Grade Kindergarten

Strand K.1: WEATHER PATTERNS

Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather to identify patterns over time. Weather scientists forecast severe weather so that communities can prepare for and respond to these events. Sunlight warms Earth's surface.

State Standard	FOSS Program
K.1.1 Obtain, evaluate, and communicate information about local, observable weather conditions to describe patterns over time. Emphasize the students' collection and sharing of data. Examples of data could include sunny, cloudy, windy, rainy, cold, or warm. (ESS2.D)	**FOSS Next Generation Trees and Weather** Investigation 3: Observing Weather Investigation 4: Trees through the Seasons
K.1.2 Obtain, evaluate, and communicate information on the effect of forecasted weather patterns on human behavior. Examples could include how humans respond to local forecasts of typical and severe weather such as extreme heat, high winds, flash floods, thunderstorms, or snowstorms. (ESS3.B)	**FOSS Next Generation Trees and Weather** Investigation 3: Observing Weather
K.1.3 Carry out an investigation using the five senses, to determine the effect of sunlight on different surfaces and materials. Examples could include measuring temperature, through touch or other methods, on natural and man-made materials in various locations throughout the day. (PS3.B)	**FOSS Next Generation Trees and *Weather*** Investigation 3: Observing Weather **FOSS Next Generation Materials and Motion** Investigation 3: Getting to Know Fabric
K.1.4 Design a solution that will reduce the warming effect of sunlight on an area. Define the problem by asking questions and gathering information, convey designs through sketches, drawings, or physical models, and compare and test designs. (PS3.B, ETS1.A, ETS1.B, ETS1.C)	**FOSS Next Generation Materials and Motion** Investigation 3: Getting to Know Fabric

Strand K.2: LIVING THINGS AND THEIR SURROUNDINGS

Living things (plants and animals, including humans) depend on their surroundings to get what they need, including food, water, shelter, and a favorable temperature. The characteristics of surroundings influence where living things are naturally found. Plants and animals affect and respond to their surroundings.

State Standard	FOSS Program
K.2.1 Obtain, evaluate, and communicate information to describe patterns of what living things (plants and animals, including humans) need to survive. Emphasize the similarities and differences between the survival needs of all living things. Examples could include that plants depend on air, water, minerals, and light to survive, or animals depend on plants or other animals to survive. (LS1.C)	**FOSS Next Generation Animals Two by Two** Investigation 1: Goldfish and Guppies Investigation 2: Water and Land Snails Investigation 3: Big and Little Worms Investigation 4: Pill Bugs and Sow Bugs **FOSS Next Generation Trees and Weather** Investigation 1: Observing Trees Investigation 2: Observing Leaves Investigation 4: Trees through the Seasons
K.2.2 Obtain, evaluate, and communicate information about patterns in the relationships between the needs of different living things (plants and animals, including humans) and the places they live. Emphasize that living things need water, air, and resources and that they live in places that have the things they need.	**FOSS Next Generation Animals Two by Two** Investigation 1: Goldfish and Guppies Investigation 2: Water and Land Snails Investigation 3: Big and Little Worms Investigation 4: Pill Bugs and Sow Bugs

Grade Kindergarten

Examples could include investigating plants grown in various locations and comparing the results or comparing animals with the places they live. (LS2.B, ESS3.A)	**FOSS Next Generation Trees and Weather** Investigation 1: Observing Trees Investigation 4: Trees through the Seasons
K.2.3 Obtain, evaluate, and communicate information about how living things (plants and animals, including humans) affect their surroundings to survive. Examples could include squirrels digging in the ground to hide their food, plant roots breaking concrete, or humans building shelters. (ESS2.E)	**FOSS Next Generation Animals Two by Two** Investigation 1: Goldfish and Guppies Investigation 2: Water and Land Snails Investigation 3: Big and Little Worms Investigation 4: Pill Bugs and Sow Bugs **FOSS Next Generation Trees and Weather** Investigation 1: Observing Trees Investigation 2: Observing Leaves
K.2.4 Design and communicate a solution to address the effects that living things (plants and animals, including humans) experience while trying to survive in their surroundings. *Define the problem by asking questions and gathering information, convey designs through sketches, drawings, or physical models, and compare designs.* Emphasize students working from a plant, animal, or human perspective. Examples could include a plant growing to get more sunlight, a beaver building a dam, or humans caring for the Earth by reusing and recycling natural resources. (ESS3.C, ETS1.A, ETS1.B, ETS1.C)	**FOSS Next Generation Materials and Motion** Investigation 1: Getting to Know Wood Investigation 2: Getting to Know Paper Investigation 3: Getting to Know Fabric

Strand K.3: FORCES, MOTION AND INTERACTION

The motion of objects can be observed and described. Pushing or pulling on an object can change the speed or direction of an object's motion and can start or stop it. Pushes and pulls can have different strengths and different directions. A bigger push or pull makes things go faster and when objects touch or collide, they push on one another and can change motion.

State Standard	FOSS Program
K.3.1 Plan and conduct an investigation to compare the effects of different strengths or different directions of forces on the motion of an object. Emphasize forces as a push and pull on an object. The idea of strength should be kept separate from the idea of direction. Non-contact forces, such as magnets and static electricity, will be taught in Grades 3 through 5. (PS2.A, PS2.B, PS2.C, PS3.C)	**FOSS Next Generation Materials and Motion** Investigation 4: Getting Things to Move
K.3.2 Analyze data to determine how a **design solution** causes a change in the speed or direction of an object with a push or a pull. *Define the problem by asking questions and gathering information, convey designs through sketches, drawings, or physical models, and compare and test designs.* Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, or knock down other objects. (PS2.A, PS2.B, PS2.C, PS3.C, ETS1.A, ETS1.B, ETS1.C)	**FOSS Next Generation Materials and Motion** Investigation 4: Getting Things to Move

Grade 1

Strand 1.1: SEASONS AND SPACE PATTERNS

Seasonal patterns of motion of the Sun, Moon, and stars can be observed, described, and predicted. These patterns may vary depending on the region, location, or time of year.

State Standard	FOSS Program
1.1.1 Obtain, evaluate, and communicate information about the movement of the Sun, Moon, and stars to describe predictable patterns. Examples of patterns could include how the Sun and Moon appear to rise in one part of the sky, move across the sky, and set; or how stars, other than the Sun, are visible at night but not during the day. (ESS1.A)	**FOSS Next Generation Air and Weather** Investigation 2: Observing the Sky Investigation 4: Looking for Change
1.1.2 Obtain, evaluate, and communicate information about the patterns observed at different times of the year to relate the amount of daylight to the time of year. Emphasize the variation in daylight patterns at different times of the day and different times of the year. Examples could include varying locations and regions throughout the state, country, and world. (ESS1.B)	**FOSS Next Generation Air and Weather** Investigation 2: Observing the Sky Investigation 4: Looking for Change
1.1.3 Design a device that measures the varying patterns of daylight. *Define the problem by asking questions and gathering information, convey designs through sketches, drawings, or physical models, and compare and test designs*. Examples could include sundials for telling the time or tracking the movement of shadows throughout the day. (ESS1.B, ETS1.A, ETS1.B, ETS1.C)	**FOSS Next Generation Sound and Light** Investigation 3, Part 2 "Sun and Shadows" Science Extension: "Make a Sundial" p. 203

Strand 1.2: THE NEEDS OF LIVING THINGS AND THEIR OFFSPRING

Living things (plants and animals, including humans) depend on their surroundings to get what they need, including food, water, shelter, and a favorable temperature. Plants and animals have external features that allow them to survive in a variety of environments. Young plants and animals are similar but not exactly like their parents. In many kinds of animals, parents and offspring engage in behaviors that help the offspring to survive.

State Standard	FOSS Program
1.2.1 Plan and carry out an investigation to determine the effect of sunlight and water on plant growth. Emphasize Investigation that test one variable at a time. (LS1.C)	**FOSS Next Generation Plants and Animals** Investigation 1: Grass and Grain Seeds Investigation 2: Stems Investigation 3: Terrariums
1.2.2 Construct an explanation, by observing patterns of external features of living things that survive in different locations. Emphasize how plants and nonhuman animals, found in specific surroundings, share similar physical characteristics. Examples could include that plants living in dry areas are more likely to have thick outer coatings that hold in water, animals living in cold locations have longer and thicker fur, or most desert animals are awake at night. (LS1.A, LS1.D)	**FOSS Next Generation Plants and Animals** Investigation 3: Terrariums
1.2.3 Obtain, evaluate, and communicate information about the patterns of plants and nonhuman animals that are alike, but not exactly like, their parents. An example could include that most carrots are orange and shaped like a cone but may be different sizes or have differing tastes. (LS3.A, LS3.B)	**FOSS Next Generation Plants and Animals** Investigation 1: Grass and Grain Seeds Investigation 2: Stems Investigation 4: Growth and Change

Grade 1

1.2.4 Construct an explanation of the patterns in the behaviors of parents and offspring which help offspring to survive. Examples of behavioral patterns could include the signals that offspring make such as crying, chirping, and other vocalizations or the responses of the parents such as feeding, comforting, and protecting the offspring. (LS1.B)	**FOSS Next Generation Plants and Animals** Investigation 4: Growth and Change

Strand 1.3: LIGHT AND SOUND

Sound can make matter vibrate, and vibrating matter can make sound. Objects can only be seen when light is available to illuminate them. Some objects give off their own light. Some materials allow light to pass through them, others allow only some light to pass through them, and still others block light and create a dark shadow on the surface beyond them where the light cannot reach. Mirrors can be used to redirect light. People use a variety of devices that may include sound and light to communicate over long distances.

State Standard	FOSS Program
1.3.1 Plan and carry out an investigation to show the cause and effect relationship between sound and vibrating matter. Emphasize that vibrating matter can make sound and that sound can make matter vibrate. (PS4.A)	**FOSS Next Generation Sound and Light** Investigation 1: Sound and Vibration Investigation 2: Changing Sounds
1.3.2 Use a model to show the effect of light on objects. Emphasize that objects can be seen when light is available to illuminate them or if they give off their own light. (PS4.B)	**FOSS Next Generation Sound and Light** Investigation 4: Light and Mirrors
1.3.3 Plan and carry out an investigation to determine the effect of materials in the path of a beam of light. Emphasize that light can travel through some materials, can be reflected off some materials, and some materials block light causing shadows. Examples of materials could include clear plastic, wax paper, cardboard, or a mirror. (PS4.B)	**FOSS Next Generation Sound and Light** Investigation 3: Light and Shadows Investigation 4: Light and Mirrors
1.3.4 Design a device in which the structure of the device uses light or sound to solve the problem of communicating over a distance. *Define the problem by asking questions and gathering information, convey designs through sketches, drawings, or physical models, and compare and test designs*. Examples of devices could include a light source to send signals, paper-cup-and-string telephones, or a pattern of drum beats. (PS4.C, ETS1.A, ETS1.B, ETS1.C)	**FOSS Next Generation Sound and Light** Investigation 2: Changing Sounds Investigation 4: Light and Mirrors

Grade 2

Strand 2.1: CHANGES IN EARTH'S SURFACE

Earth has an ancient history of slow and gradual surface changes, punctuated with quick but powerful geologic events like volcanic eruptions, flooding, and earthquakes. Water and wind play a significant role in changing Earth's surface. The effects of wind and water can cause both slow and quick changes to the surface of the Earth. Scientists and engineers design solutions to slow or prevent wind or water from changing the land.

State Standard	FOSS Program
2.1.1 Develop and use models illustrating the patterns of landforms and water on Earth. Examples of models could include valleys, canyons, or floodplains and could depict water in the solid or liquid state. (ESS2.B)	**FOSS Next Generation Pebbles. Sand, and Silt** Investigation 2: River Rocks Investigation 4: Soil and Water
2.1.2 Construct an explanation about changes in Earth's surface that happen quickly or slowly. Emphasize the contrast between fast and slow changes. Examples of fast changes could include volcanic eruptions, earthquakes, or landslides. Examples of slow changes could include the erosion of mountains or the shaping of canyons. (ESS1.C)	**FOSS Next Generation Pebbles. Sand, and Silt** Investigation 1: First Rocks Investigation 2: River Rocks Investigation 4: Soil and Water
2.1.3 Design solutions to slow or prevent wind or water from changing the shape of land. *Define the problem by asking questions and gathering information, convey designs through sketches, drawings, or physical models, and compare and test designs.* Examples of solutions could include retaining walls, dikes, windbreaks, shrubs, trees, and grass to hold back wind, water, and land. (ESS2.A, ESS2.C, ETS1.A, ETS1.B, ETS1.C)	**FOSS Next Generation Pebbles. Sand, and Silt** Investigation 2: River Rocks Investigation 4: Soil and Water

Strand 2.2: LIVING THINGS AND THEIR HABITATS

Living things (plants and animals, including humans) need water, air, and resources from the land to survive and live in habitats that provide these necessities. The physical characteristics of plants and animals reflect the habitat in which they live. Animals also have modified behaviors that help them survive, grow, and meet their needs. Humans sometimes mimic plant and animal adaptations to survive in their environment.

	FOSS Program
2.2.1 Obtain, evaluate, and communicate information about patterns of living things (plants and animals, including humans) in different habitats. Emphasize the diversity of living things in land and water habitats. Examples of patterns in habitats could include descriptions of temperature or precipitation and the types of plants and animals found in land habitats. (LS2.C, LS4.C, LS4.D)	**FOSS Next Generation Insects and Plants** Investigation 3: Milkweed Bugs Investigation 4: Silkworms Investigation 5: Butterflies
2.2.2 Plan and carry out an investigation of the structure and function of plant and animal parts in different habitats. Emphasize how different plants and animals have different structures to survive in their habitat. Examples could include the shallow roots of a cactus in the desert or the seasonal changes in the fur coat of a wolf. (LS1.A, LS4.A, LS4.D)	**FOSS Next Generation Insects and Plants** Investigation 3: Milkweed Bugs Investigation 4: Silkworms
2.2.3 Develop and use a model that mimics the function of an animal dispersing seeds or pollinating plants. Examples could include plants that have seeds with hooks or barbs that attach themselves to animal fur, feathers, or human clothing, or dispersal through the wind, or consumption of fruit and the disposal of the pits or seeds. (LS2.A)	**FOSS Next Generation Insects and Plants** Investigation 2: Brassica Seeds Investigation 5: Butterflies

Grade 2

2.2.4 Design a solution to a human problem by mimicking the structure and function of plants and/or animals and how they use their external parts to help them survive, grow, and meet their needs. *Define the problem by asking questions and gathering information, convey designs through sketches, drawings, or physical models, and compare and test designs.* Examples could include a human wearing a jacket to mimic the fur of an animal or a webbed foot to design a better swimming fin. (LS1.A, LS1.D, ETS1.A, ETS1.B, ETS1.C)	**FOSS Next Generation Insects and Plants** "Student Projects" p. 180

Strand 2.3: PROPERTIES OF MATTER

All things are made of matter which exists with different forms and properties. Matter can be described and classified by its observable properties. Materials with certain properties are well-suited for specific uses. Heating or cooling some types of matter may or may not irreversibly change their properties.

State Standard	FOSS Program
2.3.1 Plan and carry out an investigation to classify different kinds of materials based on patterns in their observable properties. Examples could include sorting materials based on similar properties such as strength, color, flexibility, hardness, texture, or whether the materials are solids or liquids. (PS1.A)	**FOSS Next Generation Solids and Liquids** Investigation 1: Solids Investigation 2: Liquids Investigation 3: Bits and Pieces **FOSS Next Generation Pebbles. Sand, and Silt** Investigation 1: First Rocks Investigation 3: Using Rocks
2.3.2 Construct an explanation showing how the properties of materials influence their intended use and function. Examples could include using wood as a building material because it is lightweight and strong or the use of concrete, steel, or cotton due to their unique properties. (PS1.A)	**FOSS Next Generation Solids and Liquids** Investigation 1: Solids Investigation 3: Bits and Pieces Investigation 4: Solids, Liquids and Water **FOSS Next Generation Pebbles. Sand, and Silt** Investigation 3: Using Rocks
2.3.3 Develop and use a model to describe how an object, made of a small set of pieces, can be disassembled and reshaped into a new object with a different function. Emphasize that a great variety of objects can be built from a small set of pieces. Examples of pieces could include wooden blocks or building bricks. (PS1.A)	**FOSS Next Generation Solids and Liquids** Investigation 1: Solids Investigation 4: Solids, Liquids and Water
2.3.4 Obtain, evaluate, and communicate information about changes in matter caused by heating or cooling. Emphasize that some changes can be reversed and some cannot. Examples of reversible changes could include freezing water or melting crayons. Examples of irreversible changes could include cooking an egg or burning wood. (PS1.B)	**FOSS Next Generation Solids and Liquids** Investigation 4: Solids, Liquids and Water

Grade 3

Strand 3.1: WEATHER AND CLIMATE PATTERNS

Weather is a minute-by-minute, day-by-day variation of the atmosphere's condition on a local scale. Scientists record patterns of weather across different times and areas so that they can make weather forecasts. Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over a long period of time. A variety of weather-related hazards result from natural processes. While humans cannot eliminate natural hazards, they can take steps to reduce their impact.

State Standard	FOSS Program
3.1.1 Analyze and interpret data to reveal patterns that indicate typical weather conditions expected during a particular season. Emphasize students gathering data in a variety of ways and representing data in tables and graphs. Examples of data could include temperature, precipitation, or wind speed. (ESS2.D)	**FOSS Next Generation Water and Climate** Investigation 3: Weather and Water Investigation 4: Seasons and Climate
3.1.2 Obtain and communicate information to describe climate patterns in different regions of the world. Emphasize how climate patterns can be used to predict typical weather conditions. Examples of climate patterns could be average seasonal temperature and average seasonal precipitation. (ESS2.D)	**FOSS Next Generation Water and Climate** Investigation 2: Hot Water, Cold Water Investigation 4: Seasons and Climate
3.1.3 Design a solution that reduces the effects of a weather-related hazard. *Define the problem, identify criteria and constraints, develop possible solutions, analyze data from testing solutions, and propose modifications for optimizing a solution.* Examples could include barriers to prevent flooding or wind-resistant roofs. (ESS3.B, ETS1.A, ETS1.B, ETS1.C)	**FOSS Next Generation Water and Climate** Investigation 1: Water Observations Investigation 4: Seasons and Climate Investigation 5: Water Works

Strand 3.2: EFFECTS OF TRAITS ON SURVIVAL

Organisms (plants and animals, including humans) have unique and diverse life cycles, but they all follow a pattern of birth, growth, reproduction, and death. Different organisms vary in how they look and function because they have different inherited traits. An organism's traits are inherited from its parents and can be influenced by the environment. Variations in traits between individuals in a population may provide advantages in surviving and reproducing in particular environments. When the environment changes, some organisms have traits that allow them to survive, some move to new locations, and some do not survive. Humans can design solutions to reduce the impact of environmental changes on organisms.

State Standard	FOSS Program
3.2.1 Develop and use models to describe changes that organisms go through during their life cycles. Emphasize that organisms have unique and diverse life cycles but follow a pattern of birth, growth, reproduction, and death. Examples of changes in life cycles could include how some plants and animals look different at different stages of life or how other plants and animals only appear to change size in their life. (LS1.B)	**FOSS Next Generation Structures of Life** Investigation 1: Origin of Seeds Investigation 2: Growing Further
3.2.2 Analyze and interpret data to identify patterns of traits that plants and animals have inherited from parents. Emphasize the similarities and differences in traits between parent organisms and offspring and variation of traits in groups of similar organisms. (LS3.A, LS3.B)	**FOSS Next Generation Structures of Life** Investigation 1: Origin of Seeds Investigation 2: Growing Further Investigation 3: Meet the Crayfish Investigation 4: Human Body

Grade 3

3.2.3 Construct an explanation that the environment can affect the traits of an organism. Examples could include that the growth of normally tall plants is stunted with insufficient water or that pets given too much food and little exercise may become overweight. (LS3.B)	**FOSS Next Generation Structures of Life** Investigation 2: Growing Further Investigation 3: Meet the Crayfish Investigation 4: Human Body
3.2.4 Construct an explanation showing how variations in traits and behaviors can affect the ability of an individual to survive and reproduce. Examples of traits could include large thorns protecting a plant from being eaten or strong smelling flowers to attracting certain pollinators. Examples of behaviors could include animals living in groups for protection or migrating to find more food. (LS2.D, LS4.B)	**FOSS Next Generation Structures of Life** Investigation 3: Meet the Crayfish
3.2.5 Engage in argument from evidence that in a particular habitat (system) some organisms can survive well, some survive less well, and some cannot survive at all. Emphasize that organisms and habitats form systems in which the parts depend upon each other. Examples of evidence could include needs and characteristics of the organisms and habitats involved such as cacti growing in dry, sandy soil but not surviving in wet, saturated soil. (LS4.C)	**FOSS Next Generation Structures of Life** Investigation 3: Meet the Crayfish
3.2.6 Design a solution to a problem caused by a change in the environment that impacts the types of plants and animals living in that environment. *Define the problem, identify criteria and constraints, and develop possible solutions*. Examples of environmental changes could include changes in land use, water availability, temperature, food, or changes caused by other organisms. (LS2.C, LS4.D, ETS1.A, ETS1.B, ETS1.C)	**FOSS Next Generation Structures of Life** Investigation 3: Meet the Crayfish

Strand 3.3: FORCE AFFECTS MOTION

Forces act on objects and have both a strength and a direction. An object at rest typically has multiple forces acting on it, but they are balanced, resulting in a zero net force on the object. Forces that are unbalanced, can cause changes in an object's speed or direction of motion. The patterns of an object's motion in various situations can be observed, measured, and used to predict future motion. Forces are exerted when objects come in contact with each other, however some forces can act on objects that are not in contact. The gravitational force of Earth, acting on an object near Earth's surface pulls that object toward the planet's center. Electric and magnetic forces between a pair of objects can act at a distance. The strength of these non-contact forces depends on the properties of the objects and the distance between the objects.

State Standard	FOSS Program
3.3.1 Plan and carry out Investigation that provide evidence of the effects of balanced and unbalanced forces on the motion of an object. Emphasize Investigation where only one variable is tested at a time. Examples could include an unbalanced force on one side of a ball causing it to move and balanced forces pushing on a box from both sides producing no movement. (PS2.A, PS2.B)	**FOSS Next Generation Motion and Matter** Investigation 1: Forces Investigation 2: Patterns of Motion Investigation 3: Engineering
3.3.2 Analyze data from observations and measurements of an object's motion to identify patterns in its motion that can be used to predict future motion. Examples of motion with a	**FOSS Next Generation Motion and Matter** Investigation 1: Forces Investigation 2: Patterns of Motion

Grade 3

predictable pattern could include a child swinging on a swing or a ball rolling down a ramp. (PS2.A, PS2.C)	Investigation 3: Engineering
3.3.3 Construct an explanation that the gravitational force exerted by Earth causes objects to be directed downward, toward the center of the spherical Earth. Emphasize that "downward" is a local description depending on one's position on Earth. (PS2.B)	**FOSS Next Generation Motion and Matter** Investigation 1: Forces
3.3.4 Ask questions to **plan and carry out an investigation** to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. Emphasize how static electricity and magnets can cause objects to move without touching. Examples could include the force an electrically charged balloon has on hair, how magnet orientation affects the direction of a force, or how distance between objects affects the strength of a force. Electrical charges and magnetic fields will be taught in Grades 6 through 8. (PS2.B)	**FOSS Next Generation Motion and Matter** Investigation 1: Forces
3.3.5 Design a solution to a problem in which a device functions by using scientific ideas about magnets. *Define the problem, identify criteria and constraints, develop possible solutions using models, analyze data from testing solutions, and propose modifications for optimizing a solution*. Examples could include a latch or lock used to keep a door shut or a device to keep two moving objects from touching each other. (PS2.B, ETS1.A, ETS1.B, ETS1.C)	**FOSS Next Generation Motion and Matter** Investigation 3: Engineering

Grade 4

Strand 4.1: ORGANISMS FUNCTIONING IN THEIR ENVIRONMENT

Through the study of organisms, inferences can be made about environments both past and present. Plants and animals have both internal and external structures that serve various functions for growth, survival, behavior, and reproduction. Animals use different sense receptors specialized for particular kinds of information to understand and respond to their environment. Some kinds of plants and animals that once lived on Earth can no longer be found. However, fossils from these organisms provide evidence about the types of organisms that lived long ago and the nature of their environments. Additionally, the presence and location of certain fossil types indicate changes that have occurred in environments over time.

State Standard	FOSS Program
4.1.1 Construct an explanation from evidence that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. Emphasize how structures support an organism's survival in its environment and how internal and external structures of plants and animals vary within the same and across multiple Utah environments. Examples of structures could include thorns on a stem to prevent predation or gills on a fish to allow it to breathe underwater. (LS1.A)	**FOSS Next Generation Environments** Investigation 1: Environmental Factors Investigation 2: Ecosystems Investigation 3: Brine Shrimp Hatching Investigation 4: Range of Tolerance
4.1.2 Develop and use a model of a system to describe how animals receive different types of information from their environment through their senses, process the information in their brain, and respond to the information. Emphasize how animals are able to use their perceptions and memories to guide their actions. Examples could include models that explain how animals sense and then respond to different aspects of their environment such as sounds, temperature, or smell. (LS1.D)	**FOSS Next Generation Environments** Investigation 1: Environmental Factors Investigation 2: Ecosystems
4.1.3 Analyze and interpret data from fossils to provide evidence of the stability and change in organisms and environments from long ago. Emphasize using the structures of fossils to make inferences about ancient organisms. Examples of fossils and environments could include comparing a trilobite with a horseshoe crab in an ocean environment or using a fossil footprint to determine the size of a dinosaur. (LS4.A)	**FOSS Next Generation Soils, Rocks, and Landforms** Investigation 2, Part 4 "Fossil Evidence"
4.1.4 Engage in Argument from evidence based on patterns in rock layers and fossils found in those layers to support an explanation for how an environment has changed over time. Emphasize the relationship between fossils and past environments. Examples could include tropical plant fossils found in Arctic areas and rock layers with marine shell fossils found above rock layers with land plant fossils. (ESS1.C)	**FOSS Next Generation Soils, Rocks, and Landforms** Investigation 2, Part 4 "Fossil Evidence"

Grade 4

Strand 4.2: ENERGY TRANSFER

Energy is present whenever there are moving objects, sound, light, or heat. The faster a given object is moving, the more energy it possesses. When objects collide, energy can be transferred from one object to another causing the objects' motions to change. Energy can also be transferred from place to place by electrical currents, heat, sound, or light. Devices can be designed to convert energy from one form to another.

State Standard	FOSS Program
4.2.1 Construct an explanation to describe the cause and effect relationship between the speed of an object and the energy of that object. Emphasize using qualitative descriptions of the relationship between speed and energy like fast, slow, strong, or weak. An example could include a ball that is kicked hard has more energy and travels a greater distance than a ball that is kicked softly. (PS3.A)	**FOSS Next Generation Energy** Investigation 4: Energy Transfer
4.2.2 Ask questions and make observations about the changes in energy that occur when objects collide. Emphasize that energy is transferred when objects collide and may be converted to different forms of energy. Examples could include changes in speed when one moving ball collides with another or the transfer of energy when a toy car hits a wall. (PS3.B, PS3.C)	**FOSS Next Generation Energy** Investigation 4: Energy Transfer
4.2.3 Plan and carry out an investigation to gather evidence from observations that energy can be transferred from place to place by sound, light, heat, and electrical currents. Examples could include sound causing objects to vibrate and electric currents being used to produce sound or light. (PS3.A, PS3.B)	**FOSS Next Generation Energy** Investigation 1: Energy and Circuits Investigation 3: Electromagnets Investigation 4: Energy Transfer Investigation 5: Waves
4.2.4 Design device that converts energy from one form to another. Define the problem, identify criteria and constraints, develop possible solutions using models, analyze data from testing solutions, and propose modifications for optimizing a solution. Emphasize identifying the initial and final forms of energy. Examples could include solar ovens that convert light energy to heat energy or a simple alarm system that converts motion energy into sound energy. (PS3.B, PS3.D, ETS1.A, ETS1.B, ETS1.C)	**FOSS Next Generation Energy** Investigation 1: Energy and Circuits Investigation 2: The Force of Magnetism Investigation 3: Electromagnets Investigation 5: Waves

Grade 4

Strand 4.3: WAVE PATTERNS

Waves are regular patterns of motion that transfer energy and have properties such as amplitude (height of the wave) and wavelength (spacing between wave peaks). Waves in water can be directly observed. Light waves cause objects to be seen when light reflected from objects enters the eye. Humans use waves and other patterns to transfer information.

State Standard	FOSS Program
4.3.1 Develop and use a model to describe the regular patterns of waves. Emphasize patterns in terms of amplitude and wavelength. Examples of models could include diagrams, analogies, and physical models such as water or rope. (PS4.A)	**FOSS Next Generation Energy** Investigation 5: Waves
4.3.2 Develop and use a model to describe how visible light waves reflected from objects enter the eye causing objects to be seen. Emphasize the reflection and movement of light. The structure and function of organs and organ systems and the relationship between color and wavelength will be taught in Grades 6 through 8. (PS4.B)	**FOSS Next Generation Energy** Investigation 5: Waves
4.3.3 Design a solution to an information transfer problem using wave patterns. *Define the problem, identify criteria and constraints, develop possible solutions using models, analyze data from testing solutions, and propose modifications for optimizing a solution.* Examples could include using light to transmit a message in Morse code or using lenses and mirrors to see objects that are far away. (PS4.C, ETS1.A, ETS1.B, ETS1.C)	**FOSS Next Generation Energy** Investigation 3: Electromagnets Investigation 5: Waves

Strand 4.4: OBSERVABLE PATTERNS IN THE SKY

The Sun is a star that appears larger and brighter than other stars because it is closer to Earth. The rotation of Earth on its axis and orbit of Earth around the Sun cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the Sun and stars at different times of the day, month, and year.

State Standard	FOSS Program
4.4.1 Construct an explanation that differences in the apparent brightness of the Sun compared to other stars is due to the relative distance (scale) of stars from Earth. Emphasize relative distance from Earth. (ESS1.A)	**FOSS Next Generation Earth and Sun** Investigation 2: Planetary Systems
4.4.2 Analyze and interpret data of observable patterns to show that the Earth rotates on its axis and revolves around the Sun. Emphasize patterns that provide evidence of Earth's rotation and orbits around the Sun. Examples of patterns could include day and night, daily changes in length and direction of shadows, and seasonal appearance of some stars in the night sky. Earth's seasons and its connection to the tilt of Earth's axis will be taught in Grades 6 through 8. (ESS1.B)	**FOSS Next Generation Earth and Sun** Investigation 1: The Sun Investigation 2: Planetary Systems

Grade 5

Strand 5.1: CHARACTERISTICS AND INTERACTIONS OF EARTH'S SYSTEMS.

Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). Within these systems, the location of Earth's land and water can be described. Also, these systems interact in multiple ways. Weathering and erosion are examples of interactions between Earth's systems. Some interactions cause landslides, earthquakes, and volcanic eruptions that impact humans and other organisms. Humans cannot eliminate natural hazards, but solutions can be designed to reduce their impact.

State Standard	FOSS Program
5.1.1 Analyze and interpret data to describe patterns of Earth's features. Emphasize most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans while major mountain chains may be found inside continents or near their edges. Examples of data could include maps showing locations of mountains on continents and the ocean floor or the locations of volcanoes and earthquakes. (ESS2.B)	**FOSS Next Generation Soils, Rocks, and Landforms** Investigation 2: Landforms Investigation 3: Mapping Earth's Surface
5.1.2 Use mathematics and computational thinking to compare the quantity of saltwater and fresh water in various reservoirs to provide evidence for the distribution of water on Earth. Emphasize reservoirs such as oceans, lakes, rivers, glaciers, groundwater, and polar ice caps. Examples of using mathematics and computational thinking could include measuring, estimating, graphing, or finding percentages of quantities. (ESS2.C)	**FOSS Next Generation Earth and Sun** Investigation 5, Part 3 "Water Cycle"
5.1.3 Ask questions to **plan and carry out Investigation** that provide evidence for the effects of weathering and the rate of erosion on the geosphere. Emphasize weathering and erosion by water, ice, wind, gravity, or vegetation. Examples could include observing the effects of cycles of freezing and thawing of water on rock or changing the slope in the downhill movement of water. (ESS2.A, ESS2.E)	**FOSS Next Generation Soils, Rocks, and Landforms** Investigation 1: Soils and Weathering Investigation 2: Landforms
5.1.4 Develop a model to describe interactions between Earth's systems including the geosphere, biosphere, hydrosphere, and/or atmosphere. Emphasize interactions between only two systems at a time. Examples could include the influence of a rainstorm in a desert, waves on a shoreline, or mountains on clouds. (ESS2.A)	**FOSS Next Generation Living Systems** Investigation 1: Systems Investigation 4: Sensory Systems **FOSS Next Generation Earth and Sun** Investigation 1: Systems
5.1.5 Design solutions to reduce the effects of naturally occurring events that impact humans. *Define the problem, identify criteria and constraints, develop possible solutions using models, analyze data from testing solutions, and propose modifications for optimizing a solution*. Emphasize that humans cannot eliminate natural hazards, but they can take steps to reduce their impacts. Examples of events could include landslides, earthquakes, tsunamis, blizzards, or volcanic eruptions. (ESS3.B, ETS1.A, ETS1.B, ETS1.C)	**FOSS Next Generation Soils, Rocks, and Landforms** Investigation 2: Landforms Investigation 3: Mapping Earth's Surface

Grade 5

Strand 5.2: PROPERTIES AND CHANGES OF MATTER

All substances are composed of matter. Matter is made of particles that are too small to be seen but still exist and can be detected by other means. Substances have specific properties by which they can be identified. When two or more different substances are combined a new substance with different properties may be formed. Whether a change results in a new substance or not, the total amount of matter is always conserved.

State Standard	FOSS Program
5.2.1 Develop and use a model to describe that matter is made of particles on a scale that is too small to be seen. Emphasize making observations of changes supported by a particle model of matter. Examples could include adding air to expand a balloon, compressing air in a syringe, adding food coloring to water, or dissolving salt in water and evaporating the water. The use of the terms atoms and molecules will be taught in Grades 6 through 8. (PS1.A)	**FOSS Next Generation Mixtures and Solutions** Investigation 1: Separating Mixtures Investigation 2: Developing Models Investigation 3: Concentration Investigation 4: Reaching Saturation Investigation 5: Fizz Quiz **FOSS Next Generation Earth and Sun** Investigation 3, Part 1 "The Air Around Us"
5.2.2 Ask questions to **plan and carry out Investigation** to identify substances based on patterns of their properties. Emphasize using properties to identify substances. Examples of properties could include color, hardness, conductivity, solubility, or a response to magnetic forces. Examples of substances could include powders, metals, minerals, or liquids. (PS1.A)	**FOSS Next Generation Mixtures and Solutions** Investigation 4: Reaching Saturation Investigation 5: Fizz Quiz
5.2.3 Plan and carry out Investigation to determine the effect of combining two or more substances. Emphasize whether a new substance is or is not created by the formation of a new substance with different properties. Examples could include combining vinegar and baking soda or rusting an iron nail in water. (PS1.B)	**FOSS Next Generation Mixtures and Solutions** Investigation 5: Fizz Quiz
5.2.4 Use mathematics and computational thinking to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. Examples could include melting an ice cube, dissolving salt in water, and combining baking soda and vinegar in a closed bag. (PS1.A, PS1.B)	**FOSS Next Generation Mixtures and Solutions** Investigation 1: Separating Mixtures Investigation 2: Developing Models Investigation 3: Concentration Investigation 4: Reaching Saturation Investigation 5: Fizz Quiz

Grade 5

Strand 5.3: CYCLING OF MATTER IN ECOSYSTEMS

Matter cycles within ecosystems and can be traced from organism to organism. Plants use energy from the Sun to change air and water into matter needed for growth. Animals and decomposers consume matter for their life functions, continuing the cycling of matter. Human behavior can affect the cycling of matter. Scientists and engineers design solutions to conserve Earth's environments and resources.

State Standard	FOSS Program
5.3.1 Construct an explanation that plants use air, water, and energy from sunlight to produce plant matter needed for growth. Emphasize photosynthesis at a conceptual level and that plant matter comes mostly from air and water, not from the soil. Photosynthesis at the cellular level will be taught in Grades 6 through 8. (LS1.C)	**FOSS Next Generation Living Systems** Investigation 2: Nutrient Systems Investigation 3: Transport Systems
5.3.2 Obtain, evaluate, and communicate information that animals obtain energy and matter from the food they eat for body repair, growth, and motion and to maintain body warmth. Emphasize that the energy used by animals was once energy from the Sun. Cellular respiration will be taught in Grades 6 through 8. (PS3.D, LS1.C)	**FOSS Next Generation Living Systems** Investigation 1: Systems Investigation 2: Nutrient Systems Investigation 3: Transport Systems Investigation 4: Nutrient Systems
5.3.3 Develop and use a model to describe the movement of matter among plants, animals, decomposers, and the environment. Emphasize that matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Examples could include simple food chains from ecosystems such as deserts or oceans or diagrams of decomposers returning matter to the environment. Complex interactions in a food web will be taught in Grades 6 through 8. (LS2.A, LS2.B)	**FOSS Next Generation Living Systems** Investigation 1: Systems Investigation 2: Nutrient Systems Investigation 3: Transport Systems Investigation 4: Nutrient Systems
5.3.4 Evaluate design solution whose primary function is to conserve Earth's environments and resources. Define the problem, identify criteria and constraints, analyze available data on proposed solutions, and determine an optimal solution. Emphasize how humans can balance everyday needs (agriculture, industry, and energy) while conserving Earth's environments and resources. (ESS3.A, ESS3.C, ETS1.A, ETS1.B, ETS1.C)	**FOSS Next Generation Living Systems** Investigation 4: Nutrient Systems