

Grade 4 - Science Curriculum Framework

(NGSS in Parentheses)

Physical Science								
Grade	Big Idea	Essential Questions	Concepts	Competencies	Vocabulary	2002 Standards	SAS Standards	Assessment Anchor Eligible Content
4	Matter can be understood in terms of the types of atoms present and the interactions both between and within atoms.	How can one explain the structure, properties, and interactions of matter?	N/A	N/A	N/A	N/A	N/A	N/A
4	Interactions between any two objects can cause changes in one or both.	How can one explain and predict interactions between objects within systems?	When objects touch or collide, they push on one another and can change motion or shape. Magnets create a magnetic field that can exert an attracting or repelling force on other objects that can affect motion. (PS2.B) (PS3.C)	Investigate the forces between two or more magnets to identify patterns. (3-PS2-4) (3-PS2-2)	Attract Collision Friction Gravity Magnets Repel	3.4.4 C	3.2.3.B1 3.2.3.B2 3.2.4.B1 3.2.4.B2 3.2.4.B4	S4.C.3.1
4	Interactions between any two objects can cause changes in one or both.	How can one explain and predict interactions between objects within systems?	Magnets create a magnetic field that can exert an attracting or repelling force on other objects that can affect motion. (PS2.B)	Investigate the push-and-pull forces between objects not in contact with one another. (3-PS2-3)	Attract Collision Magnets Repel	3.4.4.C	3.2.3.B1 3.2.3.B2 3.2.4.B1 3.2.4.B2 3.2.4.B4	S4.C.3.1
4	Interactions between any two objects can cause changes in one or both.	How can one explain and predict interactions between objects within systems?	When objects touch or collide, they push on one another and can change motion or shape. Magnets create a magnetic field that can exert an attracting or repelling force on other objects that can affect	Design and refine solutions to a problem by using magnets to move objects not in contact with one another. (3-PS2-3)	Attract Collision Magnets Repel	3.4.4 C	3.2.3.B1 3.2.3.B2 3.2.4.B1 3.2.4.B2 3.2.3.B6 3.2.4.B4	S4.C.3.1

Grade 4 - Science Curriculum Framework

			motion. (PS2.A)					
4	Interactions between any two objects can cause changes in one or both.	How can one explain and predict interactions between objects within systems?	Materials that allow electricity to flow are conductors; those that do not are insulators. (PS3.A)	Investigate and describe conductors and insulators. (4-PS3-1)	Conductor Electricity Insulator	3.4.4 B	3.2.4.B4	S4.C.1.1.1 S4.C.2.1.3
4	Interactions between any two objects can cause changes in one or both.	How can one explain and predict interactions between objects within systems?	Electrical circuits require a complete loop through which an electrical current can pass. (PS3.A)	Construct serial and parallel circuits and describe the path of electrons in the circuit. (4-PS3-1)	Parallel circuit Serial circuit System	3.4.4 B	3.2.4.B4	S4.C.2.1.3
4	Interactions between any two objects can cause changes in one or both.	How can one explain and predict interactions between objects within systems?	An open circuit is an incomplete electric pathway; a closed circuit is a complete pathway. (PS3.A)	Demonstrate and explain open and closed circuits utilizing switches. (4-PS3-1)	Closed circuit Open circuit Switch System	3.4.4 B	3.2.3.B4 3.2.4.B4	S4.C.2.1.3
4	Interactions between any two objects can cause changes in one or both.	How can one explain and predict interactions between objects within systems?	A core of iron or steel becomes an electromagnet when electricity flows through a coil of insulated wire surrounding it. (PS3.B) (PS2.B)	Construct an electromagnet and plan an investigation to determine how one can make the electromagnet stronger or weaker. (4-PS3-4) (3-PS2-3)	Current Electromagnet System	3.4.4 B	3.2.6.B4 3.2.4.B6 3.2.5.B3 3.2.5.B4	S4.A.2.1.3
4	Interactions between any two objects can cause changes in one or both.	How can one explain and predict interactions between objects within systems?	Electromagnetic forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects. (PS3.B) (PS2.B)	Plan and carry out an investigation to determine factors that affect the strength of electric and magnetic forces. (4-PS3-4) (3-PS2-3)	Current Electromagnetic forces	3.4.7.B	3.2.5.B4 3.4.7.C 3.6.7.C	S4.A.2.1.3
4	Interactions between any two objects can	How can one explain and predict interactions between	A system can appear to be unchanging when processes	Construct an explanation using data why an object subjected to multiple	Pull Push	3.1.7.A	3.2.4.B1	S4.C.3.1

Grade 4 - Science Curriculum Framework

	cause changes in one or both.	objects within systems?	within the system are going on at opposite but equal rates (e.g., water behind a dam is at a constant height because water is flowing in at the same rate that water is flowing out).	pushes and pulls might stay in one place or move.	Systems			
4	Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer and conservation.	How is energy transferred and conserved?	Magnets can exert forces on other magnets or on materials, causing energy transfer between them (e.g., leading to changes in motion) even when the objects are not touching. (PS2.B)	Demonstrate the energy transfer between two objects using a magnet and another object. (3-PS2-3)	Energy Force Magnet Transfer	3.4.4 B 3.4.4 C	3.2.4.B2 3.2.5.B.4	S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer and conservation.	How is energy transferred and conserved?	The faster a given object is moving, the more energy it possesses. (PS3.A)	Use evidence to construct an explanation for the relationship between speed, energy and motion. (4-PS3-2)	Energy Motion	3.4.4 B	3.2.3.B2	S4.C.2.1 S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer and conservation.	How is energy transferred and conserved?	Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (PS3.A)	Carry out investigations to provide evidence that energy is transferred from place to place by sound, light, heat, electric currents, interacting magnets, and moving or colliding objects. (4-PS3-2)	Collision Electric current Energy Heat Light Magnets Sound Transformation	3.4.4 B 3.4.4 C	3.2.4.B.2 3.2.3.B.2	S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Interactions of objects or systems of objects can be predicted and explained using the	How is energy transferred and conserved?	Energy can be moved from place to place by moving objects or through sound, light, or electric currents.	Obtain and communicate information for how technology allows humans to concentrate, transport, and store energy for practical use.	Electric current Energy Light Sound	3.4.4 B	3.2.3.B2 3.2.4.B.2	S4.C.2.1 S4.A.1.1 S4.1.3.1 S4.A.2.1.4

Grade 4 - Science Curriculum Framework

	concept of energy transfer and conservation.		(PS3.A)	(4-PS3-4)				
4	Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer and conservation.	How is energy transferred and conserved?	Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (PS3.A)	Design and construct a device that converts energy from one form to another using given design criteria. (4-PS3-4)	Electric current Energy Energy conversion Light Sound	3.4.4 B	3.2.3.B.2 3.2.4.B.2 3.2.5.B.2	S4.C.2.1 S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer and conservation.	How is energy transferred and conserved?	Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (PS3.B)	Design and test a solution to a problem that utilizes the transfer of electric energy in the solution using given design constraints. (4-PS3-4)	Electric current Energy Light Sound Transfer	3.4.4 B	3.2.3.B2	S4.C.2.1 S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer and conservation.	How is energy transferred and conserved?	Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (ESS3.A)	Develop a model using examples to explain differences between renewable and non-renewable sources of energy. (4-ESS3-1)	Electric current Light Non-renewable energy Renewable energy Sound	3.4.4 B	3.2.3.B2	S4.C.2.1 S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer and	How is energy transferred and conserved?	Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (PS3.B)	Carry out investigations to provide evidence that energy is transferred from place to place by sound, light, heat, electric currents, interacting magnets, and moving or colliding objects.	Collision Electric current Energy transfer Light Magnet Sound	3.4.4 B 3.4.4 C	3.2.4.B.2 3.2.5.B.4	S4.C.3.1 S4.A.1.1 S4.1.3.1 S4.A.2.1.4

Grade 4 - Science Curriculum Framework

	conservation.			(4-PS3-4)				
4	Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer and conservation.	How is energy transferred and conserved?	Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (PS3.B)	Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electrical currents. (4-PS3-2)	Electric current Energy transfer Light Sound	3.4.4 B	3.2.3.B2	S4.C.2.1 S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer and conservation.	How is energy transferred and conserved?	Energy is present whenever there are moving objects, sound, light, or heat. (PS3.B)	Construct an explanation for the relationship between energy and motion. (4-PS3-2) (4-PS3-3)	Energy Light Sound	3.4.4 B	3.2.3.B2 3.2.4.B6	S4.C.2.1 S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer and conservation.	How is energy transferred and conserved?	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. (PS3.C)	Construct an investigation to demonstrate the relationship between energy and motion. (4-PS3-3)	Collision Energy Energy transfer Heat Force Light Motion Sound	3.4.4 B 3.4.4.C	3.2.3.B2 3.2.4.B6	S4.C.2.1 S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer and conservation.	How is energy transferred and conserved?	When objects collide, the contact forces transfer energy so as to change the motion of each object. (PS3.C)	Ask questions and predict outcomes about the changes in energy that occur when objects collide. (4-PS3-3)	Collision Energy Energy transfer Force Motion	3.4.4 B	3.2.4.B2	S4.C.3.1 S4.A.1.1 S4.1.3.1 S4.A.2.1.4

Grade 4 - Science Curriculum Framework

4	Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer and conservation.	How is energy transferred and conserved?	The expression “produce energy” typically refers to the conversion of stored energy into a desired form for practical use. It is important to be able to concentrate energy so that it is available for use where and when it is needed (e.g., batteries). (PS3.D)	Obtain and communicate information explaining how technology allows humans to concentrate, transport, and store energy for practical use. (4-PS3-4)	Battery Conversion Energy Production Stored Energy	3.4.4 B 3..8.4.A	3.2.12.B5	S4.C.2.1.1 S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Waves are a repeating pattern of motion that transfers energy from place to place without overall displacement of matter.	How are waves used to transfer energy and information?	Waves are regular patterns of motion, and 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; it does not move horizontally. (PS4.A)	Identify the patterns of waves by observing their motion in water. (4-PS4-1)	Energy Information Motion Waves	3.4.4 B	3.2.4.B5 3.2.4.B6	S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Waves are a repeating pattern of motion that transfers energy from place to place without overall displacement of matter.	How are waves used to transfer energy and information?	Waves are regular patterns of motion, and 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; it does not move horizontally. (PS4.A)	Provide evidence that waves transfer energy to objects as a wave passes. (4-PS4-1)	Energy transfer Information Motion Waves	3.4.4 B	3.2.4.B6	S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Waves are a repeating pattern of motion that transfers energy from place to place without overall displacement of	How are waves used to transfer energy and information?	Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of	Plan data collection methods and make observations to provide evidence that waves transfer energy to objects. (4-PS4-1)	Energy transfer Waves	3.4.4 B	3.2.4.B5 3.2.4.B6	S4.A.1.1 S4.1.3.1 S4.A.2.1.4

Grade 4 - Science Curriculum Framework

	matter.		deep water, the water goes up and down in place; it does not move in the direction of the wave—observe, for example, a bobbing cork or seabird—except when the water meets the beach. (PS4.A)					
4	Waves are a repeating pattern of motion that transfers energy from place to place without overall displacement of matter.	How are waves used to transfer energy and information?	Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (PS4.A)	Use a model to describe the amplitude and wavelength of waves. (4-PS4-1)	Amplitude Wavelength Waves	3.1.4.B 3.4.4 B	3.2.4.B5 3.2.4.B6	S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Waves are a repeating pattern of motion that transfers energy from place to place without overall displacement of matter.	How are waves used to transfer energy and information?	Earthquakes cause seismic waves, which are waves of motion in the Earth's crust. (PS4.A)	Describe how similar seismic waves are to other types of waves. (4-PS4-1)	Earthquake Seismic Waves	3.4.4 B	3.2.4.B5 3.2.4.B6	S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Waves are a repeating pattern of motion that transfers energy from place to place without overall displacement of matter.	How are waves used to transfer energy and information?	An object can be seen when light reflected from its surface enters the eyes. (PS4.B)	Investigate and provide evidence that the color people see depends on the color of the available light sources as well as the properties of the surface of the object reflecting the light. (4-PS4-2)	Reflection Refraction	3.4.4 B	3.2.3.B5 3.2.4.B5	S4.A.1.1 S4.1.3.1 S4.A.2.1.4
4	Waves are a repeating pattern of motion that transfers energy from place to place without	How are waves used to transfer energy and information?	The color people see depends on the color of the available light sources as well as the properties of the surface.	Investigate and provide evidence that the color people see depends on the color of the available light sources as well as the properties of	Color Reflection	3.4.4 B	3.2.3.B5 3.2.4.B5	S4.A.1.1 S4.1.3.1 S4.A.2.1.4

Grade 4 - Science Curriculum Framework

	overall displacement of matter.		(PS4.B)	the surface of the object reflecting the light. (4-PS4-2)				
4	Waves are a repeating pattern of motion that transfers energy from place to place without overall displacement of matter.	How are waves used to transfer energy and information?	Digitized information (e.g., the pixels of a picture) can be stored for future recovery or 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 form to voice—and vice versa. (PS4.C)	Obtain and communicate information about modern devices that are used to transmit and receive digital information. (4-PS4-3)	Decode Digitized information Encode Pixels Transmit	3.4.4 B	3.4.4.B1 3.4.4..B3	S4.A.1.1 S4.1.3.1 S4.A.2.1.4

Life Science

Grade	Big Idea	Essential Questions	Concepts	Competencies	Vocabulary	2002 Standards	SAS Standards	Assessment Anchor Eligible Content
4	All organisms are made of cells and can be characterized by common aspects of their structure and functioning.	How do organisms live, grow, respond to their environment, and reproduce?	Plants and animals have internal and external structures that serve various functions to survive. (LS1.A)	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. (4-LS1-1)	Behaviors Cause and effect Function Offspring Reproduce Structure Survival System System Models	3.3.4 C	3.1.4.A 3.1.4.B 3.1.4.C 4.1.4.A 4.5.4.C 4.2.4.C 3.1.3.A.1	S4.B.1.1.5
4	All organisms are made of cells and can be characterized by common aspects of their structure and functioning.	How do organisms live, grow, respond to their environment, and reproduce?	N/A	N/A	N/A	N/A	N/A	N/A

Grade 4 - Science Curriculum Framework

4	Organisms grow, reproduce, and perpetuate their species by obtaining necessary resources through interdependent relationships with other organisms and the physical environment.	How and why do organisms interact with their environment and what are the effects of these interactions?	N/A	N/A	N/A	N/A	N/A	N/A
4	Biological evolution explains both the unity and diversity of species and provides a unifying principle for the history and diversity of life on Earth.	How can there be so many similarities among organisms yet so many different kinds of plants, animals, and microorganisms?	N/A	N/A	N/A	N/A	N/A	N/A

Earth and Space Science

Grade	Big Idea	Essential Questions	Concepts	Competencies	Vocabulary	2002 Standards	SAS Standards	Assessment Anchor Eligible Content
4	The universe is composed of a variety of different objects, which are organized into systems each of, which develops according to accepted physical processes and laws.	What is the universe, and what is Earth's place in it?	N/A	N/A	N/A		N/A	N/A
4	The Earth is a complex and dynamic set of interconnected systems (e.g. geosphere, hydrosphere, atmosphere, biosphere) that interact over a wide	How and why is Earth constantly changing?	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	Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. (4-ESS1-1)	Fossils Rock formations	3.5.4.A 3.5.4.D	3.3.3.A1. 3.3.5.A.3	

Grade 4 - Science Curriculum Framework

	range of temporal and spatial scales.		which rock layers were formed. (ESS1.C)					
4	The Earth is a complex and dynamic set of interconnected systems (e.g. geosphere, hydrosphere, atmosphere, biosphere) that interact over a wide range of temporal and spatial scales.	How and why is Earth constantly changing?	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. (ESS2.A)	Make observations and measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation (heating cooling, volume of water, speed of wind, deposition, slope, angles, etc.). (4-ESS2-1)	Deposition Erosion Vegetation Weathering	3.5.4.A 3.5.4.D	3.3.5.A1	S4.D.11 S4.A.1.3.3
4	The Earth is a complex and dynamic set of interconnected systems (e.g. geosphere, hydrosphere, atmosphere, biosphere) that interact over a wide range of temporal and spatial scales.	How and why is Earth constantly changing?	Living things affect the physical characteristics of their regions. (ESS2.E)	Make observations and document how living things affect the physical characteristics in different regions. (4-ESS2-1)	Physical characteristics			
4	The Earth is a complex and dynamic set of interconnected systems (e.g. geosphere, hydrosphere, atmosphere, biosphere) that interact over a wide range of temporal and spatial scales.	How and why is Earth constantly changing?	The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. (ESS2.B)	Analyze and interpret data from maps to describe patterns of Earth's features. 4-ESS2-2)	Biogeology Earthquake Geographic Geologic Hazards Mountain range Natural Plate tectonics Trench Volcano	3.5.4 A 4.1.4 A 4.1.4 B Inquiry Standards 3.1.4.A	3.3.4.A1 4.5.4.D	S4.A.1.1 S4.A.1.3 S4.A.2.1 S4.A.2.2 S4.A.3.1 S4.A.3.2 S4.A.3.3
4	The Earth is a complex and dynamic set of interconnected systems (e.g. geosphere, hydrosphere,	How and why is Earth constantly changing?	The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns.	Analyze and interpret data from maps to describe Earth's features (e.g., mountains, valleys, caves, sinkholes, lakes, rivers, peninsulas, lentic/lotic water systems, etc.).	Analyze Features Interpret			

Grade 4 - Science Curriculum Framework

	atmosphere, biosphere) that interact over a wide range of temporal and spatial scales.		(ESS2.B)	(4-ESS2-3)				
4	The Earth is a complex and dynamic set of interconnected systems (e.g. geosphere, hydrosphere, atmosphere, biosphere) that interact over a wide range of temporal and spatial scales.	How and why is Earth constantly changing?	Water occurs underground, above ground, and in the atmosphere. (ESS2.A)	Identify various types of water environments in Pennsylvania. (4-ESS2-2)	Lakes Lentic Lotic Ponds Rivers Streams Watersheds	3.3.4.A 4.2.4.B 3.1.4.B		S4.D.1.1.1 S4.D.1.1.2 S4.D.1.1.3
4	The Earth is a complex and dynamic set of interconnected systems (e.g. geosphere, hydrosphere, atmosphere, biosphere) that interact over a wide range of temporal and spatial scales.	How and why is Earth constantly changing?	Many types of rocks and minerals are formed from the remains of organisms or are altered by their activities. (ESS1.C)	Use fossils as evidence to infer that some rocks were formed from the remains of once living organisms. (4-ESS1-1)	Erosion Fossil Landform Organism	3.5.4 B	3.3.4.A3 4.4.4.C	S4.A.1.1 S4.A.1.3 S4.A.2.1 S4.A.2.2 S4.A.3.1 S4.A.3.2 S4.A.3.3
4	The Earth is a complex and dynamic set of interconnected systems (e.g. geosphere, hydrosphere, atmosphere, biosphere) that interact over a wide range of temporal and spatial scales.	How and why is Earth constantly changing?	The presence and location of certain fossil types indicate the order in which rock layers were formed. (ESS1-C)	Use evidence from patterns in rock formations and fossils in rock layers to support the explanation for a change in landforms and environments over time. (4-ESS1-1)	Minerals Rock layers	3.5.4 B	3.3.4.A3 4.4.4.C	S4.A.1.1 S4.A.1.3 S4.A.2.1 S4.A.2.2 S4.A.3.1 S4.A.3.2 S4.A.3.3
4	The Earth's processes affect and are affected by human activities.	How do Earth's processes and human activities affect each other?	Energy that humans use is derived from multiple natural sources and their use affects the environment in many	Research multiple sources to describe ways that energy and fuels are derived from natural resources and their impact.	Dams Fissile materials Fossil fuels	4.2.4.B 4.8.4.B	4.3.4.A 4.3.4.A	S4.D.1.2.3

Grade 4 - Science Curriculum Framework

			ways. (ESS3.A)	(4-ESS3-1)	Natural resources Solar			
4	The Earth's processes affect and are affected by human activities.	How do Earth's processes and human activities affect each other?	A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, etc.). Humans cannot eliminate the hazards, but can take steps to reduce the impact. (ESS3.B)	Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. (4-ESS3-2)	Earthquake Natural hazard Tsunami Volcanic eruptions Weather			