

SCOPE AND SEQUENCE

This is one model of a curriculum scope and sequence. Grade level expectations are clustered into suggested units and arranged to support development of conceptual understanding. School district personnel are encouraged to adapt this model as necessary in order to better meet the needs of their students. The Expectations described in Strand 7: Inquiry and Strand 8: Science/Technology/Human Activity should be made a priority and integrated throughout every teaching unit in each of the other strands. Science assessments based from GLE 2.0 will begin 2009-2010 school year.

	Kindergarten	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth
Strand 1 Matter & Energy	Properties of Matter Investigating Sound	Properties of Matter: Mass and Temperature	Properties of Rocks and Soil Forms of Energy: Sound	Investigating States of Matter Earth, Sun and Moon	Mixtures and Solutions Forms of Energy: Electrical Circuits		Properties of and Changes in Matter Forms of Energy: Light and Sound	Forms of Energy: Heat, Electricity, and Magnetism Energy Transformations	Physical and Chemical Properties and Changes of Matter
Strand 2 Force & Motion	Change in Position	Investigating Motion	Forces and Motion		Laws of Motion	Work and Simple Machines		Force, Motion, and Work	
Strand 3 Living Organisms	Plants and Animals Parent-Offspring Relationships	Characteristics of Plants and Animals	Life Cycles of Animals	Plants		Classification of Plants and Animals	Characteristics of Living Organisms		Cells and Body Systems Disease Reproduction and Heredity
Strand 4 Ecology	Weather and Seasons			Food Chains	Interactions among Organisms and their Environments		Ecosystems and Populations		
Strand 5 Earth Systems	Weather and Seasons	Observing Water and Weather	Earth Materials: Rocks and Soil	Investigating States of Matter	Changes in the Earth's Surface	Water Cycle and Weather	Internal Processes and External Events Earth's Resources	Weather and Climate	Rock Cycle and Plate Tectonics
Strand 6 Universe	Objects in the Sky			Earth, Sun, and Moon		Solar System		Objects and Their Motion in the Solar System	
Strand 7 Scientific Inquiry	Inquiry	Inquiry	Inquiry	Inquiry	Inquiry	Inquiry	Inquiry	Inquiry	Inquiry
Strand 8 Science, Technology, & Human Activity	Science, Technology, and Human Activity	Science, Technology, and Human Activity	Science, Technology, and Human Activity	Science, Technology, and Human Activity	Science, Technology, and Human Activity	Science, Technology, and Human Activity	Science, Technology, and Human Activity	Science, Technology, and Human Activity	Science, Technology, and Human Activity

Strand 1: Properties and Principles of Matter and Energy

1. Changes in properties and states of matter provide evidence of the atomic theory of matter

Concept	Kindergarten	First	Second	Third	Fourth	Fifth
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them	<p>Scope and Sequence: Properties of Matter</p> <p>a. Describe physical properties of objects (i.e., size, shape, color, mass) by using the senses, simple tools (e.g., magnifiers, equal arm balances), and/or nonstandard measures (e.g., bigger/smaller; more/less)</p> <p>b. Identify materials (e.g., cloth, paper, wood, rock, metal) that make up an object and some of the physical properties of the materials (e.g., color, texture, shiny/dull, odor, sound, taste, flexibility)</p> <p>c. Sort objects based on observable physical properties (e.g., size, material, color, shape, mass)</p>	<p><i>Scope and Sequence: Mass and Temperature</i></p> <p>a. Given an equal-arm balance and various objects, illustrate arrangements in which the beam is balanced</p> <p>b. Measure and compare the mass of objects (more/less)</p> <p>c. Order objects according to mass</p>	<p><i>Scope and Sequence – Properties of Rocks and Soil</i></p> <p>a. Describe and compare the physical properties of objects by using simple tools (i.e., thermometer, magnifier, centimeter ruler, balance, magnet)</p> <p>b. Classify objects/substances as “one kind of material” or a mixture (e.g. m & m’s® vs. trail mix, water vs. kool aid®)</p>		<p><i>Scope and Sequence – Mixtures and Solutions</i></p> <p>a. Describe and compare the masses (the amount of matter in an object) of objects to the nearest gram using balances</p> <p>b. Describe and compare the volumes (the amount of space an object occupies) of objects using a graduated cylinder</p> <p>c. Identify situations where no two objects can occupy the same space at the same time (e.g. water level rises when an object or substance such as a rock is placed in a quantity of water)</p> <p>d. Classify types of materials (e.g., water, salt, sugar, iron filings, salt water) into “like” substances (materials that have specific physical properties) or mixtures of substances by using their characteristic properties</p>	Note that NAEP acknowledges the confusion between mass and weight and does not expect students to differentiate between the two (accepting either mass/weight interchangeably) until after grade 4
ST					a.2 ; b.2; c.1; d.2	
DOK						
B. Properties of mixtures depend upon the concentrations, properties, and interactions of particles			<p><i>Scope and Sequence – Properties of Rocks and Soil</i></p> <p>a. Observe and describe how mixtures are made by combining solids</p> <p>b. Describe ways to separate the components of a mixture by their physical properties (e.g., sorting, magnets, screening)</p>		<p><i>Scope and Sequence – Mixtures and Solutions/ Changes on the Earth’s Surface</i></p> <p>a. Identify water as a solvent that dissolves materials (Do NOT assess the term solvent)</p> <p>b. Observe and describe how mixtures are made by combining solids or liquids, or a combination of these</p> <p>c. Distinguish between the components in a mixture/solution (e.g., trail mix, conglomerate rock, salad, soil, salt water)</p> <p>d. Describe ways to separate the components of a mixture/solution by their properties (i.e., sorting, filtration, magnets, screening)</p>	
ST					a.1; b.1; c.1; d.1	
DOK						

Strand 1: Properties and Principles of Matter and Energy

1. Changes in properties and states of matter provide evidence of the atomic theory of matter

Concept	Kindergarten	First	Second	Third	Fourth	Fifth
C. Properties of matter can be explained in terms of moving particles too small to be seen without tremendous magnification						<i>Scope and Sequence – Water Cycle and Weather</i> a. Describe how changes in state (i.e., freezing/melting, condensation/evaporation/boiling) provide evidence that matter is made of particles too small to be seen
ST						
DOK						a. 1
D. Physical changes in the state of matter that result from thermal changes can be explained by the Kinetic Theory of Matter				<i>Scope and Sequence – Investigating States of Matter</i> a. Compare the observable physical properties of solids, liquids, or gases (air) (i.e., visible vs. invisible, changes in shape, changes in the amount of space occupied) b. Identify everyday objects/substances as solid, liquid, or gas (e.g., air, water) c. Observe and identify that water evaporates (liquid water changes into a gas as it moves into the air) d. Measure and compare the temperature of water when it exists as a solid to its temperature when it exists as a liquid e. Investigate and observe that water can change from a liquid to a solid (freeze), and back again to a liquid (melt), as the result of temperature changes f. Describe the changes in the physical properties of water (i.e., shape, volume) when frozen or melted g. Predict and investigate the effect of heat (thermal energy) (i.e., change in temperature, melting, evaporation) on objects and materials		<i>Scope and Sequence – Water cycle and Weather</i> a. Classify matter as a solid, a liquid, or a gas, as it exists at room temperature, using physical properties (i.e., volume, shape, ability to flow) b. Predict the effect of heat (thermal energy) on the physical properties of water as it changes to and from a solid, liquid, or gas (i.e., freezes/melts, evaporates/condenses/boils)
ST						
DOK				a. 2; b.1; c.1; d.2; e.1; f.1; g.2		a. 1, b. 2
E. The atomic model describes the electrically neutral atom	Not assessed at this level					

Strand 1: Properties and Principles of Matter and Energy

1. Changes in properties and states of matter provide evidence of the atomic theory of matter

Concept	Kindergarten	First	Second	Third	Fourth	Fifth
<p>F. The periodic table organizes the elements according to their atomic structure and chemical reactivity</p>	Not assessed at this level					
<p>G. Properties of objects and states of matter can change chemically and/or physically</p>	Not assessed at this level					
<p>H. Chemical bonding is the combining of different pure substances (elements, compounds) to form new substances with different properties</p>	Not assessed at this level					
<p>I. Mass is conserved during any physical or chemical change</p>					<p><i>Scope and Sequence – Mixtures and Solutions</i> a. Observe that the total mass of a material remains constant whether it is together, in parts, or in a different state</p>	<p><i>Scope and Sequence – Water Cycle and Weather</i> a. Observe the mass of water remains constant as it changes state (as evidenced in a closed container)</p>
ST						
DOK					a.1	a. 1

Strand 1: Properties and Principles of Matter and Energy

2. Energy has a source, can be stored, and can be transferred but is conserved within a system

Concept	Kindergarten	First	Second	Third	Fourth	Fifth
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver	<i>Scope and Sequence – Investigating Sound</i> a. Identify the sounds and their source of vibrations in everyday life (e.g., alarms, car horns, animals, machines, musical instruments) b. Compare different sounds (i.e., loudness, pitch, rhythm) c. Identify the ear as a receiver of vibrations that produce sound	<i>Scope and Sequence – Properties of Matter: Mass and Temperature</i> a. Identify the source of energy that causes an increase in the temperature of an object (e.g., Sun, stove, flame, light bulb) b. Compare the temperature of hot and cold objects using a simple thermometer c. Describe the change in temperature of an object as warmer or cooler	<i>Scope and Sequence – Forms of Energy: Sound</i> a. Identify air, water, and solids as mediums that sound travels through b. Describe different ways to change the pitch of a sound (i.e., changes in size, such as length or thickness, and in tightness/tension of the source) c. Describe how the ear serves as a receiver of sound (i.e., sound vibrates eardrum) d. Describe how to change the loudness of a sound (i.e., increase or decrease the force causing vibrations)	<i>Scope and Sequence – Investigating States of Matter</i> a. Identify sources of thermal energy (e.g., Sun, stove, fire, body) that can cause solids to change to liquids, and liquids to change to gas <i>Scope and Sequence – Earth, Sun, and Moon</i> b. Identify sources of light energy (e.g., Sun, bulbs, flames) c. Observe light being transferred from the source to the receiver (eye) through space d. Identify the three things (light source, object, and surface) necessary to produce a shadow	<i>Scope and Sequence – Forms of Energy: Electrical Circuits</i> a. Construct and diagram a complete electric circuit by using a source (e.g., battery), means of transfer (e.g., wires), and receiver (e.g., resistance bulbs, motors, fans) b. Observe and describe the evidence of energy transfer in a closed series circuit (e.g., lit bulb, moving motor, fan) c. Classify materials as conductors or insulators of electricity when placed within a circuit (e.g., wood, pencil lead, plastic, glass, aluminum foil, lemon juice, air, water)	<i>Scope and Sequence – Solar System</i> a. Observe and explain light being transferred from the source to the receiver (eye) through space in straight lines b. Observe and explain how an object (e.g., moon, mirror, objects in a room) can only be seen when light is reflected from that object to the receiver (eye)
ST						
DOK				a.1; b.1; c.1	a. 2; b.2; c.1	a. 1, b. 1
B. Mechanical energy comes from the motion (kinetic energy) and/or relative position (potential energy) of an object	Not assessed at this level					
C. Electromagnetic energy from the Sun (solar radiation) is a major source of energy on Earth		<i>Scope and Sequence – Characteristics of Plants and Animals</i> a. Identify light from the Sun as a basic need of most plants		<i>Scope and Sequence – Earth, Sun, and Moon/Food Chains</i> a. Identify the Sun as the primary source of light and food energy on Earth		<i>Scope and Sequence – Water Cycle and Weather/Solar System</i> a. Identify the Sun as the primary source of energy for temperature change on Earth
				a.1		a. 1

Strand 1: Properties and Principles of Matter and Energy

2. Energy has a source, can be stored, and can be transferred but is conserved within a system

Concept	Kindergarten	First	Second	Third	Fourth	Fifth
<p>D. Chemical reactions involve changes in the bonding of atoms with the release or absorption of energy</p>	Not assessed at this level					
<p>E. Nuclear energy is a major source of energy throughout the universe</p>	Not assessed at this level					
<p>F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy)</p>					<p><i>Scope and Sequence – Forms of Energy: Electrical Circuits</i></p> <p>a. Identify the evidence of energy transformations (temperature change, light, sound, motion, and magnetic effects) that occur in electrical circuits</p>	
ST						
DOK	a. 1					

Strand 2: Properties and Principles of Force and Motion

1. The motion of an object is described by its change in position relative to another object or point

Concept	Kindergarten	First	Second	Third	Fourth	Fifth
<p>A. The motion of an object is described as a change in position, direction, and speed relative to another object (frame of reference)</p>	<p><i>Scope and Sequence – Changes in Position</i> a. Describe an object's position relative to another object (e.g., above, below, in front of, behind)</p>	<p><i>Scope and Sequence – Investigating Motion</i> a. Compare the position of an object relative to another object (e.g., left of or right of) b. Describe an object's motion as straight, circular, vibrating (back and forth), zigzag, stopping, starting, or falling c. Compare the speeds (faster vs. slower) of two moving objects</p>			<p><i>Scope and Sequence – Laws of Motion</i> a. Classify different types of motion [straight line, curved, vibrating (back and forth)] b. Describe an object's motion in terms of distance and time</p>	
ST						
DOK					a. 2; b. 2	
<p>B. An object that is accelerating is speeding up, slowing down, or changing direction</p>			<p><i>Scope and Sequence – Forces and Motion</i> a. Describe Earth's gravity as a force that pulls objects on or near the Earth toward the Earth without touching the object</p>			
ST						
DOK						
<p>C Magnetic forces are related to electrical forces as different aspects of a single electromagnetic force</p>						
ST						
DOK						

Strand 2: Properties and Principles of Force and Motion

2. Forces affect motion						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
<p>A. Forces are classified as either contact (pushes, pulls, friction, buoyancy) or non-contact forces (gravity, magnetism), that can be described in terms of direction and magnitude</p>	<p><i>Scope and Sequence – Changes in Position</i></p> <p>a. Identify ways (push, pull) to cause some objects to move by touching them</p> <p>b. Identify magnets cause some objects to move without touching them</p>	<p><i>Scope and Sequence – Investigating Motion</i></p> <p>a. Identify the force (i.e., push or pull) required to do work (move an object)</p>	<p><i>Scope and Sequence – Forces and Motion</i></p> <p>a. Identify magnets attract and repel each other and certain materials</p> <p>b. Describe magnetism as a force that can push or pull other objects without touching them</p> <p>c. Measure (using non-standard units) and compare the force (i.e., push or pull) required to overcome friction and move an object over different surfaces (i.e., rough, smooth)</p>		<p><i>Scope and Sequence – Laws of Motion</i></p> <p>a. Identify the forces acting on the motion of objects traveling in a straight line (specify that forces should be acting in the same line as the motion, provide examples)</p> <p>b. Describe and compare forces (measured by a spring scale in Newton's) applied to objects in a single line.</p> <p>c. Observe and identify friction as a force that slows down or stops a moving object that is touching another object or surface</p> <p>d. Compare the forces (measured by a spring scale in Newton's) required to overcome friction when an object moves over different surfaces (i.e., rough/smooth)</p>	<p><i>Scope and Sequence – Work and Simple Machines</i></p> <p>a. Identify the forces acting on a load and use a spring scale to measure the weight (resistance force) of the load</p>
ST						
DOK					a.1; b. 2, c. 1; d.2	a. 2
<p>B. Every object exerts a gravitational force on every other object</p>			<p><i>Scope and Sequence – Forces and Motion</i></p> <p>a. Describe Earth's gravity as a force that pulls objects on or near the Earth toward the Earth without touching the object</p>		<p><i>Scope and Sequence – Laws of Motion</i></p> <p>a. Determine the gravitational pull of the Earth on an object (weight) using a spring scale</p>	
ST						
DOK					a. 1	
<p>C. Magnetic forces are related to electrical forces as different aspects of a single electromagnetic force</p>	<i>Not assessed at this level</i>					

Strand 2: Properties and Principles of Force and Motion

2. Forces affect motion						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
<p>D. Newton’s Laws of Motion explain the interaction of mass and forces, and are used to predict changes in motion</p>		<p><i>Scope and Sequence – Investigating Motion</i></p> <p>a. Describe ways to change the motion of an object (i.e., how to cause an object to go slower, go faster, go farther, change direction, stop)</p>	<p><i>Scope and Sequence – Forces and Motion</i></p> <p>a. Describe the direction and amount of force (i.e., direction of push or pull, strong/weak push or pull) needed to change an object’s motion (i.e., faster/slower, change in direction)</p> <p>b. Describe and compare the distances traveled by heavier/lighter objects after applying the same amount of force (i.e., push or pull) in the same direction</p> <p>c. Describe and compare the distances traveled by objects with the same mass after applying different amounts of force (i.e., push or pull) in the same direction</p>		<p>Scope and Sequence – Laws of Motion</p> <p>a. Observe that balanced forces do not affect an object’s motion (need to clarify that balanced forces means no change in forces acting on an object)</p> <p>b. Describe how unbalanced forces acting on an object changes its speed (faster/slower), direction of motion, or both (need to clarify that unbalanced forces means any change in forces acting on an object)</p> <p>c. Predict how the change in speed of an object (i.e., faster/slower/remains the same) is affected by the amount of force applied to an object and the mass of the object</p> <p>Energy: Electrical Circuits</p> <p>d. Predict the effects of an electrostatic force (static electricity) on the motion of objects (attract or repel)</p>	<p><i>Scope and Sequence – Work and Simple Machines</i></p> <p>a. Describe how friction affects the amount of force needed to do work over different surfaces or through different media</p>
ST						
DOK					a. 1; b. 2; c. 2; d.1	a. 2

Strand 2: Properties and Principles of Force and Motion

2. Forces affect motion						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
E. Perpendicular forces act independently of each other	Not assessed at this level					
F. Work transfers energy into and out of a mechanical system			<i>Scope and Sequence – Forces and Motion</i> a. Compare and describe the amount of force (i.e., more, less, or same push or pull) needed to raise an object to a given height, with or without using inclined planes (ramps) of different slopes b. Compare and describe the amount of force (i.e., more, less, or same push or pull) needed to raise an object to a given height, with or without using levers c. Apply the use of an inclined plane (ramp) and/or lever to different real life situations in which objects are raised			<i>Scope and Sequence – Work and Simple Machines</i> a. Explain how work can be done on an object (force applied and distance moved) (No formula calculations at this level) b. Identify the simple machines in common tools and household items c. Compare the measures of effort force (measured using a spring scale to the nearest Newton) needed to lift a load with and without the use of simple machines d. Observe and explain that simple machines change the amount of effort force and/or direction of force
ST						
DOK						a. 1, b.1, c.2, d.1

Strand 3: Characteristics and Interactions of Living Organisms

1. There is a fundamental unity underlying the diversity of all living organisms						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
A. Organisms have basic needs for survival		<i>Scope and Sequence – Characteristics of Plants and Animals</i> a. Identify the basic needs of most animals (i.e., air, water, food, shelter) b. Identify the basic needs of most plants (i.e., air, water, light) c. Predict and investigate the growth of plants when growing conditions are altered (e.g., dark vs. light, water vs. no water)		<i>Scope and Sequence – Plants</i> a. Describe the basic needs of most plants (i.e., air, water, light, nutrients, temperature)		
ST						
DOK				a.1		
B. Organisms progress through life cycles unique to different types of organisms			<i>Scope and Sequence – Life Cycles of Animals</i> a. Identify and sequence life cycles (birth, growth, and development, reproduction and death) of animals (i.e., butterfly, frog, chicken, snake, dog) b. Record observations on the life cycle of different animals (e.g., butterfly, dog, frog, chicken, snake)	<i>Scope and Sequence – Plants</i> a. Describe and sequence the stages in the life cycle (for a plant) of seed germination, growth and development, reproduction, and death (i.e., a flowering plant)		
ST						
DOK				a.1		
C. Cells are the fundamental units of structure and function of all living things	Not assessed at this level					

Strand 3: Characteristics and Interactions of Living Organisms

1. There is a fundamental unity underlying the diversity of all living organisms						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
<p>D. Plants and animals have different structures that serve similar functions necessary for the survival of the organism</p>	<p><i>Scope and Sequence – Plants and Animals</i></p> <p>a. Observe and compare the structures and behaviors of different kinds of plants and animals</p>	<p><i>Scope and Sequence – Characteristics of Plants and Animals</i></p> <p>a. Identify and compare the physical structures of a variety of plants (e.g., stem, leaves, flowers, seeds, roots)</p> <p>b. Identify and compare the physical structures of a variety of animals (e.g., sensory organs, beaks, appendages, body covering) (Do NOT assess terms: sensory organs, appendages)</p> <p>c. Identify the relationships between the physical structures of plants and the function of those structures (e.g., absorption of water, absorption of light energy, support, reproduction)</p> <p>d. Identify the relationships between the physical structures of animals and the function of those structures (e.g., taking in water, support, movement, obtaining food, reproduction)</p>		<p><i>Scope and Sequence - Plants</i></p> <p>a. Identify the major organs (roots, stems, flowers, leaves) and their functions in vascular plants (e.g., absorption, transport, reproduction) (Do NOT assess the term vascular)</p>		<p><i>Scope and Sequence – Classification of Plants and Animals</i></p> <p>a. Compare structures (e.g., wings vs. fins vs. legs; gills vs. lungs; feathers vs. hair vs. scales) that serve similar functions for animals belonging to different vertebrate classes</p>
ST						
DOK				a.1		a. 2
<p>E. Biological classifications are based on how organisms are related</p>		<p><i>Scope and Sequence – Characteristics of Plants and Animals</i></p> <p>a. Distinguish between plants and animals based on observable structures and behaviors</p>				<p><i>Scope and Sequence – Classification of Plants and Animals</i></p> <p>a. Explain how similarities are the basis for classification</p> <p>b. Distinguish between plants (which use sunlight to make their own food) and animals (which must consume energy-rich food)</p> <p>c. Classify animals as vertebrates or invertebrates</p> <p>d. Classify vertebrate animals into classes (amphibians, birds, reptiles, mammals, fish) based on their characteristics</p> <p>e. Identify plants or animals using simple dichotomous keys</p>
ST						
DOK						a. 2, b.1, c.1, d.1, e.1

Strand 3: Characteristics and Interactions of Living Organisms

2. Living organisms carry out life processes in order to survive						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
<p>A. The cell contains a set of structures called organelles that interact to carry out life processes through physical and chemical means</p>	Not assessed at this level					
<p>B. All living organisms have genetic material (DNA) that carries hereditary information</p>	Not assessed at this level					
<p>C. Complex multicellular organisms have systems that interact to carry out life processes through physical and chemical means</p>				<p><i>Scope and Sequence – Plants</i> a. Illustrate and trace the path of water and nutrients as they move through the transport system of a plant</p>		<p><i>Scope and Sequence – Classification of Plants and Animals</i> a. Compare the major organs/organ systems (e.g. support, reproductive, digestive, transport/circulatory, excretory, response) that perform similar functions for animals belonging to different vertebrate classes.</p>
ST						
DOK				a.1		a. 1

Strand 3: Characteristics and Interactions of Living Organisms

2. Living organisms carry out life processes in order to survive						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
D. Cells carry out chemical transformations that use energy for the synthesis or breakdown of organic compounds						Not assessed at this level
E. Protein structure and function are coded by the DNA (Deoxyribonucleic acid) molecule						Not assessed at this level
F. Cellular activities and responses can maintain stability internally while external conditions are changing (homeostasis)						Not assessed at this level
G. Life processes can be disrupted by disease (intrinsic failures of the organ systems or by infection due to other organisms)						Not assessed at this level

Strand 3: Characteristic and Interactions of Living Organisms

3. There is a genetic basis for the transfer of biological characteristics from one generation to the next through productive processes						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
A. Reproduction can occur asexually or sexually	Not assessed at this level					
B. All living organisms have genetic material (DNA) that carries hereditary information	Not assessed at this level					
C. Chromosomes are components of cells that occur in pairs and carry hereditary information from one cell to daughter cells and from parent to offspring during reproduction	Not assessed at this level					
D. There is heritable variation within every species of organism	Scope and Sequence: Parent-Offspring Relationships a. Identify that living things have offspring based on the organisms' physical similarities and differences		Scope and Sequence: Life Cycles of Animals a. Identify and relate the similarities and differences among animal parents and their offspring or multiple offspring	Scope and Sequence – Plants a. Identify and relate the similarities and differences between plants and their offspring (i.e., seedlings)		
ST						
DOK				a.2		
E. The pattern of inheritance for many traits can be predicted by using the principles of Mendelian genetics	Not assessed at this level					

Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments

1. Organisms are interdependent with one another and with their environment						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
A. All populations living together within a community interact with one another and with their environment in order to survive and maintain a balanced ecosystem	<i>Scope and Sequence – Weather and Seasons</i> a. Describe how the seasons affect the behavior of plants and animals. b. Describe how the seasons affect the everyday life of humans (e.g., clothing, activities)	<i>Scope and Sequence – Characteristics of Plants and Animals</i> a. Identify ways man depends on plants and animals for food, clothing, and shelter			Scope and Sequence: Interactions Among Organisms and Their Environment a. Identify the ways a specific organism may interact with other organisms or with the environment (e.g., pollination, shelter, seed dispersal, camouflage, migration, hibernation, defensive mechanism) b. Identify and describe different environments (i.e. pond, forest, prairie) support the life of different types of plants and animals	
ST						
DOK					a.1; b.1	
B. Living organisms have the capacity to produce populations of infinite size, but environments and resources are finite	Not assessed at this level					
C. All organisms, including humans, and their activities cause changes in their environment that affect the ecosystem	Not assessed at this level					
D. The diversity of species within an ecosystem is affected by changes in the environment, which can be caused by other organisms or outside processes					<i>Scope and Sequence – Interactions among Organisms and their Environment</i> a. Identify examples in Missouri where human activity has had a beneficial or harmful effect on other organisms (e.g., feeding birds, littering vs. picking up trash, hunting/conservation of species, paving/restoring green space)	
ST						
DOK					a.1	

Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments

2. Matter and energy flow through an ecosystem						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
A. As energy flows through the ecosystem, all organisms capture a portion of that energy and transform it to a form they can use				<i>Scope and Sequence – Food Chains</i> a. Identify sunlight as the primary source of energy plants use to produce their own food b. Classify populations of organisms as producers or consumers by the role they serve in the ecosystem c. Sequence the flow of energy through a food chain beginning with the Sun d. Predict the possible effects of removing an organism from a food chain	<i>Scope and Sequence – Interactions among Organisms and their Environment</i> a. Classify populations of organisms as producers and consumers by the role they serve in the ecosystem b. Differentiate between the types of consumers (herbivore, carnivore, omnivore, and detritivore/decomposer) c. Categorize organisms as predator or prey in a given ecosystem	
ST						
DOK				a. 1; b.1; c.1; d.2	a. 1; b.1; c.2	
B. Matter is recycled through an ecosystem	Not assessed at this level					

Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments

3. Genetic variation sorted by the natural selection process explains evidence of biological evolution

Concept	Kindergarten	First	Second	Third	Fourth	Fifth
<p>A. Evidence for the nature and rates of evolution can be found in anatomical and molecular characteristics of organisms and in the fossil record</p>					<p><i>Scope and Sequence – Change's in the Earth's Surface</i></p> <p>a. Compare and contrast common fossils found in Missouri (i.e., trilobites, ferns, crinoids, gastropods, bivalves, fish, mastodons) to organisms present on Earth today</p>	
ST						
DOK					a.2	
<p>B. Reproduction is essential to the continuation of every species</p>	Not assessed at this level					
<p>C. Natural selection is the process of sorting individuals based on their ability to survive and reproduce within their ecosystem</p>					<p><i>Scope and Sequence – Interactions among Organisms and their Environment</i></p> <p>a. Identify specialized structures and describe how they help plants survive in their environment (e.g., root, cactus needles, thorns, winged seed, waxy leaves)</p> <p>b. Identify specialized structures and senses and describe how they help animals survive in their environment (e.g., antennae, body covering, teeth, beaks, whiskers, appendages)</p> <p>c. Identify internal cues (e.g., hunger) and external cues (e.g., changes in the environment) that cause organisms to behave in certain ways (e.g., hunting, migration, hibernation)</p> <p>d. Predict which plant or animal will be able to survive in a specific environment based on its special structures or behaviors.</p>	
ST						
DOK					a. 2; b. 2; c. 1; d.2	

Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)

1. Earth's systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures

Concept	Kindergarten	First	Second	Third	Fourth	Fifth
A. The Earth's crust is composed of various materials, including soil, minerals, and rocks, with characteristic properties			<i>Scope and Sequence - Earth Materials: Rocks and Minerals</i> a. Observe and describe the physical properties (e.g., odor, color, appearance, relative grain size, texture, absorption of water) and different components (i.e., sand, clay, humus) of soils b. Observe and describe the physical properties of rocks (e.g., size, shape, color, presence of fossils)		Scope and Sequence – Changes in the Earth's Surface a. Identify and describe the components of soil (e.g., plant roots and debris, bacteria, fungi, worms, types of rock) and its properties (e.g., odor, color, resistance to erosion, texture, fertility, relative grain size, absorption rate) b. Compare the physical properties (i.e., size, shape, color, texture, layering, presence of fossils) of rocks (mixtures of different Earth materials, each with observable physical properties)	
ST						
DOK					a. 1; b.2	
B. The hydrosphere is composed of water (a material with unique properties) and other materials						<i>Scope and Sequence – Water Cycle and Weather</i> a. Classify major bodies of surface water (e.g., rivers, lakes, oceans, glaciers) as fresh or salt water, flowing or stationary, large or small, solid or liquid, surface or groundwater
ST						
DOK						a. 1
C. The atmosphere (air) is composed of a mixture of gases, including water vapor, and minute particles	<i>Scope and Sequence – Weather and Seasons</i> a. Observe wind as moving air that is felt			<i>Scope and Sequence – Investigating States of Matter</i> a. Identify that liquid water can be changed into a gas (vapor) in the air. b. Identify that clouds are composed of tiny droplets of water c. Identify air as a substance that surrounds us, taking up space and moves around us as wind		<i>Scope and Sequence – Water Cycle and Weather</i> a. Recognize the atmosphere is composed of a mixture of gases, water, and minute particles.
ST						
DOK				a.1; b.1; c.1		a. 1

Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)

1. Earth's systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures

Concept	Kindergarten	First	Second	Third	Fourth	Fifth
D. Climate is a description of average weather conditions in a given area over time						

2. Earth's systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes

Concept	Kindergarten	First	Second	Third	Fourth	Fifth
A. The Earth's materials and surface features are changed through a variety of external processes			<p><i>Scope and Sequence – Earth Materials: Rocks and Minerals</i></p> <p>a. Observe and identify examples of slow changes in the Earth's surface and surface materials (e.g., rock, soil layers) due to processes such as decay (rotting), freezing, thawing, breaking, or wearing away by running water or wind</p>		<p><i>Scope and Sequence- Changes in the Earth's Surface</i></p> <p>a. Observe and describe the breakdown of plant and animal material into soil through decomposition processes (i.e., decay/rotting, composting, digestion)</p> <p>b. Identify the major landforms/bodies of water on Earth (i.e., mountains, plains, river valleys, coastlines, canyons)</p> <p>c. Describe how weathering agents (e.g., water, chemicals, temperature, wind, plants) cause surface changes that create and/or change Earth's surface materials and/or landforms/ bodies of water</p> <p>d. Describe how erosion processes (i.e., action of gravity, waves, wind, rivers, glaciers) cause surface changes that create and/or change Earth's surface materials and/or landforms/ bodies of water</p> <p>e. Relate the type of landform/water body to the process by which it was formed</p>	
ST						
DOK					a.1; b.1, c.1; d.1; e.2	

Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)

2. Earth's systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
B. There are internal processes and sources of energy within the geosphere that cause changes in Earth's crustal plates						
C. Continual changes in Earth's materials and surface that result from internal and external processes are described by the rock cycle						
D. Changes in the Earth over time can be inferred through rock and fossil evidence						
E. Changes in the form of water as it moves through Earth's systems are described as the water cycle				<i>Scope and Sequence – Investigating States of Matter</i> a. Describe clouds and precipitation as forms of water		<i>Scope and Sequence – Water Cycle and Weather</i> a. Describe and trace the path of water as it cycles through the hydrosphere, geosphere, and atmosphere (i.e., the water cycle: evaporation, condensation, precipitation, surface run-off/groundwater flow) b. Identify the different forms water can take (e.g., snow, rain, sleet, fog, clouds, dew) as it moves through the water cycle
ST						
DOK						a. 1, b. 1

Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)

2. Earth's systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
<p>F. Climate is a description of average weather conditions in a given area due to the transfer of energy and matter through Earth's systems</p>	<p><i>Scope and Sequence – Weather and Seasons</i></p> <p>a. Observe and describe daily weather: precipitation (e.g., snow, rain, sleet, fog), wind (i.e., light breezes to strong wind), cloud cover, temperature</p> <p>b. Observe and describe the general weather conditions that occur during each season</p>	<p><i>Scope and Sequence – Observing Water and Weather</i></p> <p>a. Observe, measure, record weather data throughout the year (i.e., cloud cover, temperature, precipitation, wind speed) by using thermometers, rain gauges, wind socks</p> <p>b. Compare temperatures in different locations (e.g., inside, outside, in the sun, in the shade)</p> <p>c. Compare weather data observed at different times throughout the year (e.g., hot vs. cold, cloudy vs. clear, types of precipitation, windy vs. calm)</p> <p>d. Identify patterns indicating relationships between observed weather data and weather phenomena (e.g., temperature and types of precipitation, clouds and amounts of precipitation)</p>				<p><i>Scope and Sequence Water Cycle and Weather</i></p> <p>a. Identify and use appropriate tools (i.e., thermometer, anemometer, wind vane, rain gauge, satellite images, weather maps) to collect weather data (i.e., temperature, wind speed and direction, precipitation, cloud type and cover.)</p> <p>b. Identify and summarize relationships between weather data (e.g., temperature and time of day, cloud cover and temperature, wind direction and temperature) collected over a period of time.</p>
ST						
DOK						a. 2, b. 3
3. Human activity is dependent upon and affects Earth's resources and systems						
<p>A. Earth's materials are limited natural resource's affected by human activity</p>		<p><i>Scope and Sequence – Observing Water and Weather</i></p> <p>a. Observe and describe ways water, both as a solid and liquid, is used in every day activities at different times of the year (e.g., bathe, drink, make ice cubes, build snowmen, cook, swim)</p>	<p><i>Scope and Sequence – Earth materials: Rocks and Soil</i></p> <p>a. Observe and describe ways humans use Earth's materials (e.g., soil, rocks) in a daily life</p>		<p><i>Scope and Sequence – Changes in the Earth's Surface</i></p> <p>a. Identify the ways humans affect the erosion and deposition of Earth's materials (e.g., clearing of land, planting vegetation, paving land construction of new buildings)</p> <p>b. Propose ways to solve simple environmental problems (e.g., recycling, composting, ways to decrease soil erosion) that result from human activity</p>	<p><i>Scope and Sequence – Water Cycle and Weather</i></p> <p>a. Explain how major bodies of water are important natural resources for human activity (e.g., food recreation, habitat, irrigation, solvent, transportation)</p> <p>b. Describe how human needs and activities (e.g., irrigation damming of rivers, waste management, sources of drinking water) have affected the quantity and quality of major bodies of fresh water</p> <p>c. Propose solutions to problems related to water quality and availability that result from human activity.</p>
ST						
DOK					a.1; b.2	a. 2,; b. 3; c. 3

Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It

1. The universe has observable properties and structure						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
A. The Earth, Sun, and Moon are part of a larger system that includes other planets and smaller celestial bodies	<i>Scope and Sequence – Objects in the Sky</i> a. Observe and describe the presence of the Sun, Moon, and stars in the sky b. Observe there are more stars in the sky than anyone can count and that they are scattered unevenly and vary in brightness			<i>Scope and Sequence – Earth, Sun, and Moon</i> a. Describe our Sun as a star because it provides light energy to the solar system b. Observe and identify the Moon as a reflection of light		<i>Scope and Sequence – Solar System</i> a. Observe and identify the Earth is one of several planets within a solar system that orbits the Sun b. Observe and identify the Moon orbits the Earth in about a month c. Identify that planets look like stars and appear to move across the sky among the stars
ST						
DOK				a. 1; b.1		a. 1, b. 1, c.1
B. The Earth has a composition and location suitable to sustain life						<i>Scope and Sequence – Solar System</i> a. Describe physical features of the planet Earth that allows life to exist (e.g., air, water, temperature) and compare these to the physical features of the Sun, the Moon, and other planets
ST						
DOK						a. 2
C. Most of the information we know about the universe comes from the electromagnetic spectrum						

Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It

2. Regular and predictable motions of objects in the universe can be described and explained as the result of gravitational forces						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
A. The apparent position of the Sun and other stars, as seen from Earth, change in observable patterns	<i>Scope and Sequence – Objects in the Sky</i> a. Describe the Sun as only being seen in the daytime and appears to move across the sky from morning to night			<i>Scope and Sequence – Earth, Sun, and Moon</i> a. Illustrate and describe how the Sun appears to move slowly across the sky from east to west during the day		
ST						
DOK				a.1		
B. The apparent position of the moon, as seen from Earth, and its actual position relative to Earth change in observable patterns	<i>Scope and Sequence – Objects in the Sky</i> a. Observe the Moon can be seen sometimes at night and sometimes during the daytime b. Observe that the Moon appears to change shape over the course of a month			<i>Scope and Sequence – Earth, Sun, and Moon</i> a. Illustrate and describe how the Moon appears to move slowly across the sky from east to west during the day and/or night b. Describe the pattern of change that can be observed in the Moon's appearance relative to time of day and month as it occurs over several months (Do NOT assess moon phases)		<i>Scope and Sequence – Solar System</i> a. Sequence images of the lit portion of the Moon seen from Earth as it cycles day-to-day in about a month in order of occurrence
ST						
DOK				a.1; b.2		a. 2
C. The regular and predictable motions of the Earth and Moon relative to the Sun explain natural phenomena on Earth, such as day, month, year, shadows, moon phases, eclipses, tides, and seasons	<i>Scope and Sequence – Weather and Seasons</i> a. Observe and describe the characteristics of the four seasons as they cycle through the year (summer, fall, winter, spring)			<i>Scope and Sequence – Earth, Sun, and Moon</i> a. Observe and identify there is a day/night cycle every 24 hours b. Describe the changes in length and position (direction) of shadows from morning to midday to afternoon c. Describe how the Sun's position in the sky changes the length and position of shadows		<i>Scope and Sequence – Solar System</i> a. Identify that the Earth rotates once every 24 hours b. Relate changes in the length and position of a shadow to the time of day and apparent position of the Sun in the sky, as determined by Earth's rotation c. Relate the apparent motion of the Sun, Moon, and stars in the sky to the rotation of the Earth (Do not assess apparent motion of polar constellations)
ST						
DOK				a.1; b.1; c.1		a.1, b.2, c.2
D. Gravity is a force of attraction between objects in the solar system that governs their motion	Not assessed at this level					

Strand 7: Scientific Inquiry

1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking

Concept	Kindergarten	First	Second	Third	Fourth	Fifth
A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation	<i>Scope and Sequence - All Units</i> a. Pose questions about objects, materials, organisms and events in the environment b. Conduct a simple investigation (fair test) to answer a question	<i>Scope and Sequence - All Units</i> a. Pose questions about objects, materials, organisms, and events in the environment b. Plan and conduct a simple investigation (fair test) to answer a question	<i>Scope and Sequence - All Units</i> a. Pose questions about objects, materials, organisms and events in the environment b. Plan and conduct a simple investigation (fair test) to answer a question	<i>Scope and Sequence - All Units</i> a. Pose questions about objects, materials, organisms, and events in the environment b. Plan and conduct a fair test to answer a question	<i>Scope and Sequence - All Units</i> a. Formulate testable questions and explanations (hypotheses) b. Recognize the characteristics of a fair and unbiased test c. Conduct a fair test to answer a question	<i>Scope and Sequence - All Units</i> a. Formulate testable questions and explanations (hypotheses) b. Recognize the characteristics of a fair and unbiased test c. Conduct a fair test to answer a question d. Make suggestions for reasonable improvements or extensions of a fair test
ST						
DOK				a.2; b.3	a.3; b.2; c.2	a. 3, b.2, c.2, d.3
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	<i>Scope and Sequence - All Units</i> a. Make qualitative observations using the five senses b. Make observations using simple tools and equipment (e.g., magnifiers/hand lenses, magnets, equal arm balances, thermometers) c. Measure length and mass using non-standard units d. Compare amounts/measurements	<i>Scope and Sequence - All Units</i> a. Make qualitative observations using the five senses b. Make observations using simple tools and equipment (e.g., magnifiers/hand lenses, magnets, equal arm balances, thermometers) c. Measure length, mass, and temperature using standard and non-standard units d. Compare amounts/measurements	<i>Scope and Sequence - All Units</i> a. Make qualitative observations using the five senses b. Make observations using simple tools and equipment (e.g., magnifiers/hand lenses, magnets, equal arm balances, thermometers) c. Measure length, mass, and temperature using standard and non-standard units d. Compare amounts/measurements	<i>Scope and Sequence - All Units</i> a. Make qualitative observations using the five senses b. Make observations using simple tools and equipment (e.g., hand lenses, magnets, thermometers, metric rulers, balances, graduated cylinders) c. Measure length to the nearest centimeter, mass using grams, temperature using degrees Celsius, volume using liters d. Compare amounts/measurements e. Judge whether measurements and computation of quantities are reasonable	<i>Scope and Sequence - All Units</i> a. Make qualitative observations using the five senses b. Make observations using simple tools and equipment (e.g., hand lenses, magnets, thermometers, metric rulers, balances, graduated cylinders, spring scale) c. Measure length to the nearest centimeter, mass using grams, temperature using degrees Celsius, volume to the nearest milliliter, force/weight to the nearest Newton d. Compare amounts/measurements e. Judge whether measurements and computation of quantities are reasonable	<i>Scope and Sequence - All Units</i> a. Make qualitative observations using the five senses b. Determine the appropriate tools and techniques to collect data c. Use a variety of tools and equipment to gather data (e.g., hand lenses, magnets, thermometers, metric rulers, balances, graduated cylinders, spring scales) d. Measure length to the nearest centimeter, mass to the nearest gram, volume to the nearest milliliter, temperature to the nearest degree Celsius, force/weight to the nearest Newton e. Compare amounts/measurements f. Judge whether measurements and computation of quantities are reasonable
ST						
DOK				a.2; b.1; c.1; d.2; e.2	a.2; b.1; c.1; d.2; e.2	a.1, b.2, c.1, d.1, e.2, f.3

Strand 7: Scientific Inquiry

1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
<p style="text-align: center;">C.</p> <p>Scientific inquiry includes evaluation of explanations (laws/principles, theories/models) in light of evidence (data) and scientific principles (understandings)</p> <p>See CLEs: This concept became C, as the previous concept was eliminated and the GLEs were moved to this concept, and redundancy was eliminated</p>	<p><i>Scope and Sequence - All Units</i></p> <p>a. Use observations as support for reasonable explanations</p> <p>b. Use observations to describe relationships and patterns and to make predictions to be tested</p> <p>c. Compare explanations with prior knowledge</p>	<p><i>Scope and Sequence - All Units</i></p> <p>a. Use observations as support for reasonable explanations</p> <p>b. Use observations to describe relationships and patterns and to make predictions to be tested</p> <p>c. Compare explanations with prior knowledge</p>	<p><i>Scope and Sequence - All Units</i></p> <p>a. Use observations as support for reasonable explanations</p> <p>b. Use observations to describe relationships and patterns and to make predictions to be tested</p> <p>c. Compare explanations with prior knowledge</p>	<p><i>Scope and Sequence - All Units</i></p> <p>a. Use quantitative and qualitative data as support for reasonable explanations</p> <p>b. Use data as support for observed patterns and relationships, and to make predictions to be tested</p> <p>c. Evaluate the reasonableness of an explanation</p> <p>d. Analyze whether evidence supports proposed explanations</p>	<p><i>Scope and Sequence - All Units</i></p> <p>a. Use quantitative and qualitative data as support for reasonable explanations</p> <p>b. Use data as support for observed patterns and relationships, and to make predictions to be tested</p> <p>c. Evaluate the reasonableness of an explanation</p> <p>d. Analyze whether evidence supports proposed explanations</p>	<p><i>Scope and Sequence - All Units</i></p> <p>a) Use quantitative and qualitative data as support for reasonable explanations</p> <p>b) Use data as support for observed patterns and relationships, and to make predictions to be tested</p> <p>c) Evaluate the reasonableness of an explanation</p> <p>d) Analyze whether evidence supports proposed explanations</p>
				a. 3, b. 3, c.3, d. 3	a. 3, b. 3, c.3, d. 3	a. 3, b. 3, c.3, d. 3
<p style="text-align: center;">D.</p> <p>The nature of science relies upon communication of results and justification of explanations</p> <p>See CLEs: This concept became D, as the original C concept was eliminated</p>	<p><i>Scope and Sequence - All Units</i></p> <p>a. Communicate observations using words, pictures, and numbers</p>	<p><i>Scope and Sequence - All Units</i></p> <p>a. Communicate simple procedures and results of investigations and explanations through:</p> <ul style="list-style-type: none"> ⇒ oral presentations ⇒ drawings and maps ⇒ data tables ⇒ graphs (bar, pictograph) ⇒ writings 	<p><i>Scope and Sequence - All Units</i></p> <p>a. Communicate simple procedures and results of investigations and explanations through:</p> <ul style="list-style-type: none"> ⇒ oral presentations ⇒ drawings and maps ⇒ data tables ⇒ graphs (bar, pictograph) ⇒ writings 	<p><i>Scope and Sequence - All Units</i></p> <p>a. Communicate simple procedures and results of investigations and explanations through:</p> <ul style="list-style-type: none"> ⇒ oral presentations ⇒ drawings and maps ⇒ data tables ⇒ graphs (bar, single line, pictograph) ⇒ writings 	<p><i>Scope and Sequence - All Units</i></p> <p>a. Communicate the procedures and results of investigations and explanations through:</p> <ul style="list-style-type: none"> ⇒ oral presentations ⇒ drawings and maps ⇒ data tables ⇒ graphs (bar, single line, pictograph) ⇒ writings 	<p><i>Scope and Sequence - All Units</i></p> <p>a. Communicate the procedures and results of investigations and explanations through:</p> <ul style="list-style-type: none"> ⇒ oral presentations ⇒ drawings and maps ⇒ data tables ⇒ graphs (bar, single line, pictograph) ⇒ writings
ST						
DOK				a. 2	a. 2	a. 2

Strand 8: Impact of Science, Technology and Human Activity

1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
A. Designed objects are used to do things better or more easily and to do some things that could not otherwise be done at all	<i>Scope and Sequence – Properties of Matter/Weather and Seasons</i> a. Observe and identify that some objects occur in nature (natural objects); others have been designed and made by people	<i>Scope and Sequence – Properties of Matter/Weather and Seasons</i> a. Observe and identify that some objects occur in nature (natural objects); others have been designed and made by people	<i>Scope and Sequence – Forms of Energy: Sound</i> a. Design and construct a musical instrument using materials (e.g., cardboard, wood, plastic, metal) and/or existing objects (e.g., toy wheels, gears, boxes, sticks) that can be used to perform a task (Assess Locally)	<i>Scope and Sequence – Investigating States of Matter/ Earth, Sun, and Moon</i> a. Observe and identify that some objects or materials (e.g., Sun, fire, ice, snow) occur in nature (natural objects); others (e.g., stoves, refrigerators, bulbs, candles, lanterns) have been designed and made by people to solve human problems and enhance the quality of life (human-made objects)	<i>Scope and Sequence – Forms of Energy: Electrical Circuits</i> a. Design and construct an electrical device, using materials and/or existing objects, that can be used to perform a task (Assess Locally)	<i>Scope and Sequence – Work and Simple Machines</i> a. Design and construct a machine, using materials and/or existing objects, that can be used to perform a task (Assess Locally)
ST						
DOK				a.1	a.3	a. 3
B. Advances in technology often result in improved data collection and an increase in scientific information	<i>Scope and Sequence – Properties of Matter/Plants and Animals</i> a. Describe how tools have helped scientists make better observations (i.e., magnifiers)	<i>Scope and Sequence – Properties of Matter/Characteristics of Plants and Animals</i> a. Describe how tools have helped scientists make better observations (e.g., magnifiers, balances, thermometers)	<i>Scope and Sequence – Forms of Energy: Sound/Properties of Rocks and Soil</i> a. Describe how tools have helped scientists make better observations, measurements, or equipment for investigations (e.g., magnifiers, balances, stethoscopes, thermometers)	<i>Scope and Sequence – Investigating States of Matter/ Earth, Sun, and Moon/Plants</i> a. Describe how new technologies have helped scientists make better observations and measurements for investigations (e.g., telescopes, magnifiers, balances, microscopes, computers, stethoscopes, thermometers)	<i>Scope and Sequence – Mixtures and Solutions/Forms of Energy: Electrical Circuits</i> a. Describe how new technologies have helped scientists make better observations and measurements for investigations (e.g., telescopes, magnifiers, balances, microscopes, computers, stethoscopes, thermometers)	<i>Scope and Sequence – Work and Simple Machines/Water Cycle and Weather/Solar System/Classification of Plants and Animals</i> a. Describe how new technologies have helped scientists make better observations and measurements for investigations (e.g., telescopes, electronic balances, electronic microscopes, x-ray technology, computers, ultrasounds, computer probes such as thermometers)
ST						
DOK				a.2	a.2	a.2
C. Technological solutions to problems often have drawbacks as well as benefits					<i>Scope and Sequence – Forms of Energy: Electrical Circuits/Laws of Motion/Interactions among Organisms and Their Environments</i> a. Identify how the effects of inventions or technological advances (e.g., different types of light bulbs, semiconductors/integrated circuits and electronics, satellite imagery, robotics, communication, transportation, generation of energy, renewable materials) may be helpful, harmful, or both (Assess Locally)	<i>Scope and Sequence – Simple Machines/Water Cycle and Weather/Solar System/Classification of Plants and Animals</i> a. Identify how the effects of inventions or technological advances (e.g., complex machinery, technologies used in space exploration, satellite imagery, weather observation and prediction, communication, transportation, robotics, tracking devices) may be helpful, harmful, or both (Assess Locally)
ST						
DOK					a.3	a. 3

Strand 8: Impact of Science, Technology and Human Activity

2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time						
Concept	Kindergarten	First	Second	Third	Fourth	Fifth
<p>A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations</p>				<p><i>Scope and Sequence – All units</i> a. Research biographical information about various scientists and inventors from different gender and ethnic backgrounds, and describe how their work contributed to science and technology (Assess Locally)</p>	<p><i>Scope and Sequence – All units</i> a. Research biographical information about various scientists and inventors from different gender and ethnic backgrounds, and describe how their work contributed to science and technology (Assess Locally)</p>	<p><i>Scope and Sequence – All units</i> a. Research biographical information about various scientists and inventors from different gender and ethnic backgrounds, and describe how their work contributed to science and technology (Assess Locally)</p>
ST						
DOK				a. 3	a. 3	a. 3
<p>B. Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity</p>						

Strand 8: Impact of Science, Technology and Human Activity

3. Science and technology affect, and are affected by, society

Concept	Kindergarten	First	Second	Third	Fourth	Fifth
<p>A. People, alone or in groups, are always making discoveries about nature and inventing new ways to solve problems and get work done</p>	<p><i>Scope and Sequence - All Units</i> a. Identify a question that was asked, or could be asked, or a problem that needed to be solved when given a brief scenario (fiction or nonfiction of individuals solving everyday problems or learning through discovery) b. Work with a group to solve a problem, giving due credit to the ideas and contributions of each group member (Assess Locally)</p>	<p><i>Scope and Sequence - All Units</i> a. Identify a question that was asked, or could be asked, or a problem that needed to be solved when given a brief scenario (fiction or nonfiction of individuals solving everyday problems or learning through discovery) b. Work with a group to solve a problem, giving due credit to the ideas and contributions of each group member (Assess Locally)</p>	<p><i>Scope and Sequence - All Units</i> a. Identify a question that was asked, or could be asked, or a problem that needed to be solved when given a brief scenario (fiction or nonfiction of individuals solving everyday problems or learning through discovery) b. Work with a group to solve a problem, giving due credit to the ideas and contributions of each group member (Assess Locally)</p>	<p><i>Scope and Sequence - All Units</i> a. Identify a question that was asked, or could be asked, or a problem that needed to be solved when given a brief scenario (fiction or nonfiction of people working alone or in groups solving everyday problems or learning through discovery) b. Work with a group to solve a problem, giving due credit to the ideas and contributions of each group member (Assess Locally)</p>	<p><i>Scope and Sequence - All Units</i> a. Identify a question that was asked, or could be asked, or a problem that needed to be solved when given a brief scenario (fiction or nonfiction of people working alone or in groups solving everyday problems or learning through discovery) b. Work with a group to solve a problem, giving due credit to the ideas and contributions of each group member (Assess Locally)</p>	<p><i>Scope and Sequence - All Units</i> a. Identify a question that was asked, or could be asked, or a problem that needed to be solved when given a brief scenario (fiction or nonfiction of people working alone or in groups solving everyday problems or learning through discovery) b. Work with a group to solve a problem, giving due credit to the ideas and contributions of each group member (Assess Locally)</p>
ST						
DOK				a. 3, b. 3	a. 3, b. 3	a. 3, b. 3
<p>B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology</p>						
<p>C. Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent</p>						
<p>D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible</p>						

Strand 1: Properties and Principles of Matter and Energy

1. Changes in properties and states of matter provide evidence of the atomic theory of matter

Concept	Sixth	Seventh	Eighth
<p>A. Objects, and the materials they are made of, have properties that can be used to describe and classify them</p>	<p><i>Scope and Sequence – Properties of and Changes in Matter</i></p> <ol style="list-style-type: none"> a. Identify matter is anything that has mass and volume b. Describe and compare the volumes (the amount of space an object occupies) of objects or substances directly, using a graduated cylinder, and/or indirectly, using displacement methods c. Describe and compare the masses (amounts of matter) of objects to the nearest gram using a balance d. Classify the types of matter in an object into pure substances or mixtures using their specific physical properties 		<p><i>Scope and Sequence – Physical and Chemical Properties and Changes of Matter</i></p> <ol style="list-style-type: none"> a. Identify elements (unique atoms) and compounds (molecules or crystals) are pure substances that have characteristic properties b. Describe the physical and chemical properties (e.g., magnetic attraction, conductivity, melting point and boiling point, reactivity) of pure substances (elements or compounds) (e.g., copper wire, aluminum wire, iron, charcoal, sulfur, water, salt, sugar, sodium bicarbonate, galena, quartz, magnetite, pyrite) using appropriate senses and tools
ST			
DOK	a. 1, b. 2, c. 2, d. 2		a. 1, b. 2
<p>B. Properties of mixtures depend upon the concentrations, properties, and interactions of particles</p>	<p><i>Scope and Sequence – Properties of and Changes in Matter</i></p> <ol style="list-style-type: none"> a. Describe the properties of each component in a mixture/solution and their distinguishing properties (e.g., salt water, oil and vinegar, pond water, Kool-Aid) b. Describe appropriate ways to separate the components of different types of mixtures (sorting, evaporation, filtration, magnets, boiling, chromatography, screening) c. Predict how various solids (soluble/insoluble) behave (e.g., dissolve, settle, float) when mixed with water 		
ST			
DOK	a. 2. b. 2, c. 3		

Strand 1: Properties and Principles of Matter and Energy

1. Changes in properties and states of matter provide evidence of the atomic theory of matter

Concept	Sixth	Seventh	Eighth
<p>C. Properties of matter can be explained in terms of moving particles too small to be seen without tremendous magnification</p>	<p><i>Scope and Sequence – Properties of and Changes in Matter</i> a. Describe evidence (e.g., diffusion of food coloring in water, light reflecting off of dust particles in the air, condensation of water vapor by increased pressure or decreased temperature) that supports the theory that matter is composed of small particles (atoms, molecules) that are in constant, random motion</p>		<p><i>Scope and Sequence – Physical and Chemical Properties and Changes of Matter</i> a. Describe evidence (e.g., diffusion of colored material into clear material such as water; light reflecting off of dust particles in air; changes in physical properties and reactivity such as gold hammered into foil, oil spreading on the surface of water, decay of organic matter, condensation of water vapor by increased pressure) that supports the theory that matter is composed of moving particles too small to be seen (atoms, molecules)</p>
ST			
DOK	a. 2		a. 1
<p>D. Physical changes in the state of matter that result from thermal changes can be explained by the Kinetic Theory of Matter</p>	<p><i>Scope and Sequence – Earth's Resources</i> a. Describe the relationship between the change in the volume of water and changes in temperature as it relates to the properties of water (i.e., water expands and becomes less dense when frozen)</p>	<p><i>Scope and Sequence – Weather and Climate</i> a. Describe the relationship between temperature and the movement of atmospheric gases (i.e., warm air rises due to expansion of the volume of gas, cool air sinks due to contraction of the volume of gas)</p>	<p><i>Scope and Sequence – Physical and Chemical Properties and Changes of Matter</i> a. Using the Kinetic Theory model, illustrate and account for the physical properties (i.e., shape, volume, malleability, viscosity) of a solid, liquid, or gas in terms of the arrangement and motion of molecules in a substance b. Use the Kinetic Theory model to explain changes in the volume, shape, and viscosity of materials in response to temperature changes during a phase change c. Predict the effect of energy transfer on the physical properties of a substance as it changes to or from a solid, liquid, or gas (i.e., phase changes that occur during freezing, melting, evaporation, boiling, condensation)</p>
ST			
DOK	a. 2	a.2	a. 1, b. 2, c.2
<p>E. The atomic model describes the electrically neutral atom</p>	Not assessed at this level		

Strand 1: Properties and Principles of Matter and Energy

1. Changes in properties and states of matter provide evidence of the atomic theory of matter

Concept	Sixth	Seventh	Eighth
F. The periodic table organizes the elements according to their atomic structure and chemical reactivity			<i>Scope and Sequence – Physical and Chemical Properties and Changes of Matter</i> a. Identify more than 100 known elements (unique atoms) exist that may be combined in nature or by man to produce compounds that make up the living and nonliving substances in the environment (Do NOT assess memorization of the Periodic Table)
ST			
DOK			a. 2
G. Properties of objects and states of matter can change chemically and/or physically	<i>Scope and Sequence – Properties of and Changes in Matter</i> a. Identify and classify changes in matter as chemical and/or physical b. Identify chemical changes (i.e., rusting, oxidation, burning, decomposition by acids, decaying, baking) in common objects (i.e., rocks such as limestone, minerals, wood, steel wool, plants) as a result of interactions with sources of energy or other matter that form new substances with different characteristic properties c. Identify physical changes in common objects (e.g., rocks, minerals, wood, water, steel wool, plants) and describe the processes which caused the change (e.g., weathering, erosion, cutting, dissolving)		
ST			
DOK	a. 2, b. 2, c.2		

Strand 1: Properties and Principles of Matter and Energy

1. Changes in properties and states of matter provide evidence of the atomic theory of matter

Concept	Sixth	Seventh	Eighth
<p>H. Chemical bonding is the combining of different pure substances (elements, compounds) to form new substances with different properties</p>	Not assessed at this level		
<p>I. Mass is conserved during any physical or chemical change</p>	<p><i>Scope and Sequence – Properties of and Changes in Matter</i> a. Demonstrate and provide evidence that mass is conserved during a physical change</p>	<p><i>Scope and Sequence – Weather and Climate</i> a. Explain that the amount of matter remains constant while being recycled through the water cycle</p>	<p><i>Scope and Sequence – Physical and Chemical Properties and Changes of Matter</i> a. Provide evidence that mass is conserved during a chemical change in a closed system (e.g., vinegar + baking soda, mold growing in a closed container, steel wool rusting)</p> <p><i>Scope and Sequence – Rock Cycle and Plate Tectonics</i> b. Explain that the amount of matter remains constant while being recycled through the rock cycle</p> <p><i>Scope and Sequence – Cells and Body Systems</i> c. Explain that the amount of matter remains constant while being recycled through food chains and food webs</p>
ST			
DOK	a. 2	a. 1	a. 2, b. 2, c.2

Strand 1: Properties and Principles of Matter and Energy

2. Energy has a source, can be stored, and can be transferred but is conserved within a system

Concept	Sixth	Seventh	Eighth
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver	<p><i>Scope and Sequence -- Forms of Energy: Light</i></p> <ul style="list-style-type: none"> a. Identify sources of visible light (e.g., the Sun and other stars, flint, bulb, flames, lightning) b. Describe evidence (i.e., cannot bend around walls) that visible light travels in a straight line, using the appropriate tools (i.e., pinhole viewer, ray box, laser pointer) c. Compare the reflection of visible light by various surfaces (i.e., mirror, smooth and rough surfaces, shiny and dull surfaces, Moon) d. Compare the refraction of visible light passing through different transparent and translucent materials (e.g., prisms, water, a lens) e. Predict how different surfaces (transparent, translucent, opaque) and lenses (convex, concave) affect the behavior of visible light rays and the resulting image of an object f. Identify receivers of visible light energy (e.g., eye, photocell) g. Recognize and explain that an object is "seen" only when the object emits or reflects light to the eye h. Recognize differences in wavelength and energy levels within that range of visible light that can be seen by the human eye are perceived as differences in color <p><i>Scope and Sequence – Forms of Energy: Sound</i></p> <ul style="list-style-type: none"> i. Describe how sound energy is transferred by wave-like disturbances that spread away from the source through a medium j. Describe how changes in energy cause changes in loudness and pitch of a sound k. Predict how the properties of the medium (e.g., air, water, empty space, rock) affect the speed of different types of mechanical waves (i.e., earthquake, sound) 	<p><i>Scope and Sequence – Forms of Energy: Heat</i></p> <ul style="list-style-type: none"> a. Identify thermal energy as the random motion (kinetic energy) of molecules or atoms within a substance b. Use the kinetic molecular model to explain changes in the temperature of a material c. Identify thermal energy is transferred as heat from warmer objects to cooler objects until both reach the same temperature (equilibrium) d. Identify the type of materials that transfer energy by conduction, convection, and/or radiation e. Describe how heat is transferred by conduction, convection, and radiation, and classify examples of each f. Classify common materials (e.g., wood, foam, plastic, glass, aluminum foil, soil, air, water) as conductors or insulators of thermal energy g. Predict the differences in temperature over time on different colored (black and white) objects placed under the same heat source <p><i>Scope and Sequence – Forms of Energy: Electricity and Magnetism</i></p> <ul style="list-style-type: none"> h. Describe the interactions (i.e., repel, attract) of like and unlike charges (i.e., magnetic, static electric, electrical) i. Diagram and identify a complete electric circuit by using a source (battery), means of transfer (wires), and receiver (resistance bulbs, motors, fans) j. Observe and describe the evidence of energy transfer in a closed series circuit k. Describe the effects of resistance (number of receivers), amount of voltage (number of energy sources), and kind of transfer materials on the current being transferred through a circuit (e.g., brightness of light, speed of motor) l. Classify materials as conductors or insulators of electricity when placed within a circuit (e.g., wood, pencil lead, plastic, glass, aluminum foil, lemon juice, air, water) m. Diagram and distinguish between complete series and parallel circuits n. Identify advantages and disadvantages of series and parallel circuits 	<p><i>Scope and Sequence – Physical and Chemical Properties and Changes of Matter</i></p> <ul style="list-style-type: none"> a. Recognize and describe how chemical energy is stored in chemical compounds (e.g., energy stored in and released from food molecules, batteries, nitrogen explosives, fireworks, organic fuels)
ST			
DOK	a.1,b.2,c.2,d.2,e.3,f.1,g.1,h.2,i.1,j.3	a.1; b.2; c.1; d.1; e.2; f.1; g.2; h.1; i.2; j.2; k.2; l.1; m.2; n.1	a.1

Strand 1: Properties and Principles of Matter and Energy

2. Energy has a source, can be stored, and can be transferred but is conserved within a system

Concept	Sixth	Seventh	Eighth
B. Mechanical energy comes from the motion (kinetic energy) and/or relative position (potential energy) of an object	Not assessed at this level		
C. Electromagnetic energy from the Sun (solar radiation) is a major source of energy on Earth	<i>Scope and Sequence – Forms of Energy - Light</i> a. Recognize and describe how energy from the Sun is transferred to Earth in a range of wavelengths and energy levels, including visible light, infrared radiation, and ultraviolet radiation <i>Scope and Sequence- Characteristics of Living Organisms</i> b. Recognize and apply the fact that energy from the Sun is the source of almost all energy used to produce the food for living organisms	<i>Scope and Sequence – Weather and Climate</i> a. Identify solar radiation as the primary source of energy for weather phenomena	
ST			
DOK	a.2, b.1	a.1	
D. Chemical reactions involve changes in the bonding of atoms with the release or absorption of energy	Not assessed at this level		
E. Nuclear energy is a major source of energy throughout the universe	Not assessed at this level		

Strand 1: Properties and Principles of Matter and Energy

2. Energy has a source, can be stored, and can be transferred but is conserved within a system

Concept	Sixth	Seventh	Eighth
F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy)		<i>Scope and Sequence – Energy Transformations</i> a. Identify the different energy transformations that occur between different systems (e.g., chemical energy in battery converted to electricity in circuit converted to light and heat from a bulb) b. Identify that, during an energy transformation, heat is often transferred from one object (system) to another because of a difference in temperature c. Recognize and describe how energy is not lost but conserved as it is transferred and transformed	<i>Scope and Sequence – Physical and Chemical Properties and Changes of Matter</i> a. Identify the evidence of different energy transformations (e.g., explosion of light, heat, and sound, temperature change, electrical charge) that may occur as chemical energy is released during a chemical reaction
ST			
DOK		a. 1; b.1; c.1	a. 1

Strand 2: Properties and Principles of Force and Motion

1. The motion of an object is described by its change in position relative to another object or point

Concept	Sixth	Seventh	Eighth
<p>A. The motion of an object is described as a change in position, direction, and speed relative to another object (frame of reference)</p>		<p><i>Scope and Sequence – Force, Motion, and Work</i></p> <p>a. Describe the circular motion of a moving object as the result of a force acting toward the center</p> <p>b. Classify different types of motion (e.g., straight line, projectile, circular, vibrational)</p> <p>c. Given an object in motion, calculate its speed (distance/time)</p> <p>d. Interpret a line graph representing an object's motion in terms of distance over time (speed) using metric units</p>	
ST			
DOK		a.1; b.1; c.1; d.2	
<p>B. An object that is accelerating is speeding up, slowing down, or changing direction</p>		Not assessed at this level	
<p>C. Momentum depends on the mass of the object and the velocity with which it is traveling</p>		Not assessed at this level	

Strand 2: Properties and Principles of Force and Motion

2. Forces affect motion			
Concept	Sixth	Seventh	Eighth
A. Forces are classified as either contact forces (pushes, pulls, friction, buoyancy) or non-contact forces (gravity, magnetism), that can be described in terms of direction and magnitude		<i>Scope and Sequence – Force, Motion, and Work</i> a. Identify and describe the types of forces acting on an object in motion, at rest, floating/sinking (i.e., type of force, direction, amount of force in Newton's) b. Compare the forces acting on an object by using a spring scale to measure them to the nearest Newton	
ST			
DOK		a. 1; b.2	
B. Every object exerts a gravitational force on every other object		<i>Scope and Sequence – Force, Motion, and Work</i> a. Explain every object exerts a gravitational force of attraction on every other object b. Recognize an object's weight is a measure of the gravitational force of a planet/moon acting on that object c. Compare the amount of gravitational force acting between objects (which is dependent upon their masses and the distance between them)	
ST			
DOK		a.1; b.1; c.2	
C. Magnetic forces are related to electrical forces as different aspects of a single electromagnetic force		Not assessed at this level	

Strand 2: Properties and Principles of Force and Motion

2. Forces affect motion			
Concept	Sixth	Seventh	Eighth
D. Newton's Laws of Motion explain the interaction of mass and forces, and are used to predict changes in motion		<i>Scope and Sequence – Force, Motion, and Work</i> a. Compare the effects of balanced and unbalanced forces (including magnetic, gravity, friction, push or pull) on an object's motion b. Explain that when forces (including magnetic, gravity, friction, push or pull) are balanced, objects are at rest or their motion remains constant c. Explain that a change in motion is the result of an unbalanced force acting upon an object d. Explain how the acceleration of a moving object is affected by the amount of net force applied and the mass of the object	
ST			
DOK		a.2; b.1; c.1; d.1	
E. Perpendicular forces act independently of each other	Not assessed at this level		
F. Work transfers energy into and out of a mechanical system		<i>Scope and Sequence – Force, Motion, and Work</i> a. Recognize examples of work being done on an object (force applied and distance moved in the direction of the applied force) with and without the use of simple machines b. Calculate the amount of work done when a force is applied to an object over a distance ($W = F \times d$) c. Explain how simple machines affect the amount of effort force, distance through which a force is applied, and/or direction of force while doing work d. Recognize the amount of work output is never greater than the amount of work input, with or without the use of a simple machine e. Evaluate simple machine designs to determine which design requires the least amount of effort force and explain why	
ST			
DOK		a.1; b.1; c.2; d.1, e.2	

Strand 3: Characteristics and Interactions of Living Organisms

1. There is a fundamental unity underlying the diversity of all living organisms

Concept	Sixth	Seventh	Eighth
A. Organisms have basic needs for survival	<i>Scope and Sequence – Characteristics of Living Organisms</i> a. Describe the common life processes necessary to the survival of organisms (i.e., growth, reproduction, life span, response to stimuli, energy use, exchange of gases, use of water, elimination of waste)		<i>Scope and Sequence – Cells and Body Systems</i> a. Recognize that most plants and animals require food and oxygen (needed to release the energy from that food)
ST			
DOK	a.2		a.1
B. Organisms progress through life cycles unique to different types of organisms			
C. Cells are the fundamental units of structure and function of all living things	<i>Scope and Sequence – Characteristics of Living Organisms</i> a. Recognize all organisms are composed of cells, the fundamental units of life, which carry on all life processes		
ST			
DOK	a. 1		
D. Plants and animals have different structures that serve similar functions necessary for the survival of the organism			<i>Scope and Sequence – Cells and Body Systems</i> a. Identify and contrast the structures of plants and animals that serve similar functions (e.g., taking in water and oxygen, support, response to stimuli, obtaining energy, circulation, digestion, excretion, reproduction)
ST			
DOK			a. 2

Strand 3: Characteristics and Interactions of Living Organisms

1. There is a fundamental unity underlying the diversity of all living organisms

Concept	Sixth	Seventh	Eighth
E. Biological classifications are based on how organisms are related	<i>Scope and Sequence – Characteristics of Living Organisms</i> a. Recognize most of the organisms on Earth are unicellular (e.g., bacteria, protists) and other organisms, including humans, are multicellular b. Identify examples of unicellular (e.g., bacteria, some protists, fungi) and multicellular organisms (e.g., some fungi, plants, animals)		
ST			
DOK	a. 2, b. 2		

2. Living organisms carry out life processes in order to survive

Concept	Sixth	Seventh	Eighth
A. The cell contains a set of structures called organelles that interact to carry out life processes through physical and chemical means	<i>Scope and Sequence – Characteristics of Living Organisms</i> a. Compare and contrast the following plant and animal cell structures: cell membrane, nucleus, cell wall, chloroplast, and cytoplasm b. Recognize the chloroplast as the cell structure where food is produced in plants and some unicellular organisms (e.g., algae, some protists)		<i>Scope and Sequence – Cells and Body Systems</i> a. Describe how the cell membrane helps regulate the transfer of materials in and out of the cell b. Identify the function of the chloroplast during photosynthesis
ST			
DOK	a. 2, b. 1		a. 1, b. 1

Strand 3: Characteristics and Interactions of Living Organisms

2. Living organisms carry out life processes in order to survive

Concept	Sixth	Seventh	Eighth
B. Photosynthesis and cellular respiration are complementary processes necessary to the survival of most organisms on Earth	<i>Scope and Sequence – Characteristics of Living Organisms</i> a. Describe how plants use energy from the Sun to produce food and oxygen through the process of photosynthesis		Scope and Sequence: Cells and Body Systems a. Describe photosynthesis is a chemical change with reactants (water and carbon dioxide) and products (energy-rich sugar molecules and oxygen) that takes place in the presence of light and chlorophyll b. Describe how oxygen is needed by all cells of most organisms for the release of energy from nutrient (sugar) molecules (Do NOT assess the term cellular respiration) c. Describe the importance of the transport and exchange of oxygen and carbon dioxide to the survival of the organism
ST			
DOK	a. 1		a. 1, b.1, c.1
C. Complex multicellular organisms have systems that interact to carry out life processes through physical and chemical means			Scope and Sequence: Cells and Body Systems a. Identify and give examples of each level of organization (cell, tissue, organ, organ system) in multicellular organisms (plants, animals) b. Illustrate and explain the path water and nutrients take as they move through the transport system of a plant c. Explain the interactions between the circulatory and digestive systems as nutrients are processed by the digestive system, passed into the blood stream, and transported in and out of the cell d. Compare and contrast the processes of mechanical and chemical digestion, and their role in providing materials necessary for survival of the cell and organism e. Identify the importance of the transport and exchange of nutrient and waste molecules to the survival of the cell and organism f. Explain the interactions between the circulatory and respiratory systems in exchanging oxygen and carbon dioxide between cells and the atmosphere (when oxygen enters the body, passes into the blood stream, and is transported into the cell; carbon dioxide is transported out of the cell, passes into the blood stream, and exits the body) g. Explain the interactions between the nervous and muscular systems when an organism responds to a stimulus
ST			
DOK			a. 2, b.2, c.2, d.2, e.2, f.2, g.2

Strand 3: Characteristics and Interactions of Living Organisms

2. Living organisms carry out life processes in order to survive			
Concept	Sixth	Seventh	Eighth
D. Cells carry out chemical transformations that use energy for the synthesis or breakdown of organic compounds	Not assessed at this level		
E. Protein structure and function are coded by the DNA (Deoxyribonucleic acid) molecule	Not assessed at this level		
F. Cellular activities and responses can maintain stability internally while external conditions are changing (homeostasis)			<i>Scope and Sequence – Cells and Body Systems</i> a. Predict the response the body may take to maintain internal balance during an environmental change (e.g., shivering when cold, slowing metabolism when food supply decreases or when dehydrated, adrenaline rush when frightened)
			DOK a.2
G. Life processes can be disrupted by disease (intrinsic failures of the organ systems or by infection due to other organisms)			<i>Scope and Sequence – Disease</i> a. Explain the cause and effect of diseases (e.g., AIDS, cancer, diabetes, hypertension) on the human body (locally assessed) b. Relate some common diseases (i.e., cold, influenza, strep throat, dysentery, fungal infections) to the organisms that cause them (bacteria, viruses, protists, fungi) c. Differentiate between infectious and noninfectious diseases d. Explain the role of antibiotics and vaccines in the treatment and prevention of diseases
ST			
DOK			a. 2, b.2, c.2, d.2

Strand 3: Characteristics and Interactions of Living Organisms

3. There is a genetic basis for the transfer of biological characteristics from one generation to the next through reproductive processes			
Concept	Sixth	Seventh	Eighth
A. Reproduction can occur asexually or sexually			<i>Scope and Sequence: Reproduction and Heredity</i> a. Compare and contrast the processes of asexual and sexual reproduction, including the type and number of cells involved (one body cell in asexual, two sex cells in sexual), and the number of gene sets (body cell has two sets, sex cells have one set each) passed from parent(s) to offspring b. Identify examples of asexual reproduction (i.e., plants budding, binary fission of single cell organisms) c. Compare and contrast the reproductive mechanisms of classes of vertebrates (i.e., internal vs. external fertilization) d. Describe how flowering plants reproduce sexually
ST			
DOK			a.2, b.1, c.2, d.2
B. all living organisms have genetic material (DNA) that carries hereditary information			
C. Chromosomes are components of cells that occur in pairs and carry hereditary information from one cell to daughter cells and from parent to offspring during reproduction			<i>Scope and Sequence: Reproduction and Heredity</i> a. Identify chromosomes as cellular structures that occur in pairs that carry hereditary information in units called genes b. Recognize and describe how when asexual reproduction occurs, the same genetic information found in the parent cell is copied and passed on to each new daughter cell (Assess only the concept – not the term or process of mitosis) c. Recognize and describe how when sexual reproduction occurs, genetic material from both parents is passed on and combined to form the genetic code for the new organism (Assess only the concept – not the term or process of meiosis)
ST			
DOK			a. 1. b. 1, c.1

Strand 3: Characteristics and Interactions of Living Organisms

3. There is a genetic basis for the transfer of biological characteristics from one generation to the next through reproductive processes			
Concept	Sixth	Seventh	Eighth
D. There is heritable variation within every species of organism			<i>Scope and Sequence – Reproduction and Heredity</i> a. Recognize and describe when asexual reproduction occurs, the daughter cell is identical to the parent cell (assuming no change in the parent genes) b. Recognize and describe when sexual reproduction occurs, the offspring is not identical to either parent due to the combining of the different genetic codes contained in each sex cell
ST			
DOK			a. 1, b. 1
E. The pattern of inheritance for many traits can be predicted by using the principles of Mendelian genetics			

Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments

1. Organisms are interdependent with one another and with their environment

Concept	Sixth	Seventh	Eighth
A. All populations living together within a community interact with one another and with their environment in order to survive and maintain a balanced ecosystem	<i>Scope and Sequence – Ecosystems and Populations</i> a. Identify the biotic factors (populations of organisms) and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition) that make up an ecosystem		
ST			
DOK	a. 2		
B. Living organisms have the capacity to produce populations of infinite size, but environments and resources are finite	<i>Scope and Sequence – Ecosystems and Populations</i> a. Identify populations within a community that are in competition with one another for resources b. Identify the factors that affect the number and types of organisms an ecosystem can support (e.g., food availability, abiotic factors such as quantity of light and water, temperature and temperature range, soil composition, disease, competitions from other organisms, predation) c. Predict the possible effects of changes in the number and types of organisms in an ecosystem on the populations of other organisms within that ecosystem		
ST			
DOK	a. 2, b. 2, c. 3		
C. All organisms including humans and their activities cause changes in their environment that affect the ecosystem	Not assessed at this level		

Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments

1. Organisms are interdependent with one another and with their environment

Concept	Sixth	Seventh	Eighth
<p>D. The diversity of species within an ecosystem is affected by changes in the environment, which can be caused by other organisms or outside processes</p>	<p><i>Scope and Sequence – Ecosystems and Populations</i></p> <p>a. Describe beneficial and harmful activities of organisms, including humans (e.g., deforestation, overpopulation, water and air pollution, global warming, restoration of natural environments, river bank/coastal stabilization, recycling, channelization, reintroduction of species, depletion of resources), and explain how these activities affect organisms within an ecosystem</p> <p>b. Predict the impact (beneficial or harmful) of a natural environmental change (e.g., forest fire, flood, volcanic eruption, avalanche) on the organisms in an ecosystem</p> <p>c. Describe possible solutions to potentially harmful environmental changes within an ecosystem</p>		<p><i>Scope and Sequence – Disease</i></p> <p>a. Explain the beneficial or detrimental impact that some organisms (i.e., viruses, bacteria, protists, fungi) may have on other organisms (e.g., diseases, antibiotics, breakdown of waste, fermentation)</p>
ST			
DOK	a. 2, b. 3, c. 3		a. 2

Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments

2. Matter and energy flow through an ecosystem			
Concept	Sixth	Seventh	Eighth
A. As energy flows through the ecosystem, all organisms capture a portion of that energy and transform it to a form they can use	<i>Scope and Sequence – Ecosystems and Populations</i> a. Diagram and describe the transfer of energy in an aquatic food web and a land food web with reference to producers, consumers, decomposers, scavengers, and predator/prey relationships b. Classify populations of unicellular and multicellular organisms as producers, consumers, and decomposers by the role they serve in the ecosystem		
ST			
DOK	a. 3, b. 2		
B. Matter is recycled through an ecosystem			<i>Scope and Sequence – Cells and Body Systems</i> a. Illustrate the oxygen/carbon dioxide cycles (including the processes of photosynthesis and cellular respiration) b. Describe the processes involved in the recycling of matter in the oxygen/carbon dioxide cycles
ST			
DOK			a. 1, b. 1

Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments

3. Genetic variation sorted by the natural selection process explains evidence of biological evolution

Concept	Sixth	Seventh	Eighth
A. Evidence for the nature and rates of evolution can be found in anatomical and molecular characteristics of organisms and in the fossil record	<i>Scope and Sequence – Ecosystems and Populations</i> a. Identify fossils as evidence some types of organisms (e.g., dinosaurs, trilobites, mammoths, giant tree ferns) that once lived in the past, and have since become extinct, have similarities with and differences from organisms living today		
ST			
DOK	a. 2		
B. Reproduction is essential to the continuation of every species			
C. Natural selection is the process of sorting individuals based on their ability to survive and reproduce within their ecosystem	<i>Scope and Sequence – Ecosystems and Populations</i> a. Relate examples of adaptations (specialized structures or behaviors) within a species to its ability to survive in a specific environment (e.g., hollow bones/flight, hollow hair/insulation, dense root structure/compact soil, seeds/food, protection for plant embryo vs. spores, fins/movement in water) b. Predict how certain adaptations, such as behavior, body structure, or coloration, may offer a survival advantage to an organism in a particular environment		
ST			
DOK	a. 2, b. 3		

Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)

1. Earth's systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures

Concept	Sixth	Seventh	Eighth
A. The Earth's crust is composed of various materials, including soil, minerals, and rocks, with characteristic properties	<i>Scope and Sequence – Earth's Resources</i> a. Describe the components of soil and other factors that influence soil texture, fertility, and resistance to erosion (e.g., plant roots and debris, bacteria, fungi, worms, rodents)		<i>Scope and Sequence – Rock Cycle and Plate Tectonics</i> a. Differentiate between minerals and rocks (which are composed of different kinds of minerals) b. Describe the distinguishing properties that can be used to classify minerals (i.e., texture, smell, luster, hardness, crystal shape, streak, reaction to magnets and acids) c. Describe the methods used to identify the distinguishing properties of minerals Classify rocks as sedimentary, igneous, or metamorphic
ST			
DOK	a. 2		a. 2, b. 1, c. 1, d.2
B. The hydrosphere is composed of water (a material with unique properties), gases, and other materials	<i>Scope and Sequence – Earth's Resources</i> a. Identify and describe the properties of water that make it an essential component of the Earth system (e.g., its ability to act as a solvent, its ability to remain as a liquid at most Earth temperatures)		
ST			
DOK	a. 2		
C. The atmosphere (air) is composed of a mixture of gases, including water vapor, and minute particles		<i>Scope and Sequence – Weather and Climate</i> a. Describe the composition of the Earth's atmosphere (i.e., mixture of gases, water and minute particles) and how it circulates as air masses b. Describe the role atmosphere (e.g., clouds, ozone) plays in precipitation, reflecting and filtering light from the Sun, and trapping heat energy emitted from the Earth's surface	
		a.2; b.2	

Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)

1. Earth's systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures

Concept	Sixth	Seventh	Eighth
D. Climate is a description of average weather conditions in a given area over time			
ST			
DOK			

2. Earth's Systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes

Concept	Sixth	Seventh	Eighth
A. The Earth's materials and surface features are changed through a variety of external processes	<i>Scope and Sequence – Internal Processes and External Events</i> a. Make inferences about the formation of sedimentary rocks from their physical properties (e.g., layering and the presence of fossils indicate sedimentation) b. Explain how the formation of sedimentary rocks depends on weathering and erosion c. Describe how weathering agents and erosional processes (i.e., force of water as it freezes or flows, expansion/contraction due to temperature, force of wind, force of plant roots, action of gravity, chemical decomposition) slowly cause surface changes that create and/or change landforms d. Describe how the Earth's surface and surface materials can change abruptly through the activity of floods, rock/mudslides, or volcanoes		
ST			
DOK	a.3, b.2, c.2, d. 2		

Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)

2. Earth's Systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes			
Concept	Sixth	Seventh	Eighth
B. There are internal processes and sources of energy within the geosphere that cause changes in Earth's crustal plates	<i>Scope and Sequence – Internal Processes and External Events</i> a. Identify events (earthquakes, volcanic eruptions) and the landforms created by them on the Earth's surface that occur at different plate boundaries		<i>Scope and Sequence – Rock Cycle and Plate Tectonics</i> a. Explain convection currents are the result of uneven heating inside the mantle resulting in the melting of rock materials, convection of magma, eruption/flow of magma, and movement of crustal plates b. Explain how rock layers are affected by the folding, breaking, and uplifting of rock layers due to plate motion c. Describe how the movement of crustal plates can cause earthquakes and volcanic eruptions that can result in mountain building and trench formation
ST			
DOK	a. 2		a. 2, b. 2, c. 1
C. Continual changes in Earth's materials and surface that result from internal and external processes are described by the rock cycle			<i>Scope and Sequence – Rock Cycle and Plate Tectonics</i> a. Explain how heating and cooling in the mantle layer leads to the formation of metamorphic rocks and some igneous rocks b. Make inferences about the formation of igneous and metamorphic rocks from their physical properties (e.g., crystal size indicates rate of cooling, air pockets or glassy texture indicate volcanic activity) c. Explain and diagram the external and internal processes of the rock cycle (e.g., weathering and erosion, sedimentation, compaction, heating, recrystallization, resurfacing due to forces that drive plate motion)
ST			
DOK			a. 2, b. 2, c. 2
D. Changes in the Earth over time can be inferred through rock and fossil evidence	<i>Scope and Sequence – Internal Processes and external Events</i> a. Explain the types of fossils and the processes by which they are formed (i.e., replacement, mold and cast, preservation, trace) b. Use fossil evidence to make inferences about changes on Earth and in its environment (i.e., superposition of rock layers, similarities between fossils in different geographical locations, fossils of seashells indicate the area was once underwater)		<i>Scope and Sequence – Rock Cycle and Plate Tectonics</i> a. Describe the methods used to estimate geologic time and the age of the Earth (e.g., techniques used to date rocks and rock layers, presence of fossils) b. Use rock and fossil evidence to make inferences about the age, history, and changing life forms and environment of the Earth (i.e., changes in successive layers of sedimentary rock and the fossils contained within them, similarities between fossils in different geographic locations, similarities between fossils and organisms present today, fossils of organisms indicating changes in climate, fossils of extinct organisms)
ST			
DOK	a. 2, b. 3		a. 1, b. 2

Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)

2. Earth's Systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes			
Concept	Sixth	Seventh	Eighth
<p>E. Changes in the form of water as it moves through Earth's systems are described as the water cycle</p>		<p><i>Scope and Sequence – Weather and Climate</i></p> <p>a. Explain and trace the possible paths of water through the hydrosphere, geosphere, and atmosphere (i.e., the water cycle: evaporation, condensation, precipitation, surface run-off/ groundwater flow)</p> <p>b. Relate the different forms water can take (i.e., snow, rain, sleet, fog, clouds, dew, humidity) as it moves through the water cycle to atmospheric conditions (i.e., temperature, pressure, wind direction and speed, humidity) at a given geographic location</p> <p>c. Explain how thermal energy is transferred throughout the water cycle by the processes of convection, conduction, and radiation</p>	
ST			
DOK		a.2; b.2; c.2	
<p>F. Climate is a description of average weather conditions in a given area due to the transfer of energy and matter through Earth's systems</p>		<p><i>Scope and Sequence – Weather and Climate</i></p> <p>a. Explain how the differences in surface temperature, due to the different heating and cooling rates of water and soil, affect the temperature and movement of the air above</p> <p>b. Describe the characteristics of air masses (i.e., high/low barometric pressure, temperature) and predict their effect on the weather in a given location</p> <p>c. Identify weather conditions associated with cold fronts and warm fronts</p> <p>d. Identify factors that affect weather patterns in a particular region (e.g., proximity to large bodies of water, latitude, altitude, prevailing wind currents, amount of solar radiation, location with respect to mountain ranges)</p> <p>e. Collect and interpret weather data (e.g., cloud cover, precipitation, wind speed and direction) from weather instruments and maps to explain present day weather and to predict the next day's weather</p> <p>f. Describe the significant changes in temperature and barometric pressure may cause dramatic weather phenomena (i.e., severe thunderstorms, tornadoes, hurricanes)</p> <p>g. Differentiate between weather and climate.</p> <p>h. Identify factors that affect climate (e.g., latitude, altitude, prevailing wind currents, amount of solar radiation)</p>	
ST			
DOK		a.2; b.2; c.1; d.1; e.3; f.1; g. 2; h.1	

Strand 5: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere, and Hydrosphere)

3. Human activity is dependent upon and affects Earth's resources and systems

Concept	Sixth	Seventh	Eighth
A. Earth's materials are limited natural resources affected by human activity	<p><i>Scope and Sequence – Earth's Resources</i></p> <p>a. Relate the comparative amounts of fresh water and salt water on the Earth to the availability of water as a resource for living organisms and human activity</p> <p>b. Describe the affect of human activities (e.g., landfills, use of fertilizers and herbicides, farming, septic systems) on the quality of water</p> <p><i>Scope and Sequence – Internal Processes and External Events</i></p> <p>c. Analyze the ways humans affect the erosion and deposition of soil and rock materials (e.g., clearing of land, planting vegetation, paving land, construction of new buildings, building or removal of dams) and propose possible solutions.</p>	<p><i>Scope and Sequence – Energy Transformations</i></p> <p>a. Distinguish between renewable (e.g., geothermal, hydroelectric) and nonrenewable (e.g., fossil fuel) energy sources</p> <p><i>Scope and Sequence – Weather and Climate</i></p> <p>b. Provide examples of how the availability of fresh water for humans and other living organisms is dependent upon the water cycle</p>	
ST			
DOK	a. 2, b. 2, c. 3	a.1; b.2	

Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It

1. The universe has observable properties and structure			
Concept	Sixth	Seventh	Eighth
A. The Earth, Sun, and Moon are part of a larger system that includes other planets and smaller celestial bodies		<i>Scope and Sequence – Objects and Their Motion in the Solar System</i> a. Classify celestial bodies in the solar system into categories: Sun, Moon, planets, and other small bodies (i.e., asteroids, comets, meteors), based on physical properties b. Compare and contrast the size, composition, atmosphere, and surface of the planets (inner vs. outer) in our solar system and Earth's moon c. Describe the relative proximity of common celestial bodies (i.e., Sun, Moon, planets, smaller celestial bodies such as comets and meteors, other stars) in the sky to the Earth	
ST			
DOK		a.2; b.2; c.1	
B. The Earth has a composition and location suitable to sustain life		<i>Scope and Sequence – Objects and Their Motion in the Solar System</i> a. Describe how the Earth's placement in the solar system is favorable to sustain life (i.e., distance from the Sun, temperature, atmosphere) b. Compare and contrast the characteristics of Earth that support life with the characteristics of other planets that are considered favorable or unfavorable to life (e.g., atmospheric gases, extremely high/low temperatures)	
ST			
DOK		a.2; b.2	
C. Most of the information we know about the universe comes from the electromagnetic spectrum		<i>Scope and Sequence – Objects and Their Motion in the Solar System</i> a. Explain that stars are separated from one another by vast and different distances, which causes stars to appear smaller than the Sun b. Compare the distance light travels from the Sun to Earth to the distance light travels from other stars to Earth using light years	
ST			
DOK		a.1; b.2	

Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It

2. Regular and predictable motions of objects in the universe can be described and explained as the result of gravitational forces			
Concept	Sixth	Seventh	Eighth
A. The apparent position of the Sun and other stars, as seen from Earth, change in observable patterns		<i>Scope and Sequence – Objects and Their Motion in the Solar System</i> a. Relate the apparent east-to-west changes in the positions of the Sun, other stars, and planets in the sky over the course of a day to Earth's counterclockwise rotation about its axis b. Describe the pattern that can be observed in the changes in number of hours of visible sunlight, and the time and location of sunrise and sunset, throughout the year c. Describe how, in the Northern Hemisphere, the Sun appears lower in the sky during the winter and higher in the sky during the summer d. Describe how, in winter, the Sun appears to rise in the Southeast and set in the Southwest, accounting for a relatively short day length, and, in summer, the Sun appears to rise in the Northeast and set in the Northwest, accounting for a relatively long day length e. Describe how the Sun is never directly overhead when observed from North America	
ST			
DOK		a. 2; b.1; c.1; d.1; e.1	
B. The apparent position of the Moon, as seen from Earth, and its actual position relative to Earth change in observable patterns		<i>Scope and Sequence – Objects and Their Motion in the Solar System</i> a. Observe the change in time and location of Moon rise, Moon set, and the Moon's appearance relative to time of day and month over several months, and note the pattern in this change b. Describe how the Moon rises later each day due to its revolution around the Earth in a counterclockwise direction c. Describe how the Moon is in the sky for roughly 12 hours in a 24-hour period (i.e., if the Moon rises at about 6 P.M., it will set at about 6 A.M.) d. Describe how that one half of the Moon is always facing the Sun and, therefore, one half of the Moon is always lit e. Relate the apparent change in the Moon's position in the sky as it appears to move east-to-west over the course of a day to Earth's counterclockwise rotation about its axis f. Describe how the appearance of the Moon that can be seen from Earth changes approximately every 28 days in an observable pattern (moon phases)	
ST			
DOK		a.2; b.1; c.1; d.1; e.2; f.1	

Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It

2. Regular and predictable motions of objects in the universe can be described and explained as the result of gravitational forces			
Concept	Sixth	Seventh	Eighth
<p>C. The regular and predictable motions of a planet and moon relative to the Sun explain natural phenomena on a planet, such as day, month, year, shadows, moon phases, eclipses, tides, and seasons</p>		<p><i>Scope and Sequence – Objects and Their Motion in the Solar System</i></p> <ol style="list-style-type: none"> a. Illustrate and explain a day as the time it takes a planet to make a full rotation about its axis b. Diagram the path (orbital ellipse) the Earth travels as it revolves around the Sun c. Illustrate and explain a year as the time it takes a planet to revolve around the Sun d. Explain the relationships between a planet's length of year (period of revolution) and its position in the solar system e. Recognize and explain the phases of the moon are due to the relative positions of the Moon with respect to the Earth and Sun f. Relate the axial tilt and orbital position of the Earth as it revolves around the Sun to the intensity of sunlight falling on different parts of the Earth during different seasons 	
ST			
DOK		a.1; b.1; c.1; d.2; e.2; f.2	
<p>D. Gravity is a force of attraction between objects in the solar system that governs their motion</p>		<p><i>Scope and Sequence – Objects and Their Motion in the Solar System</i></p> <ol style="list-style-type: none"> a. Describe how the Earth's gravity pulls any object on or near the Earth toward it (including natural and artificial satellites) b. Describe how the planets' gravitational pull keeps satellites and moons in orbit around them c. Describe how the Sun's gravitational pull holds the Earth and other planets in their orbits 	
ST			
DOK		a.1; b.1; c.1	

Strand 7: Scientific Inquiry

1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking			
Concept	Sixth	Seventh	Eighth
<p>A. Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation</p>	<p><i>Scope and Sequence - All Units</i></p> <ul style="list-style-type: none"> a. Formulate testable questions and hypotheses b. Identify and describe the importance of the independent variable, dependent variables, control of constants, and multiple trials to the design of a valid experiment c. Design and conduct a valid experiment d. Evaluate the design of an experiment and make suggestions for reasonable improvements or extensions of an experiment e. Recognize different kinds of questions suggest different kinds of scientific investigations (e.g., some involve observing and describing objects, organisms, or events; some involve collecting specimens; some involve experiments; some involve making observations in nature; some involve discovery of new objects and phenomena; some involve making models) 	<p><i>Scope and Sequence - All Units</i></p> <ul style="list-style-type: none"> a. Formulate testable questions and hypotheses b. Identify and describe the importance of the independent variable, dependent variables, control of constants, and multiple trials to the design of a valid experiment c. Design and conduct a valid experiment d. Evaluate the design of an experiment and make suggestions for reasonable improvements or extensions of an experiment e. Recognize that different kinds of questions suggest different kinds of scientific investigations (e.g., some involve observing and describing objects organisms, or events; some involve collecting specimens; some involve experiments; some involve making observations in nature; some involve discovery of new objects and phenomena; some involve making models) f. Acknowledge there is no fixed procedure called “the scientific method”, but some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and imagination in developing hypotheses and other explanations 	<p><i>Scope and Sequence - All Units</i></p> <ul style="list-style-type: none"> a. Formulate testable questions and hypotheses b. Identify and describe the importance of the independent variable, dependent variables, control of constants, and multiple trials to the design of a valid experiment c. Design and conduct a valid experiment d. Evaluate the design of an experiment and make suggestions for reasonable improvements or extensions of an experiment e. Recognize that different kinds of questions suggest different kinds of scientific investigations (e.g., some involve observing and describing objects organisms, or events; some involve collecting specimens; some involve experiments; some involve making observations in nature; some involve discovery of new objects and phenomena; some involve making models) f. Acknowledge there is no fixed procedure called “the scientific method”, but some investigations involve systematic observations, carefully collected and relevant evidence, logical reasoning, and imagination in developing hypotheses and other explanations
ST			
DOK	a. 2, b. 2, c. 4, d.3, e. 2	a. 2, b. 2, c. 4, d.3, e. 2; f.1	a. 2, b. 2, c. 4, d.3, e. 2; f.1
<p>B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations</p>	<p><i>Scope and Sequence - All Units</i></p> <ul style="list-style-type: none"> a. Make qualitative observations using the five senses b. Determine the appropriate tools and techniques to collect data c. Use a variety of tools and equipment to gather data (e.g., microscopes, thermometers, computers, spring scales, balances, magnets, metric rulers, graduated cylinders, stopwatches) d. Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, temperature to the nearest degree Celsius, force (weight) to the nearest Newton, time to the nearest second e. Compare amounts/measurements f. Judge whether measurements and computation of quantities are reasonable 	<p><i>Scope and Sequence - All Units</i></p> <ul style="list-style-type: none"> a. Make qualitative observations using the five senses b. Determine the appropriate tools and techniques to collect data c. Use a variety of tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders, stopwatches) d. Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second e. Compare amounts/measurements f. Judge whether measurements and computation of quantities are reasonable g. Calculate the range and average/mean of a set of data 	<p><i>Scope and Sequence - All Units</i></p> <ul style="list-style-type: none"> a. Make qualitative observations using the five senses b. Determine the appropriate tools and techniques to collect data c. Use a variety of tools and equipment to gather data (e.g., microscopes, thermometers, analog and digital meters, computers, spring scales, balances, metric rulers, graduated cylinders, stopwatches) d. Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, force (weight) to the nearest Newton, temperature to the nearest degree Celsius, time to the nearest second e. Compare amounts/measurements f. Judge whether measurements and computation of quantities are reasonable g. Calculate the range and average/mean of a set of data
ST			
DOK	a. 1, b. 2, c. 1, d.1, e. 2. f. 3	a. 1, b. 2, c. 1, d.1, e. 2. f. 3 g. 1	a. 1, b. 2, c. 1, d.1, e. 2. f. 3, g.1

Strand 7: Scientific Inquiry

1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking			
Concept	Sixth	Seventh	Eighth
<p>C. Scientific inquiry includes evaluation of explanations (laws/principles, theories/models) in light of evidence (data) and scientific principles (understandings)</p>	<p><i>Scope and Sequence - All Units</i></p> <ul style="list-style-type: none"> a. Use quantitative and qualitative data as support for reasonable explanations (conclusions) b. Use data as support for observed patterns and relationships, and to make predictions to be tested c. Determine the possible effects of errors in observations, measurements, and calculations on the formulation of explanations (conclusions) d. Evaluate the reasonableness of an explanation (conclusion) e. Analyze whether evidence (data) and scientific principles support proposed explanations (hypotheses, laws, theories) 	<p><i>Scope and Sequence - All Units</i></p> <ul style="list-style-type: none"> a. Use quantitative and qualitative data as support for reasonable explanations (conclusions) b. Use data as support for observed patterns and relationships, and to make predictions to be tested c. Determine the possible effects of errors in observations, measurements, and calculations on the formulation of explanations (conclusions) d. Evaluate the reasonableness of an explanation (conclusion) e. Analyze whether evidence (data) and scientific principles support proposed explanations (hypotheses, laws, theories) 	<p><i>Scope and Sequence - All Units</i></p> <ul style="list-style-type: none"> a. Use quantitative and qualitative data as support for reasonable explanations (conclusions) b. Use data as support for observed patterns and relationships, and to make predictions to be tested c. Determine the possible effects of errors in observations, measurements, and calculations on the formulation of explanations (conclusions) d. Evaluate the reasonableness of an explanation (conclusion) e. Analyze whether evidence (data) and scientific principles support proposed explanations (hypotheses, laws, theories)
ST			
DOK	a.2; b.2; c.2; d.3; e.2	a.2; b.2; c.2; d.3; e.2	a.2; b.2; c.2; d.3; e.2
<p>D. The nature of science relies upon communication of results and justification of explanations</p>	<p><i>Scope and Sequence - All Units</i></p> <ul style="list-style-type: none"> a. Communicate the procedures and results of investigations and explanations through: <ul style="list-style-type: none"> ⇒ oral presentations ⇒ drawings and maps ⇒ data tables (allowing for the recording and analysis of data relevant to the experiment, such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities) ⇒ graphs (bar, single line, pictograph) ⇒ writings 	<p><i>Scope and Sequence - All Units</i></p> <ul style="list-style-type: none"> a. Communicate the procedures and results of investigations and explanations through: <ul style="list-style-type: none"> ⇒ oral presentations ⇒ drawings and maps ⇒ data tables (allowing for the recording and analysis of data relevant to the experiment, such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities) ⇒ graphs (bar, single line, pictograph) ⇒ equations and writings 	<p><i>Scope and Sequence - All Units</i></p> <ul style="list-style-type: none"> a. Communicate the procedures and results of investigations and explanations through: <ul style="list-style-type: none"> ⇒ oral presentations ⇒ drawings and maps ⇒ data tables (allowing for the recording and analysis of data relevant to the experiment, such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities) ⇒ graphs (bar, single line, pictograph) ⇒ equations and writings
ST			
DOK	a. 2	a.2	a.2

Strand 8: Impact of Science, Technology and Human Activity

1. The nature of technology can advance, and is advanced by, science as it seeks to apply scientific knowledge in ways that meet human needs			
Concept	Sixth	Seventh	Eighth
A. Designed objects are used to do things better or more easily and to do some things that could not otherwise be done at all	<i>Scope and Sequence - All Units</i> a. Explain how technological improvements, such as those developed for use in space exploration, the military, or medicine, have led to the invention of new products that may improve lives here on Earth (e.g., new materials, freeze-dried foods, infrared goggles, Velcro, satellite imagery, robotics, lasers)		
ST			
DOK	a.2	a.2	a.2
B. Advances in technology often result in improved data collection and an increase in scientific information	<i>Scope and Sequence - All Units</i> Identify the link between technological developments and the scientific discoveries made possible through their development (e.g., Hubble telescope and stellar evolution, composition and structure of the universe; the electron microscope and cell organelles; sonar and the composition of the Earth; manned and unmanned space missions and space exploration; Doppler radar and weather conditions; MRI and CAT-scans and brain activity)		
ST			
DOK	a.2	a.2	a.2
C. Technological solutions to problems often have drawbacks as well as benefits	<i>Scope and Sequence - All Units</i> a. Describe how technological solutions to problems (e.g., storm water runoff, fiber optics, windmills, efficient car design, electronic trains without conductors, sonar, robotics, Hubble telescope) can have both benefits and drawbacks (e.g., design constraints, unintended consequences, risks) (Assess Locally)		
ST			
DOK	a.2	a.2	a.2

Strand 8: Impact of Science, Technology and Human Activity

2. Historical and cultural perspectives of scientific explanations help to improve understanding of the nature of science and how science knowledge and technology evolve over time			
Concept	Sixth	Seventh	Eighth
<p>A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations</p>	<p><i>Scope and Sequence - All Units</i> a. Describe how the contributions of scientists and inventors, representing different cultures, races, and gender, have contributed to science, technology and human activity (e.g., George Washington Carver, Thomas Edison, Thomas Jefferson, Isaac Newton, Marie Curie, Galileo, Albert Einstein, Mae Jemison, Edwin Hubble, Charles Darwin, Jonas Salk, Louis Pasteur, Jane Goodall, Tom Akers, John Wesley Powell, Rachel Carson) (Assess Locally)</p>		
ST			
DOK	a.2	a.2	a.2
<p>B Scientific theories are developed based on the body of knowledge that exists at any particular time and must be rigorously questioned and tested for validity</p>	<p><i>Scope and Sequence - All Units</i> a. Describe the difficulty science innovators experience as they attempt to break through accepted ideas (hypotheses, laws, theories) of their time to reach conclusions that may lead to changes in those ideas and serve to advance scientific understanding (e.g., Darwin, Copernicus, Newton) b. Describe explanations have changed over time as a result of new evidence</p>		
ST			
DOK	a.2; b.2	a.2; b.2	a.2; b.2

Strand 8: Impact of Science, Technology and Human Activity

3. Science and technology affect, and are affected by, society			
Concept	Sixth	Seventh	Eighth
A. People, alone or in groups, are always making discoveries about nature and inventing new ways to solve problems and get work done	Not assessed at this level		
B. Social, political, economic, ethical and environmental factors strongly influence, and are influenced by, the direction of progress of science and technology	<i>Scope and Sequence - All Units</i> a. Describe ways in which science and society influence one another (e.g., scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment; societal challenges often inspire questions for scientific research; social priorities often influence research priorities through the availability of funding for research) b. Identify and evaluate the physical, social, economic, and/or environmental problems that may be overcome using science and technology (e.g., the need for alternative fuels, human travel in space, AIDS)		
ST			
DOK	a.2; b.3	a.2; b.3	a.2; b.3
C. Scientific ethics require that scientists must not knowingly subject people or the community to health or property risks without their knowledge and consent	Not assessed at this level		
D. Scientific information is presented through a number of credible sources, but is at times influenced in such a way to become non-credible	Not assessed at this level		