Grade, Subject/Course: 4th Grade Science	
Unit: Human Body, Vision, & the Brain	**__x__ Essential _____ Important _____ Compact**
Big Idea: ● Organisms have characteristic structures, functions, and behaviors that allow them to grow, reproduce, and die. ● Animals have external and internal sensory receptors that detect different kinds of information that then gets processed by the brain. ● Electromagnetic radiation (e.g., radio, microwaves, light) can be modeled as a wave pattern of changing electric and magnetic fields that interact with matter.	
PA Core Content Standards/Anchors (or National Standards): **3.1.4.A.** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. **3.1.4.B.** Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. **3.2.4.F.** Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.	**Interdisciplinary Standards (if applicable):**
Essential Questions: ● How do the structures of organisms enable life's functions? ● How do organisms detect, process, and use information about the environment? ● What is light? ● How can one explain the varied effects that involve light? ● What other forms of electromagnetic radiation are there?	**Understandings:** Students will know… ● the structures and functions of the human body. ● how our bones and muscles are interconnected ● how our eyes interact with light and impact our vision ● how our brain responds to stimuli in our environment.

Knowledge:	**Do/Skills:** Students will be able to…
• Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. • Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. • An object can be seen when light reflected from its surface enters the eyes.	• construct a model to explain how muscles pull on bones to create movement. • develop a working model of an eye. They use the model to reason about how light reflects off an object and into the eye, helping an organism process information from the environment. • use their eye model to discover that the pupil controls the amount of light let into the eye. In the dark, pupils get larger to let in more light. • investigate how their own brain works by testing their reflexes. They discover that the brain receives information from the senses, processes the information, and sends signals to the muscles to enable movement.
Vocabulary: • internal structures • external structures • behavior • reproduction • senses • process • reflecting	**Core Resources:** • Mystery Science
Common Assessment(s): • Human Body, Vision, & the Brain Unit Assessment • Lesson Assessments • Performance Tasks	**Supplemental Resources:** • Brainpop Jr. • Discovery Education • Generation Genius

Grade, Subject/Course: 4th Grade Science	
Unit: Animal & Plant Adaptations	**__x__ Essential _____ Important _____ Compact**
Big Idea: • Organisms have characteristic structures, functions, and behaviors that allow them to grow, reproduce, and die. • Animals have external and internal sensory receptors that detect different kinds of information that then gets processed by the brain.	

PA Core Content Standards/Anchors (or National Standards): **3.1.4.A.** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. **3.1.4.B.** Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.	**Interdisciplinary Standards (if applicable):**
Essential Questions: ● How do the structures of organisms enable life's functions? ● How do organisms detect, process, and use information about the environment?	**Understandings:** Students will know… ● the adaptations of animals and plants. ● how the external and internal structures of an organism work together as an interconnected system that aids in their growth and survival. ● how a combination of instincts and memories influence animal behavior.
Knowledge: ● Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. ● Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.	**Do/Skills:** Students will be able to… ● justify how the internal and external structures of plants and animals interact to support survival, growth, behavior, and reproduction. ● demonstrate how animals gather information through their senses, process it in their brain, and respond with appropriate actions using a model
Vocabulary: ● internal structures ● external structures ● behavior ● reproduction ● senses ● process	**Core Resources:** ● Mystery Science
Common Assessment(s): ● Animal & Plant Adaptations Unit Assessment ● Lesson Assessments ● Performance Tasks	**Supplemental Resources:** ● Brainpop Jr. ● Discovery Education ● Generation Genius

Grade, Subject/Course: 4th Grade Science	
Unit: Earth's Features & Processes	**__x__ Essential _____ Important _____ Compact**
Big Idea: ● We can infer Earth's planetary history by features we observe today. ● Changes we observe on Earth are the result of energy flowing and matter cycling between interconnected systems (the geosphere, hydrosphere, atmosphere, and biosphere). ● Plate tectonics explains the past and current movements and features of the rocks at Earth's surface ● Natural processes can cause sudden or gradual changes to Earth's systems, some of which may adversely affect humans.	
PA Core Content Standards/Anchors (or National Standards): **3.3.4.A.** Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. **3.3.4.B.** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. **3.3.4.C.** Analyze and interpret data from maps to describe patterns of Earth's features. **3.3.4.E.** Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. **3.4.3-5.F** Critique ways that people depend on and change the environment.	**Interdisciplinary Standards (if applicable):**
Essential Questions: ● How do people reconstruct and date events in Earth's planetary history? ● How and why is Earth constantly changing? ● Why do the continents move, and what causes earthquakes and volcanoes? ● How do natural hazards affect individuals and societies?	**Understandings:** Students will know … ● the features and processes of the Earth's surface. ● the rapid process of volcanic eruptions. ● the gradual Earth processes of weathering and erosion. ● how to mitigate the impacts of these processes on humans.

Knowledge:	**Do/Skills:** Students will be able to…
• Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. • Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. • Living things affect the physical characteristics of their regions. The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. • Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. • Maps can help locate the different land and water features areas of Earth. A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). • Humans cannot eliminate the hazards but can take steps to reduce their impacts. • Testing a solution involves investigating how well it performs under a range of likely conditions.	• develop a map of volcanoes to discover a pattern of where volcanoes exist on Earth. • make observations of the effects of weathering of rocks. • create a model to support that landscape has changed many times over millions of years. • generate multiple possible solutions to protect homes from a natural Earth process. Students realize that there are many causes for the erosion.
Vocabulary:	**Core Resources:**
• rock formations • fossils • rock layers • landscape • weathering • erosion • vegetation • data • earth's features • solutions • reduce • impacts • earth processes • natural hazard • tsunami	• Mystery Science

• volcanic eruption	
Common Assessment(s): • Earth's Features & Processes Unit Assessment • Lesson Assessments • Performance Tasks	**Supplemental Resources:** • Brainpop Jr. • Discovery Education • Generation Genius

Grade, Subject/Course: 4th Grade Science	
Unit: Energy & Energy Transfer	**__x__ Essential _____ Important _____ Compact**
Big Idea: • Energy can be modeled as either motions of particles or as being stored in force fields. Forces between objects can result in transfer of energy between these objects. • Producing energy useful in everyday life means to convert some available energy into a desired form, which is then delivered to users.	
PA Core Content Standards/Anchors (or National Standards): **3.2.4.A.** Use evidence to construct an explanation relating the speed of an object to the energy of that object. **3.2.4.C.** Ask questions and predict outcomes about the changes in energy that occur when objects collide. **3.2.4.D.** Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.	**Interdisciplinary Standards (if applicable):**
Essential Questions: • What is energy? • How are forces related to energy? • How do food and fuel provide energy? If energy is conserved, why do people say it is produced or used?	**Understandings:** Students will know … • how energy is stored, how it can make objects move, and how collisions transfer energy between objects. • energy can be transferred.

Knowledge:	**Do/Skills:** Students will be able to…
● The faster a given object is moving, the more energy it possesses. ● Energy can be moved from place to place by moving objects or through sound, light, or electric currents. ● Energy is present whenever there are moving objects, sound, light, or heat. ● When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result the air gets heated and sound is produced. When objects collide, the contact forces transfer energy so as to change the objects' motions. ● Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. ● The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. ● Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.	● use evidence to explain the relationship between an object's speed and its energy. ● build a chain reaction machine — identifying a goal, brainstorming and testing multiple ideas, and determining an optimal solution. The chain reaction machine uses multiple components to transfer energy from one part to the next.
Vocabulary:	**Core Resources:**
● evidence ● construct ● speed ● energy ● change of energy ● collide ● scientific ideas ● design ● refine ● converts	● Mystery Science

Common Assessment(s): ● Energy & Energy Transfer Unit Assessment ● Lesson Assessments ● Performance Tasks	**Supplemental Resources:** ● Brainpop Jr. ● Discovery Education ● Generation Genius

Grade, Subject/Course: 4th Grade Science	
Unit: Electricity, Light, & Heat	**__x__ Essential _____ Important _____ Compact**
Big Idea: ● The total change of energy in any system is always equal to the total energy transferred into or out of the system. ● Producing energy useful in everyday life means to convert some available energy into a desired form, which is then delivered to users. ● All materials, energy, and fuels that humans use are derived from natural sources, some of which are renewable over time and others are not.	
PA Core Content Standards/Anchors (or National Standards): **3.2.4.B.** Make and communicate observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. **3.2.4.D.** Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. **3.3.4.D.** Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. **3.4.3-5.F** Critique ways that people depend on and change the environment. **3.4.3-5.G** Investigate how perspectives over the use of resources and the development of technology have changed over time and resulted in conflict over the development of societies and nations.	**Interdisciplinary Standards (if applicable):**
Essential Questions:	**Understandings:** Students will know…

● What is meant by conservation of energy? ● How is energy transferred between objects or systems? ● How do food and fuel provide energy? If energy is conserved, why do people say it is produced or used? ● How do Earth's surface processes and human activities affect ● each other? ● How do humans depend on Earth's resources?	● how heat energy, solar energy, wind energy, and water energy can be transformed into electrical energy. ● how to convert energy from one form into another, such as heat into motion and electricity into light.
Knowledge: ● Energy can be moved from place to place by moving objects or through sound, light, or electric currents. ● Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result the air gets heated and sound is produced. ● Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. ● The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. ● Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.	**Do/Skills:** Students will be able to… ● design a tool to demonstrate that electricity can be transformed to other forms of energy, such as movement, light, and heat. ● conduct an investigation to explain how heat makes things move. ● evaluate the advantages and disadvantages of wind, water, and solar energy. Students obtain and evaluate information about the needs of each source of energy and analyze and interpret data.
Vocabulary: ● observations ● energy ● transferred ● sound energy ● light energy ● heat energy	**Core Resources:** ● Mystery Science

• electric currents • scientific ideas • design • refine • converts • fuels • natural resources • environment	
Common Assessment(s): • Electricity, Light, & Heat Unit Assessment • Lesson Assessments • Performance Tasks	**Supplemental Resources:** • Brainpop Jr. • Discovery Education • Generation Genius

Grade, Subject/Course: 4th Grade Science	
Unit: Sound, Waves, & Communication	**__x__ Essential _____ Important _____ Compact**
Big Idea: • Waves are repeating patterns of motion that transfer energy and information without transferring matter. • Useful modern technologies and instruments have been designed based on an understanding of waves and their interactions with matter.	
PA Core Content Standards/Anchors (or National Standards): **3.2.4.E.** Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. **3.2.4.G.** Generate and compare multiple solutions that use patterns to transfer information.	**Interdisciplinary Standards (if applicable):**
Essential Questions: • What are the characteristic properties and behaviors of waves? • How are instruments that transmit and detect waves used to extend human senses?	**Understandings:** Students will know… • vibrations allows us to communicate across distances. • the different characteristics of sound waves • sound is a vibration that can travel through a medium. • air is a medium that sound vibrations travel through

Knowledge: ● Waves, which are regular patterns of motion, can be made in water by disturbing the surface. ● When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave. ● Digitized information can be transmitted over long distances without significant degradation. ● High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized to voice–and vice versa.	**Do/Skills:** Students will be able to… ● explore how patterns are used to encode and transmit information ● explore energy transfer by creating and testing simple communication devices. ● construct a model of sound vibrations. ● make observations of vibrations and sound waves to discover that high pitch sounds vibrate faster and have short wavelengths and low pitch sounds vibrate slower and have long wavelengths.
Vocabulary: ● waves ● amplitude ● wavelength ● waves ● patterns ● transfer	**Core Resources:** ● Mystery Science
Common Assessment(s): ● Sound, Waves, & Communication Unit Assessment ● Lesson Assessments ● Performance Tasks	**Supplemental Resources:** ● Brainpop Jr. ● Discovery Education ● Generation Genius