

Missouri Science Grade Level Expectations, 2008	ESS Presentations
Kindergarten	
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	
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them	
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)	Marvellous Materials Materials Matter Senses Changing Materials Hot and Cold
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)	Materials Matter Marvellous Materials
c. Sort objects based on observable physical properties (e.g., size, material, color, shape, mass)	Marvellous Materials
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	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver	
a. Identify the sounds and their source of vibrations in everyday life (e.g., alarms, car horns, animals, machines, musical instruments)	Senses
b. Compare different sounds (i.e., loudness, pitch, rhythm)	Senses Sounds
c. Identify the ear as a receiver of vibrations that produce sound	Senses
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	
A. The motion of an object is described as a change in position, direction, and speed relative to another object (frame of reference)	
a. Describe an object's position relative to another object (e.g., above, below, in front of, behind)	
Strand 2: Properties and Principles of Force and Motion: 2. Forces affect motion	
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	

K-2 Product
3-5 Product

a. Identify ways (push, pull) to cause some objects to move by touching them	Feel the Force
b. Identify magnets cause some objects to move without touching them	Mysterious Magnets
Strand 3: Characteristics and Interactions of Living Organisms: 1. There is a fundamental unity underlying the diversity of all living organisms	
D. Plants and animals have different structures that serve similar functions necessary for the survival of the organism	
a. Observe and compare the structures and behaviors of different kinds of plants and animals	Animals and Plants Living Things
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 productive processes	
D. There is heritable variation within every species of organism	
a. Identify that living things have offspring based on the organisms' physical similarities and differences	Growing Up
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments: 1. Organisms are interdependent with one another and with their environment	
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	
a. Describe how the seasons affect the behavior of plants and animals.	Weather
b. Describe how the seasons affect the everyday life of humans (e.g., clothing, activities	Weather
Strand 5: Processes and Interactions of the Earth's Systems: 1. Earth's systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures	
C. The atmosphere (air) is composed of a mixture of gases, including water vapor, and minute particles	
a. Observe wind as moving air that is felt	
Strand 5: Processes and Interactions of the Earth's Systems: 2. Earth's systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes	
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	
a. Observe and describe daily weather: precipitation (e.g., snow, rain, sleet, fog), wind (i.e., light breezes to strong wind), cloud cover, temperature	Weather

b. Observe and describe the general weather conditions that occur during each season	Weather
Strand 6: Composition and Structure of the Universe and the Motion of the Objects	
Within It: 1. The universe has observable properties and structure	
A. The Earth, Sun, and Moon are part of a larger system that includes other planets and smaller celestial bodies	
a. Observe and describe the presence of the Sun, Moon, and stars in the sky	Weather
b. Observe there are more stars in the sky than anyone can count and that they are scattered unevenly and vary in brightness	
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	
A. The apparent position of the Sun and other stars, as seen from Earth, change in observable patterns	
a. Describe the Sun as only being seen in the daytime and appears to move across the sky from morning to night	Weather Shadows
B. The apparent position of the moon, as seen from Earth, and its actual position relative to Earth change in observable patterns	
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	The Moon
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	
a. Observe and describe the characteristics of the four seasons as they cycle through the year (summer, fall, winter, spring)	Weather
Strand 7: Scientific Inquiry: 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
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	
a. Pose questions about objects, materials, organisms and events in the environment	Mysterious Magnets Hot and Cold Living Things
b. Conduct a simple investigation (fair test) to answer a question	Hot and Cold Senses

B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	
	<ul style="list-style-type: none"> Marvellous Materials Materials Matter Senses Changing Materials Hot and Cold Animals and Plants Living Things Weather Growing Up Light and Dark Feel the Force
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)	<ul style="list-style-type: none"> Mysterious Magnets Magnets Weather
c. Measure length and mass using non-standard units	
d. Compare amounts/measurements	
C. Scientific inquiry includes evaluation of explanations (laws/ principles, theories /models) in light of evidence (data) and scientific principles (understandings)	
a. Use observations as support for reasonable explanations	<ul style="list-style-type: none"> Materials Matter Hot and Cold Senses
b. Use observations to describe relationships and patterns and to make predictions to be tested	<ul style="list-style-type: none"> Mysterious Magnets Hot and Cold Living Things
c. Compare explanations with prior knowledge	
D. The nature of science relies upon communication of results and justification of explanations	
	<ul style="list-style-type: none"> Changing Materials Senses Living Things Light and Dark Materials Matter Hot and Cold
a. Communicate observations using words, pictures, and numbers	

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	
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	
a. Observe and identify that some objects occur in nature (natural objects); others have been designed and made by people	Changing Materials
B. Advances in technology often result in improved data collection and an increase in scientific information	
a. Describe how tools have helped scientists make better observations (i.e., magnifiers)	
Strand 8: Impact of Science, Technology and Human Activity: 3. Science and technology affect, and are affected by, society	
A. People, alone or in groups, are always making discoveries about nature and inventing new ways to solve problems and get work done	
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	
Grade One	
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	
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them	
a. Given an equal-arm balance and various objects, illustrate arrangements in which the beam is balanced	
b. Measure and compare the mass of objects (more/less)	
c. Order objects according to mass	
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	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver	
a. Identify the source of energy that causes an increase in the temperature of an object (e.g., Sun, stove, flame, light bulb)	Hot and Cold
b. Compare the temperature of hot and cold objects using a simple thermometer	Changing State

c. Describe the change in temperature of an object as warmer or cooler	Hot and Cold
C. Electromagnetic energy from the Sun (solar radiation) is a major source of energy on Earth	
a. Identify light from the Sun as a basic need of most plants	Living Things Growing Plants
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	
A. The motion of an object is described as a change in position, direction, and speed relative to another object (frame of reference)	
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	Feel the Force
c. Compare the speeds (faster vs. slower) of two moving objects	
Strand 2: Properties and Principles of Force and Motion: 2. Forces affect motion	
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	
a. Identify the force (i.e., push or pull) required to do work (move an object)	Feel the Force
D. Newton's Laws of Motion explain the interaction of mass and forces, and are used to predict changes in motion	
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)	Feel the Force Springs
Strand 3: Characteristics and Interactions of Living Organisms: 1. There is a fundamental unity underlying the diversity of all living organisms	
A. Organisms have basic needs for survival	
a. Identify the basic needs of most animals (i.e., air, water, food, shelter)	Living Things
b. Identify the basic needs of most plants (i.e., air, water, light)	Living Things Growing Plants
c. Predict and investigate the growth of plants when growing conditions are altered (e.g., dark vs. light, water vs. no water)	Living Things Growing Plants
D. Plants and animals have different structures that serve similar functions necessary for the survival of the organism	
a. Identify and compare the physical structures of a variety of plants (e.g., stem, leaves, flowers, seeds, roots)	Animals and Plants Growing Plants

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)	Animals and Plants
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)	Growing Plants
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)	
E. Biological classifications are based on how organisms are related	
a. Distinguish between plants and animals based on observable structures and behaviors	Animals and Plants
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments: 1. Organisms are interdependent with one another and with their environment	
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	
a. Identify ways man depends on plants and animals for food, clothing, and shelter	Growing Plants
Strand 5: Processes and Interactions of the Earth's Systems: 2. Earth's systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes	
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	
a. Observe, measure, record weather data throughout the year (i.e., cloud cover, temperature, precipitation, wind speed) by using thermometers, rain gauges, wind socks	Weather
b. Compare temperatures in different locations (e.g., inside, outside, in the sun, in the shade)	
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)	Weather
d. Identify patterns indicating relationships between observed weather data and weather phenomena (e.g., temperature and types of precipitation, clouds and amounts of precipitation)	
Strand 5: Processes and Interactions of the Earth's Systems: 3. Human activity is dependent upon and affects Earth's resources and systems	

A. Earth's materials are limited natural resource's affected by human activity	
a. Observe and describe ways water, both as a solid and liquid, is used in everyday activities at different times of the year (e.g., bathe, drink, make ice cubes, build snowmen, cook, swim)	Hot and Cold Pollution
Strand 7: Scientific Inquiry: 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
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	
a. Pose questions about objects, materials, organisms, and events in the environment	Mysterious Magnets Hot and Cold Living Things Growing Plants Shadows Soil
b. Plan and conduct a simple investigation (fair test) to answer a question	Soil Hot and Cold Springs Growing Plants
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	

<p>a. Make qualitative observations using the five senses</p>	<p>Marvellous Materials Materials Matter Senses Hot and Cold Changing Materials Animals and Plants Living Things Mysterious Magnets Growing Up Growing Plants Feel the Force Soil Rocks Magnets Springs Shadows Light and Dark Weather</p>
<p>b. Make observations using simple tools and equipment (e.g., magnifiers/hand lenses, magnets, equal arm balances, thermometers)</p>	<p>Magnets Weather Growing Plants Springs Soil</p>
<p>c. Measure length, mass, and temperature using standard and non-standard units</p>	<p>Growing Plants Springs Weather</p>
<p>d. Compare amounts/measurements</p>	
<p>C. Scientific inquiry includes evaluation of explanations (laws/ principles, theories /models) in light of evidence (data) and scientific principles (understandings)</p>	

a. Use observations as support for reasonable explanations	Hot and Cold Materials Matter Senses Springs Growing Plants Shadows Rocks
b. Use observations to describe relationships and patterns and to make predictions to be tested	Mysterious Magnets Hot and Cold Living Things Growing Plants Shadows Soil
c. Compare explanations with prior knowledge	
D. The nature of science relies upon communication of results and justification of explanations	
a. Communicate simple procedures and results of investigations and explanations through: oral presentations, drawings and maps, data tables, graphs (bar, pictograph), writings	Changing Materials Senses Living Things Light and Dark Materials Matter Hot and Cold Springs Growing Plants Rocks
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	
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	
a. Observe and identify that some objects occur in nature (natural objects); others have been designed and made by people	Changing Materials
B. Advances in technology often result in improved data collection and an increase in scientific information	
a. Describe how tools have helped scientists make better observations (e.g., magnifiers, balances, thermometers)	

Strand 8: Impact of Science, Technology and Human Activity: 3. Science and technology affect, and are affected by, society	
A. People, alone or in groups, are always making discoveries about nature and inventing new ways to solve problems and get work done	
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	
Grade Two	
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	
A. Objects, and the materials they are made of, have properties that can be used to describe and classify them	
a. Describe and compare the physical properties of objects by using simple tools (i.e., thermometer, magnifier, centimeter ruler, balance, magnet)	Magnets Weather Growing Plants Springs Soil
b. Classify objects/substances as “one kind of material” or a mixture	Separating Mixtures
B. Properties of mixtures depend upon the concentrations, properties, and interactions of particles	
a. Observe and describe how mixtures are made by combining solids	Separating Mixtures
b. Describe ways to separate the components of a mixture by their physical properties (e.g., sorting, magnets, screening)	Separating Mixtures Mysterious Magnets
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	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver	
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)	Sounds
c. Describe how the ear serves as a receiver of sound (i.e., sound vibrates eardrum)	Sounds
d. Describe how to change the loudness of a sound (i.e., increase or decrease the force causing vibrations)	Sounds

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	
B. An object that is accelerating is speeding up, slowing down, or changing direction	
a. Describe Earth's gravity as a force that pulls objects on or near the Earth toward the Earth without touching the object	Gravity
Strand 2: Properties and Principles of Force and Motion: 2. Forces affect motion	
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	
a. Identify magnets attract and repel each other and certain materials	Magnets Mysterious Magnets
b. Describe magnetism as a force that can push or pull other objects without touching them	Magnets
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)	Friction Magnets
B. Every object exerts a gravitational force on every other object	
a. Describe Earth's gravity as a force that pulls objects on or near the Earth toward the Earth without touching the object	Gravity
D. Newton's Laws of Motion explain the interaction of mass and forces, and are used to predict changes in motion	
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)	Feel the Force Springs
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	
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	
F. Work transfers energy into and out of a mechanical system	
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	
Strand 3: Characteristics and Interactions of Living Organisms: 1. There is a fundamental unity underlying the diversity of all living organisms	
B. Organisms progress through life cycles unique to different types of organisms	
a. Identify and sequence life cycles (birth, growth, and development, reproduction and death) of animals (i.e., butterfly, frog, chicken, snake, dog)	Growing Up
b. Record observations on the life cycle of different animals (e.g., butterfly, dog, frog, chicken, snake)	Growing Up
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 productive processes	
D. There is heritable variation within every species of organism	
a. Identify and relate the similarities and differences among animal parents and their offspring or multiple offspring	Growing Up
Strand 5: Processes and Interactions of the Earth's Systems: 1. Earth's systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures	
A. The Earth's crust is composed of various materials, including soil, minerals, and rocks, with characteristic properties	
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	Soil
b. Observe and describe the physical properties of rocks (e.g., size, shape, color, presence of fossils)	Rocks
Strand 5: Processes and Interactions of the Earth's Systems: 2. Earth's systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes	
A. The Earth's materials and surface features are changed through a variety of external processes	
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	Soil Rocks Erosion, Transportation and Deposition
Strand 5: Processes and Interactions of the Earth's Systems: 3. Human activity is dependent upon and affects Earth's resources and systems	

A. Earth's materials are limited natural resource's affected by human activity	
a. Observe and describe ways humans use Earth's materials (e.g., soil, rocks) in a daily life	Rocks Pollution
Strand 7: Scientific Inquiry: 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
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	
a. Pose questions about objects, materials, organisms and events in the environment	Mysterious Magnets Hot and Cold Living Things Growing Plants Shadows Soil
b. Plan and conduct a simple investigation (fair test) to answer a question	Soil Hot and Cold Springs Growing Plants
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	

<p>a. Make qualitative observations using the five senses</p>	<p>Marvellous Materials Materials Matter Senses Hot and Cold Changing Materials Animals and Plants Living Things Mysterious Magnets Growing Up Growing Plants Feel the Force Soil Rocks Magnets Springs Shadows Light and Dark Weather</p>
<p>b. Make observations using simple tools and equipment (e.g., magnifiers/hand lenses, magnets, equal arm balances, thermometers)</p>	<p>Magnets Weather Growing Plants Springs Soil</p>
<p>c. Measure length, mass, and temperature using standard and non-standard units</p>	<p>Growing Plants Springs Weather</p>
<p>d. Compare amounts/measurements</p>	
<p>C. Scientific inquiry includes evaluation of explanations (laws/ principles, theories /models) in light of evidence (data) and scientific principles (understandings)</p>	

a. Use observations as support for reasonable explanations	Hot and Cold Materials Matter Senses Springs Growing Plants Shadows Rocks
b. Use observations to describe relationships and patterns and to make predictions to be tested	Mysterious Magnets Hot and Cold Living Things Growing Plants Shadows Soil
c. Compare explanations with prior knowledge	
D. The nature of science relies upon communication of results and justification of explanations	
a. Communicate simple procedures and results of investigations and explanations through: oral presentations; drawings and maps; data tables; graphs (bar, pictograph); writings	Changing Materials Senses Living Things Light and Dark Materials Matter Hot and Cold Springs Growing Plants Rocks
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	
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	
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	Sounds
B. Advances in technology often result in improved data collection and an increase in scientific information	

a. Describe how tools have helped scientists make better observations, measurements, or equipment for investigations (e.g., magnifiers, balances, stethoscopes, thermometers)	
Strand 8: Impact of Science, Technology and Human Activity: 3. Science and technology affect, and are affected by, society	
A. People, alone or in groups, are always making discoveries about nature and inventing new ways to solve problems and get work done	
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	
Grade 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	
D. Physical changes in the state of matter that result from thermal changes can be explained by the Kinetic Theory of Matter	
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)	Changing State
b. Identify everyday objects/substances as solid, liquid, or gas (e.g., air, water)	Changing State
c. Observe and identify that water evaporates (liquid water changes into a gas as it moves into the air)	Changing State
d. Measure and compare the temperature of water when it exists as a solid to its temperature when it exists as a liquid	Changing State
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	Changing State
f. Describe the changes in the physical properties of water (i.e., shape, volume) when frozen or melted	Changing State
g. Predict and investigate the effect of heat (thermal energy) (i.e., change in temperature, melting, evaporation) on objects and materials	Changing State
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	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver	

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	Changing State Separating Mixtures Water Cycle
b. Identify sources of light energy (e.g., Sun, bulbs, flames)	Light and Dark Energy Forms
c. Observe light being transferred from the source to the receiver (eye) through space	Reflection and Refraction
d. Identify the three things (light source, object, and surface) necessary to produce a shadow	Shadows
C. Electromagnetic energy from the Sun (solar radiation) is a major source of energy on Earth	
a. Identify the Sun as the primary source of light and food energy on Earth	Food Chains
Strand 3: Characteristics and Interactions of Living Organisms: 1. There is a fundamental unity underlying the diversity of all living organisms	
A. Organisms have basic needs for survival	
a. Describe the basic needs of most plants (i.e., air, water, light, nutrients, temperature)	Growing Plants Plant Reproduction
B. Organisms progress through life cycles unique to different types of organisms	
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)	Plant Reproduction
D. Plants and animals have different structures that serve similar functions necessary for the survival of the organism	
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)	Growing Plants Plant Reproduction
Strand 3: Characteristics and Interactions of Living Organisms: 2. Living organisms carry out life processes in order to survive	
C. Complex multicellular organisms have systems that interact to carry out life processes through physical and chemical means	
a. Illustrate and trace the path of water and nutrients as they move through the transport system of a plant	Growing Plants
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 productive processes	
D. There is heritable variation within every species of organism	

a. Identify and relate the similarities and differences between plants and their offspring (i.e., seedlings)	Plant Reproduction
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments: 2. Matter and energy flow through an ecosystem	
A. As energy flows through the ecosystem, all organisms capture a portion of that energy and transform it to a form they can use	
a. Identify sunlight as the primary source of energy plants use to produce their own food	Food Chains
b. Classify populations of organisms as producers or consumers by the role they serve in the ecosystem	Food Chains Interdependence
c. Sequence the flow of energy through a food chain beginning with the Sun	Food Chains
d. Predict the possible effects of removing an organism from a food chain	Interdependence
Strand 5: Processes and Interactions of the Earth's Systems: 1. Earth's systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures	
C. The atmosphere (air) is composed of a mixture of gases, including water vapor, and minute particles	
a. Identify that liquid water can be changed into a gas (vapor) in the air.	Changing State Water Cycle
b. Identify that clouds are composed of tiny droplets of water	Water Cycle Predicting the Weather
c. Identify air as a substance that surrounds us, taking up space and moves around us as wind	
Strand 5: Processes and Interactions of the Earth's Systems: 2. Earth's systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes	
E. Changes in the form of water as it moves through Earth's systems are described as the water cycle	
a. Describe clouds and precipitation as forms of water	Water Cycle
Strand 6: Composition and Structure of the Universe and the Motion of the Objects Within It: 1. The universe has observable properties and structure	
A. The Earth, Sun, and Moon are part of a larger system that includes other planets and smaller celestial bodies	
a. Describe our Sun as a star because it provides light energy to the solar system	Our Solar System
b. Observe and identify the Moon as a reflection of light	The Moon

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	
A. The apparent position of the Sun and other stars, as seen from Earth, change in observable patterns	
a. Illustrate and describe how the Sun appears to move slowly across the sky from east to west during the day	Days and Seasons
B. The apparent position of the moon, as seen from Earth, and its actual position relative to Earth change in observable patterns	
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)	The Moon
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	
a. Observe and identify there is a day/night cycle every 24 hours	Days and Seasons
b. Describe the changes in length and position (direction) of shadows from morning to midday to afternoon	Shadows Days and Seasons
c. Describe how the Sun's position in the sky changes the length and position of shadows	Shadows Days and Seasons
Strand 7: Scientific Inquiry: 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
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	
a. Pose questions about objects, materials, organisms, and events in the environment	Separating Mixtures Friction Circuits Plant Reproduction Sounds Forces

b. Plan and conduct a fair test to answer a question	Separating Mixtures Friction Plant Reproduction Forces
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	
a. Make qualitative observations using the five senses	Habitats Food Chains Insulators and Conductors Changing State Separating Mixtures Friction Circuits Body Systems Plant Reproduction Days and Seasons The Moon Sounds Adaptations Interdependence Microorganisms Gravity Forces Reflection and Refraction Water Cycle Erosion, Transportation and Deposition Pollution Electromagnets Fossils Our Solar System Predicting the Weather Energy Forms
b. Make observations using simple tools and equipment (e.g., hand lenses, magnets, thermometers, metric rulers, balances, graduated cylinders)	Changing State Magnets Soil

c. Measure length to the nearest centimeter, mass using grams, temperature using degrees Celsius, volume using liters	Changing State
d. Compare amounts/measurements	
e. Judge whether measurements and computation of quantities are reasonable	
C. Scientific inquiry includes evaluation of explanations (laws/ principles, theories /models) in light of evidence (data) and scientific principles (understandings)	
a. Use quantitative and qualitative data as support for reasonable explanations	Insulators and Conductors Separating Mixtures Friction Plant Reproduction
b. Use data as support for observed patterns and relationships, and to make predictions to be tested	Insulators and Conductors Separating Mixtures Friction Plant Reproduction Forces
c. Evaluate the reasonableness of an explanation	Insulators and Conductors Separating Mixtures Friction Plant Reproduction Forces
d. Analyze whether evidence supports proposed explanations	Separating Mixtures Friction Circuits Plant Reproduction Sounds Forces
D. The nature of science relies upon communication of results and justification of explanations	
a. Communicate simple procedures and results of investigations and explanations through: oral presentations; drawings and maps; data tables; graphs (bar, single line, pictograph); writings	Insulators and Conductors Separating Mixtures Friction Plant Reproduction Circuits Forces Sounds

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	
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	
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)	
B. Advances in technology often result in improved data collection and an increase in scientific information	
a. Describe how new technologies have helped scientists make better observations and measurements for investigations (e.g., telescopes, magnifiers, balances, microscopes, computers, stethoscopes, thermometers)	Our Solar System Changing State Microorganisms
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	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations	
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	
Strand 8: Impact of Science, Technology and Human Activity: 3. Science and technology affect, and are affected by, society	
A. People, alone or in groups, are always making discoveries about nature and inventing new ways to solve problems and get work done	
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	
Grade Four	
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	

A. Objects, and the materials they are made of, have properties that can be used to describe and classify them	
a. Describe and compare the masses (the amount of matter in an object) of objects to the nearest gram using balances	
b. Describe and compare the volumes (the amount of space an object occupies) of objects using a graduated cylinder	
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)	
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	
B. Properties of mixtures depend upon the concentrations, properties, and interactions of particles	
a. Identify water as a solvent that dissolves materials (Do NOT assess the term solvent)	Separating Mixtures
b. Observe and describe how mixtures are made by combining solids or liquids, or a combination of these	Separating Mixtures
c. Distinguish between the components in a mixture/solution (e.g., trail mix, conglomerate rock, salad, soil, salt water)	Separating Mixtures
d. Describe ways to separate the components of a mixture/solution by their properties (i.e., sorting, filtration, magnets, screening)	Separating Mixtures
I. Mass is conserved during any physical or chemical change	
a. Observe that the total mass of a material remains constant whether it is together, in parts, or in a different state	
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	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver	
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)	Circuits
b. Observe and describe the evidence of energy transfer in a closed series circuit (e.g., lit bulb, moving motor, fan)	Circuits
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)	Insulators and Conductors

F. Energy can be transferred within a system as the total amount of energy remains constant (i.e., Law of Conservation of Energy)	
a. Identify the evidence of energy transformations (temperature change, light, sound, motion, and magnetic effects) that occur in electrical circuits	Circuits Electromagnets
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	
A. The motion of an object is described as a change in position, direction, and speed relative to another object (frame of reference)	
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	
Strand 2: Properties and Principles of Force and Motion: 2. Forces affect motion	
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	
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)	
b. Describe and compare forces (measured by a spring scale in Newton's) applied to objects in a single line.	Forces Gravity
c. Observe and identify friction as a force that slows down or stops a moving object that is touching another object or surface	Friction
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)	Friction
B. Every object exerts a gravitational force on every other object	
a. Determine the gravitational pull of the Earth on an object (weight) using a spring scale	Gravity
D. Newton's Laws of Motion explain the interaction of mass and forces, and are used to predict changes in motion	
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)	Forces
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)	Forces Gravity Friction
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	

d. Predict the effects of an electrostatic force (static electricity) on the motion of objects (attract or repel)	
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments: 1. Organisms are interdependent with one another and with their environment	
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	
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)	Habitats Food Chains Adaptations Interdependence Plant Reproduction
b. Identify and describe different environments (i.e. pond, forest, prairie) support the life of different types of plants and animals	Habitats Food Chains Adaptations Interdependence
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	
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)	Pollution
Strand 4: Changes in Ecosystems and Interactions of Organisms with their Environments: 2. Matter and energy flow through an ecosystem	
A. As energy flows through the ecosystem, all organisms capture a portion of that energy and transform it to a form they can use	
a. Classify populations of organisms as producers and consumers by the role they serve in the ecosystem	Food Chains Interdependence
b. Differentiate between the types of consumers (herbivore, carnivore, omnivore, and detritivore/decomposer)	Interdependence
c. Categorize organisms as predator or prey in a given ecosystem	Food Chains
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	
A. Evidence for the nature and rates of evolution can be found in anatomical and molecular characteristics of organisms and in the fossil record	

a. Compare and contrast common fossils found in Missouri (i.e., trilobites, ferns, crinoids, gastropods, bivalves, fish, mastodons) to organisms present on Earth today	Fossils
C. Natural selection is the process of sorting individuals based on their ability to survive and reproduce within their ecosystem	
a. Identify specialized structures and describe how they help plants survive in their environment (e.g., root, cactus needles, thorns, winged seed, waxy leaves)	
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)	Adaptations
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)	Adaptations
d. Predict which plant or animal will be able to survive in a specific environment based on its special structures or behaviors.	Habitats
Strand 5: Processes and Interactions of the Earth's Systems: 1. Earth's systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures	
A. The Earth's crust is composed of various materials, including soil, minerals, and rocks, with characteristic properties	
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)	Soil
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)	Rocks
Strand 5: Processes and Interactions of the Earth's Systems: 2. Earth's systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes	
A. The Earth's materials and surface features are changed through a variety of external processes	
a. Observe and describe the breakdown of plant and animal material into soil through decomposition processes (i.e., decay/rotting, composting, digestion)	
b. Identify the major landforms/bodies of water on Earth (i.e., mountains, plains, river valleys, coastlines, canyons)	

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	Erosion, Transportation and Deposition
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	Erosion, Transportation and Deposition
e. Relate the type of landform/water body to the process by which it was formed	Erosion, Transportation and Deposition
Strand 5: Processes and Interactions of the Earth's Systems: 3. Human activity is dependent upon and affects Earth's resources and systems	
A. Earth's materials are limited natural resource's affected by human activity	
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)	
b. Propose ways to solve simple environmental problems (e.g., recycling, composting, ways to decrease soil erosion) that result from human activity	Pollution
Strand 7: Scientific Inquiry: 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
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	
a. Formulate testable questions and explanations (hypotheses)	Separating Mixtures Friction Circuits Plant Reproduction Sounds Forces
b. Recognize the characteristics of a fair and unbiased test	Forces
c. Conduct a fair test to answer a question	Forces
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	

	Habitats Food Chains Insulators and Conductors Changing State Separating Mixtures Friction Circuits Body Systems Plant Reproduction Days and Seasons The Moon Sounds Adaptations Interdependence Microorganisms Gravity Forces Reflection and Refraction Water Cycle Erosion, Transportation and Deposition Pollution Electromagnets Fossils Our Solar System Predicting the Weather Energy Forms
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)	Changing State Gravity Magnets Soil
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	Changing State Gravity
d. Compare amounts/measurements	
e. Judge whether measurements and computation of quantities are reasonable	

C. Scientific inquiry includes evaluation of explanations (laws/ principles, theories /models) in light of evidence (data) and scientific principles (understandings)	
a. Use quantitative and qualitative data as support for reasonable explanations	Insulators and Conductors Separating Mixtures Friction Plant Reproduction
b. Use data as support for observed patterns and relationships, and to make predictions to be tested	Insulators and Conductors Separating Mixtures Friction Plant Reproduction Forces
c. Evaluate the reasonableness of an explanation	Insulators and Conductors Separating Mixtures Friction Plant Reproduction Forces
d. Analyze whether evidence supports proposed explanations	Separating Mixtures Friction Circuits Plant Reproduction Sounds Forces
D. The nature of science relies upon communication of results and justification of explanations	
a. Communicate the procedures and results of investigations and explanations through: oral presentations; drawings and maps; data tables; graphs (bar, single line, pictograph); writings	Insulators and Conductors Separating Mixtures Friction Plant Reproduction Circuits Forces Sounds
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	

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	
a. Design and construct an electrical device, using materials and/or existing objects, that can be used to perform a task	
B. Advances in technology often result in improved data collection and an increase in scientific information	
a. Describe how new technologies have helped scientists make better observations and measurements for investigations (e.g., telescopes, magnifiers, balances, microscopes, computers, stethoscopes, thermometers)	Our Solar System Microorganisms Changing State
C. Technological solutions to problems often have drawbacks as well as benefits	
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	
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	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations	
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	
Strand 8: Impact of Science, Technology and Human Activity: 3. Science and technology affect, and are affected by, society	
A. People, alone or in groups, are always making discoveries about nature and inventing new ways to solve problems and get work done	
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	
Grade Five	
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	

C. Properties of matter can be explained in terms of moving particles too small to be seen without tremendous magnification	
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	Changing State
D. Physical changes in the state of matter that result from thermal changes can be explained by the Kinetic Theory of Matter	
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)	Changing State
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)	Changing State
I. Mass is conserved during any physical or chemical change	
a. Observe the mass of water remains constant as it changes state (as evidenced in a closed container)	
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	
A. Forms of energy have a source, a means of transfer (work and heat), and a receiver	
a. Observe and explain light being transferred from the source to the receiver (eye) through space in straight lines	Reflection and Refraction
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)	Reflection and Refraction
C. Electromagnetic energy from the Sun (solar radiation) is a major source of energy on Earth	
a. Identify the Sun as the primary source of energy for temperature change on Earth	Weather Predicting the Weather
Strand 2: Properties and Principles of Force and Motion: 2. Forces affect motion	
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	
a. Identify the forces acting on a load and use a spring scale to measure the weight (resistance force) of the load	Gravity Friction Forces

D. Newton's Laws of Motion explain the interaction of mass and forces, and are used to predict changes in motion	
a. Describe how friction affects the amount of force needed to do work over different surfaces or through different media	Friction
F. Work transfers energy into and out of a mechanical system	
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	
Strand 3: Characteristics and Interactions of Living Organisms: 1. There is a fundamental unity underlying the diversity of all living organisms	
D. Plants and animals have different structures that serve similar functions necessary for the survival of the organism	
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	
E. Biological classifications are based on how organisms are related	
a. Explain how similarities are the basis for classification	Habitats
b. Distinguish between plants (which use sunlight to make their own food) and animals (which must consume energy-rich food)	Food Chains
c. Classify animals as vertebrates or invertebrates	Habitats
d. Classify vertebrate animals into classes (amphibians, birds, reptiles, mammals, fish) based on their characteristics	
e. Identify plants or animals using simple dichotomous keys	Habitats
Strand 3: Characteristics and Interactions of Living Organisms: 2. Living organisms carry out life processes in order to survive	
C. Complex multicellular organisms have systems that interact to carry out life processes through physical and chemical means	
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	Body Systems
Strand 5: Processes and Interactions of the Earth's Systems: 1. Earth's systems (geosphere, atmosphere, and hydrosphere) have common components and unique structures	

B. The hydrosphere is composed of water (a material with unique properties) and other materials	
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	
C. The atmosphere (air) is composed of a mixture of gases, including water vapor, and minute particles	
a. Recognize the atmosphere is composed of a mixture of gases, water, and minute particles	
Strand 5: Processes and Interactions of the Earth's Systems: 2. Earth's systems (geosphere, atmosphere, and hydrosphere) interact with one another as they undergo change by common processes	
E. Changes in the form of water as it moves through Earth's systems are described as the water cycle	
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)	Water Cycle
b. Identify the different forms water can take (e.g., snow, rain, sleet, fog, clouds, dew) as it moves through the water cycle	Water Cycle Predicting the Weather Weather
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	
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.)	Weather Predicting the Weather
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.	
Strand 5: Processes and Interactions of the Earth's Systems: 3. Human activity is dependent upon and affects Earth's resources and systems	
A. Earth's materials are limited natural resource's affected by human activity	
a. Explain how major bodies of water are important natural resources for human activity(e.g., food, recreation, habitat, irrigation, solvent, transportation)	Water Cycle Pollution
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	Pollution

c. Propose solutions to problems related to water quality and availability that result from human activity	Pollution
Strand 6: Composition and Structure of the Universe and the Motion of the Objects	
Within It: 1. The universe has observable properties and structure	
A. The Earth, Sun, and Moon are part of a larger system that includes other planets and smaller celestial bodies	
a. Observe and identify the Earth is one of several planets within a solar system that orbits the Sun	Our Solar System
b. Observe and identify the Moon orbits the Earth in about a month	The Moon
c. Identify that planets look like stars and appear to move across the sky among the stars	
B. The Earth has a composition and location suitable to sustain life	
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	
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	
B. The apparent position of the moon, as seen from Earth, and its actual position relative to Earth change in observable patterns	
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	The Moon
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	
a. Identify that the Earth rotates once every 24 hours	Days and Seasons
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	Days and Seasons
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)	Days and Seasons Our Solar System
Strand 7: Scientific Inquiry: 1. Science understanding is developed through the use of science process skills, scientific knowledge, scientific investigation, reasoning, and critical thinking	
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	

	Separating Mixtures Friction Circuits Plant Reproduction Sounds Forces
a. Formulate testable questions and explanations (hypotheses)	Forces
b. Recognize the characteristics of a fair and unbiased test	Forces
c. Conduct a fair test to answer a question	Forces
d. Make suggestions for reasonable improvements or extensions of a fair test	
B. Scientific inquiry relies upon gathering evidence from qualitative and quantitative observations	

<p>a. Make qualitative observations using the five senses</p>	<p>Habitats Food Chains Insulators and Conductors Changing State Separating Mixtures Friction Circuits Body Systems Plant Reproduction Days and Seasons The Moon Sounds Adaptations Interdependence Microorganisms Gravity Forces Reflection and Refraction Water Cycle Erosion, Transportation and Deposition Pollution Electromagnets Fossils Our Solar System Predicting the Weather Energy Forms</p>
<p>b. Determine the appropriate tools and techniques to collect data</p>	<p>Insulators and Conductors Separating Mixtures Friction Plant Reproduction Gravity</p>
<p>c. Use a variety of tools and equipment to gather data (e.g., hand lenses, magnets, thermometers, metric rulers, balances, graduated cylinders, spring scales)</p>	<p>Changing State Gravity</p>
<p>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</p>	

e. Compare amounts/measurements	
f. Judge whether measurements and computation of quantities are reasonable	
C. Scientific inquiry includes evaluation of explanations (laws/ principles, theories /models) in light of evidence (data) and scientific principles (understandings)	
a. Use quantitative and qualitative data as support for reasonable explanations	Insulators and Conductors Separating Mixtures Friction Plant Reproduction
b. Use data as support for observed patterns and relationships, and to make predictions to be tested	Insulators and Conductors Separating Mixtures Friction Plant Reproduction Forces
c. Evaluate the reasonableness of an explanation	Insulators and Conductors Separating Mixtures Friction Plant Reproduction Forces
d. Analyze whether evidence supports proposed explanations	Separating Mixtures Friction Circuits Plant Reproduction Sounds Forces
D. The nature of science relies upon communication of results and justification of explanations	
a. Communicate the procedures and results of investigations and explanations through: oral presentations; drawings and maps; data tables; graphs (bar, single line, pictograph); writings	Insulators and Conductors Separating Mixtures Friction Plant Reproduction Circuits Forces Sounds

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	
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	
a. Design and construct a machine, using materials and/or existing objects, that can be used to perform a task	
B. Advances in technology often result in improved data collection and an increase in scientific information	
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)	Our Solar System
C. Technological solutions to problems often have drawbacks as well as benefits	
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	
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	
A. People of different gender and ethnicity have contributed to scientific discoveries and the invention of technological innovations	
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	
Strand 8: Impact of Science, Technology and Human Activity: 3. Science and technology affect, and are affected by, society	
A. People, alone or in groups, are always making discoveries about nature and inventing new ways to solve problems and get work done	
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

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