storm systems, redistribute heat energy on Earth's surface and therefore affect weather and long-term climatic patterns of a region. J. Uneven heating and cooling of the Earth's surface produce air masses that differ in density, humidity and temperature. The interaction of these air masses results in significant weather changes. M. Heat energy stored in the oceans and transferred by currents influence climate. A disruption of the circulation and temperature of the world's oceans would foster climate change and have environmental and economic consequences. ***Technology and Applications*** A. Global weather data from ground measurements, satellites and radar are recorded on maps, analyzed, and used to predict local weather.	and globally. Technology enables us to better understand Earth's systems. It also allows us to analyze the impact of human activities on Earth's systems and the impact of Earth's systems on human activity.	atmosphere. Compare and contrast differer storm systems in terms of size formation, and associated weather Examine isobars on weather maps to describe how wind (moving air) travels from a region of high pressure to a region of low pressure. Construct and use surface station models to represent atmospheric data and interpre weather patterns on meteorological maps. Use weather maps to describe the movement of fronts and storms to predict their influen on weather.

Attachment 4: Science Scope and Sequence, 8th Grade

nit Order unit title and/or ne frame	Learning Targets Content Standards, Grade Level Expectations, Proficiency Level Expectations, or Grade Cluster Benchmarks	Theme/Big Idea/Concept	Enduring Understandings and/or Essential Questior
nit 1: anetary 'stems Weeks)rmative ssessments 'acher)servations 'aphic 'ganizers KWLs urnal Entries e-Tests ckets in/out the or Observations ımmative ssessments 'sts and Quizzes ritten Reports ojects esentations odel of Key eas Lab Reports ıbrics	**Standard 1: The Nature and Application of Science and Technology** ***Understandings and Abilities of Scientific Inquiry*** A. Understand that: Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations. The current body of scientific knowledge guides the investigation. B. Understand that: A valid investigation controls variables. Different experimental designs and strategies can be developed to answer the same question. C. Understand that: In a scientific investigation, data collection involves making precise measurements and keeping accurate records so that others can replicate the experiment. D. Understand that: There is much experimental and observational evidence that supports a large body of knowledge. The scientific community supports known information until new experimental evidence arises that does not match existing explanations. This leads to the evolution of the scientific body of knowledge. E. Understand that: Evaluating the explanations proposed by others involves examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations. Conflicting data or conflicting interpretations of the same data suggest the need for further investigation. Continued investigation can lead to greater understanding and resolution of the conflict. F. Understand that: Scientific habits of mind and other sources of knowledge and skills are essential to scientific inquiry. Habits of mind include tolerance of ambiguity, skepticism, openness to new ideas, and objectivity. Other knowledge and skills include mathematics, reading, writing, and technology. ***Science, Technology, and Society*** A. Advances in technology can expand the body of scientific knowledge. Technological tools allow people to observe objects and phenomena that otherwise would not be possible. Technology enhances the quality, accuracy, speed and analysis of data gathered. B. Science and technology in society are driven by the following factors: economical, political, cultural, social, and environmental. Increased scientific knowledge and technology create changes that can be beneficial or detrimental to individuals or society through impact	Unit Concepts: The use of modeling to demonstrate Earth, Sun and Moon movements creating Moon phases, Day/night, seasons and the amount of concentrated energy in particular locations around the Earth. Students observe patterns in Moon phases, Sunrise and Sunset and tides with the use of daily data collection of this information from the internet. Students observe the cycle of Moon phases and Sunrise and Sunset throughout the unit and record this information in journals. The use of scientific investigations allows students to explain the causes of seasons on Earth and influence of gravity on weight and jump height on different planets. Interactions between the Sun, Moon and Earth are observed through phenomena such as tides, seasons, Moon phases, day/night and eclipses. Great advances in information about Solar System objects have been obtained through the use of science	Enduring Understandings What predictable, observable patterns occur as a result of th interaction between the Earth, Moon, and Sun? What causes these patterns? How does Earth's physical characteristics and motion compare to other bodies in the Solar System? How has technology expande our knowledge of the Solar System? Student Learning Targets Describe how scientists have historically confirmed that the Earth is round, not flat. Analyze data on sunrise and sunset times (in terms of leng of daylight) and describe patterns. Explain the reason fo the patterns by using models o computer simulations of the Earth and Sun. Using internet, newspaper, an actual observations of the nig sky for at least two months,

	on human health and the environment. ***History and Context of Science*** A. Over the course of human history, contributions to science have been made by different people from different cultures. Studying some of these contributions and how they came about provides insight into the expansion of scientific knowledge. Standard 4 : Earth in Space Strand: The Earth/Sun/Moon System A: The Sun is a star that gives off radiant energy that drives Earth systems and is essential for life. The amount of radiant energy Earth receives from the Sun throughout the year is nearly constant. B: The tilt of Earth's axis of rotation as it orbits the Sun points in the same direction with respect to the stars. The tilt and the orbital motion of Earth around the Sun cause variation in the amount of solar radiation striking a location on the Earth's surface, which results in variation in the length of day/night and seasons. C: Moon phases occur because the relative positions of Earth, Moon, and Sun change, thereby enabling us to see different amounts of the Moon's surface. D: The Moon is a natural satellite of Earth and is different than the Earth in size, atmosphere, gravity, and surface features. E: Tides are caused by the gravitational interactions of the Sun, Moon and Earth. The Moon has a greater impact on tides because of its proximity to Earth **Strand: The Solar System** A: The Sun is by far the most massive object in the Solar System, therefore gravitationally dominating all other members of the Solar System. B: The Solar System consists of comets, asteroids, planets, and their respective satellites, most of which orbit the Sun on a plane called the ecliptic. The planets in our Solar System revolve in the same direction around the Sun in elliptical orbits that are very close to being in the same plane. Most planets rotate in the same direction with respect to the Sun. C: Planets can be categorized as inner or outer planets according to density, diameter and surface features. D: Planets and their moons have been shaped over time by common processes	and technology. Big Ideas: Observable, predictable patterns of movement in the Sun, Earth, and Moon system occur because of gravitational interaction and energy from the Sun. Most objects in the Solar System orbit the Sun and have distinctive physical characteristics and orderly motion Technology expands our knowledge of the Solar System	collect data on the Moon's appearance, and moonrise and moonset times. Analyze the data to describe the observabl patterns (phases). Explain wh the Moon's appearance chang in a repeating cyclical pattern Use models to describe how t relative positions of the Sun, Moon, and Earth account for Moon phases, eclipses, and tides. Describe how the relative positions of the Earth, Moon and Sun can cause high and lo tides, and unusually high or lo tides Demonstrate an understandin of the components of our Sola System and their characteristics, including the Moon, the Sun, the planets an their moons, extra- solar planets, and smaller objects such as asteroids and comets. Construct scale models of the Solar System in order to describe the relative sizes of planets and their distances fro the Sun. Use a variety of resources (e.g NASA photographs, compute simulations) to compare and contrast the physical propertie (i.e., temperature, size,

	such as cratering, volcanism, erosion, and tectonics. The presence of life on a planet can contribute to its unique development. **Strand: Technology and Application** A: Technology, including humans landing on the Moon, robot Landers and other space probes, satellites, and radio telescopes, allow scientists to investigate conditions on Earth and on other objects in the Solar System. B: The technology used in space exploration expands our knowledge of the Universe and has many spin-offs related to everyday applications.		composition, surface features of planets. Demonstrate an understandin of the motion of the bodies in our Solar System. Use model charts, illustrations, and other suitable representations to predict and describe regular patterns of motion for most objects in the Solar System. Explain how the Sun is the central and largest body in ou Solar System and the source o the light energy that hits our planet. Use models to explain how variations in the amount Sun's energy hitting the Earth surface results in seasons. Recognize that the force of gravity keeps planets in orbit around the sun and influences objects on Earth and other planets (i.e., tides, ability of humans to move and function Differentiate between an object's mass and weight Describe how scientists have acquired knowledge about components of our Solar System. Recognize the importance of people and technologies that have led to our current understanding of space. Recognize that spin-offs are products which have undergo

			a technology transfer process from research to public use. Research and report on spin-offs from the space program that have affected our everyda lives (i.e., Velcro, smoke detectors, cordless tools).