FOSS and SEEd Standard Alignment
Fifth Grade

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 the solutions can be designed to reduce their impact.

FOSS	STANDARDS
Soils, Rocks, and Landforms **Investigation 1: Soils and Weathering** **Part 1:** Soil Composition **SEP: Asking questions, Planning and carrying out investigations, Constructing explanations, Engaging in argument from evidence, Obtaining, evaluating and communicating information** CCC: Patterns, System and system models, patterns **Standard Content:** Soils can be described by their properties. Soils are composed of different kinds and amounts of earth and humus. Living things affect the characteristics of soil. **Part 2:** Physical Weathering **SEP: Developing and using models, Planning and carrying out investigations, Constructing explanations, Engaging in argument from evidence** CCC: Cause and effect **Standard Content:** Weathering is the breakdown of rocks and minerals at or	**5.1.3** Ask questions to **plan and carry out investigations** 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)

near Earth's surface. Physical-weathering processes of abrasion, freezing and pressure of tree roots (living things) break rocks and minerals into smaller pieces. **Part 3:** Chemical Weathering **SEP: Developing and using models, Planning and carrying out investigations, Analyzing and interpreting data, Constructing explanations, Obtaining, evaluating and communicating information** CCC: Cause and effect, Patterns **Standard Content:** Weathering is the breakdown of rocks and minerals at or near Earth's surface. Chemical weathering occurs when exposure to water and air changes rocks and minerals into something new. **Part 4:** Schoolyard Soil **SEP: Planning and carrying out investigations** CCC: Patterns **Standard Content:** Soils can be described by their properties. Soils are composed of different kinds and amounts of earth materials and humus. Weathering is the breakdown of rocks and minerals at or near Earth's surface.	
Soils, Rocks, and Landforms **Investigation 2: Landforms** **Part 1:** Erosion and Deposition **SEP: Developing and using models, Planning and carrying out investigations, Analyzing and interpreting data, Construction explanations, Obtaining, evaluating and communicating information** CCC: System and system models, Patterns, Cause and effect, Scale proportion and quantity, Stability and change **Standard Content:** Weathered rock material can be reshaped into new landforms by the slow processes of erosion and deposition. Erosion is the transport (movement) of weathered rock material (sediments) by moving water and wind. Deposition is the settling of sediments when the speed of moving water or wind declines.	**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) **5.1.3** Ask questions to **plan and carry out investigations** 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

Part 2: Stream - Table Investigation **SEP: Asking questions, Developing and using models, Planning and carrying out investigations, Analyzing and interpreting data, Constructing explanations, Engaging in argument from evidence, Obtaining, evaluating and communicating information** CCC: Cause and effect, System and system models, Stability and change, Patterns **Standard Content:** The rate and volume of erosion relate directly to the energy of moving water or wind. The energy of moving water depends on the mass of water in motion and it's velocity. The greater the mass and velocity, the greater the energy. **Part 3:** Schoolyard Erosion and Deposition **SEP: Planning and carrying out investigations, Constructing explanations** CCC: Cause and effect, Stability and change **Standard Content:** Erosion is the transport (movement) of weathered rock material (sediments) by moving water or wind. Deposition is the settling of sediments when the speed of moving water or wind declines. **DON'T TEACH PART 4**	cycles of freezing and thawing of water on rock or changing the slope in the downhill movement of water. (ESS2.A, ESS2.E) **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)
Soils, Rocks, and Landforms **Investigation 3: Mapping Earth's Surface** **Part 1:** Making a Topographic Map **SEP: Developing and using models, Obtaining, evaluating and communicating information** CCC: Scale proportion and quantity **Standard Content:** A topographic map uses contour lines to show the shape and elevation of the land. The change in elevation between two adjacent contour lines is always uniform. The closer the contour lines, the steeper the	**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)

slope and vise-versa. **Part 2:** Drawing a Profile **SEP: Developing and using models, Analyzing and interpreting data, Using mathematics and computational thinking, Obtaining, evaluating and communicating information** CCC: Scale, proportion and quantity **Standard Content:** A profile is a side view of a cross-section of a landform. A profile can be drawn from information given on a topographic map. **Part 3:** Mount St. Helens Case Study **SEP: Developing and using models, Planning and carrying out investigations, Analyzing interpreting data, Using mathematics computational thinking, Constructing explanations and designing solutions, Engaging in argument from evidence, Obtaining, evaluating and communicating information** CCC: Patterns, Scale, proportion and quantity, Stability and change **Standard Content:** A profile can be drawn from information and given on a topographic map. The surface of Earth is constantly changing; sometimes those changes take a long time to occur and sometimes they happen rapidly. Catastrophic events have the potential to change Earth's surface quickly. **Part 4:** Rapid Changes **SEP: Analysing and interpreting data, Constructing explanations** CCC: Cause and effect, Stability and change **Standard Content:** Catastrophic events have the potential to change Earth's surface quickly. Scientist and engineers can do things to reduce the impacts of natural Earth processes on humans.	**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)

Earth and Sun Investigation 5, Part 3 **Part 1:** Water Cycle **SEP: Developing and using models, Analyzing and interpreting data, Using mathematics and computational thinking** CCC: Scale, proportion and quantity, System and system models **Standard Content:** Most of Earth's water (97%) is salt water in the ocean; Earth's freshwater is found in many locations including the atmosphere, lakes and rivers, soil ground ice, groundwater and glaciers.	**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)

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.

FOSS	STANDARDS
Mixtures and Solutions **Investigations 1: Separating Mixtures** **Part 1:** Making and Separating Mixtures **SEP: Planning and Carrying out investigation** CCC: Cause and effect, Scale **Standard Content:** A mixture is two or more materials intermingled **Part 2:** Separating a Salt Solutions	**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)

SEP: Developing and using models, Planning and carrying out investigations, Analyzing and interpreting data, Using mathematics and computational thinking, Constructing explanations CCC: Proportion and quantity, System and system models **Standard Content:** Mixtures can be separated into their constituents. The mass of a mixture is equal to the mass of its constituents. **Part 3:** Separating a Dry Mixture **SEP: Defining problems, Planning and carrying out investigations, Analyzing and interpreting data, Designing solutions, Engaging in argument from evidence, Obtaining evaluating and communicating information** CCC: Cause and effect **Standard Content:** Mixtures can be separated into their constituents. Mixtures and solutions can be separated using screens, filters, and evaporation. Possible solutions to a problem are limited by available materials and resources (constraints). The success of a design solution is determined by considering the desired features of a solution (criteria). **Part 4:** Outdoor Solution **SEP: Planning and carrying out investigations, Analyzing and interpreting data, Obtaining, evaluating, and communicating information** CCC: **Standard Content:** A mixture is two or more materials intermingled. An aqueous solution is a mixture in which a substance disappears (dissolves) in water to make a clear liquid.	**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)

Mixtures and Solutions **Investigations 2:** Developing Modes **Part 1:** Black Boxes **SEP: Developing and using models, Planning and carrying out investigations, Analyzing and interpreting data, Constructing explanations, Engaging in argument from evidence, Obtaining, evaluating and communicating information.** CCC: System and system models **Standard Content:** Models are explanations of objects, events or systems that cannot be observed directly. Models are representations used for communicating and testing. Developing a model is an iterative process which may involve observing, constructing, analyzing and revising. **Part 2:** Drought Stopper **SEP: Developing and using models, Planning and carrying out investigations, Constructing explanations, Engaging in argument from evidence, Obtaining, evaluating and communicating information** CCC: System and system models **Standard Content:** Models are explanations of objects, events or systems that cannot be observed directly. Models are representations used for communicating and testing. **Part 3:** Models for change in Properties **SEP: Developing and using models, Planning and carrying out investigations, Constructing explanations, Obtaining, evaluating and communicating information** CCC: Cause and effect, Energy and matter **Standard Content:** Dissolving is an interaction between two (or more) substances: a solute which dissolves and a solvent, which does the dissolving into which the solute disappears. Melting is a change in a single substance from solid to liquid caused by heat (energy transfer). The amount of matter is conserved when it changes form.	**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) **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)

Mixtures and Solutions **Investigations 3: Concentration** **Part 1:** Soft-Drink Recipes **SEP: Developing and using models, Planning and carrying out investigations, Using mathematics and computational thinking, Constructing explanations, Obtaining, evaluating and communicating information** CCC: System and system models, Cause and effect, Energy and matter **Standard Content:** Concentration is the amount of dissolved solid material per unit volume of water. Solutions with a lot of solid dissolved in a volume of water are concentrated: solutions with little solid dissolved in a volume of water are dilute. **Part 2:** Salt Concentration **SEP: Developing and using models, Planning and carrying out investigations, Analyzing and interpreting data, Using mathematics and computational thinking, Constructing explanations** CCC: Cause and effect, Scale, proportion and quantity, System and system models **Standard Content:** Concentration is the amount of dissolved solid material per unit volume of water. A concentrated solution can be diluted with water. When equal volumes of two salt solutions are weighted, the heavier one is the more concentrated solution. **Part 3:** Mystery Solutions **SEP: Planning and carrying out investigations, Analyzing interpreting data, Using mathematics and computational thinking, Engaging in argument from evidence, Obtaining, evaluating and communicating information** CCC: Scale, proportion and quantity **Standard Content:** Concentration is the amount of dissolved solid material	**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) **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)

per unit volume of water. When equal volumes of two salt solutions are weighted, the heavier one is the more concentrated solution. **Part 4:** Liquid Layers **SEP: Planning and carrying out investigations, Analyzing and interpreting data, Constructing explanations, Using mathematics and computational thinking, Obtaining, evaluating and communicating information** CCC: Cause and effect **Standard Content:** Density is mass per unit volume. The greater the concentration of salt solution, the greater is the density. Less dense liquids and solid objects float on more dense solutions.	
Mixtures and Solutions **Investigations 4: Reaching Saturation** **Part 1:** Salt Saturation **SEP: Planning and carrying out investigation, Analyzing and interpreting data, Using mathematics and computational thinking, Constructing explanations, Engaging in argument from evidence, Obtaining, evaluating and communicating information** CCC: Cause and effect **Standard Content:** A solution is saturated when as much solid materials as possible has dissolved in the liquid. Solutions are composed of a solvent (liquid) and a solute (solid): the solute is dissolved in the solvent. **Part 2:** Epsom Salts Saturation **SEP: Developing and using models, Planning and carrying out investigations, Analyzing and interpreting data, Constructing explanations, Engaging in argument from evidence** CCC: **Standard Content:** A solution is saturated when as much solid material as possible has dissolved in the liquid. Solubility is the property that indicates	**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) **5.2.2** Ask questions to **plan and carry out investigations** 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) **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

how readily a solute dissolves in a solvent. Solubility varies from substance to substance and is affected by kind of solvent, temperature and other factors. **Part 3:** Saturation Puzzle **SEP: Asking questions, Developing and using models, Planning and carrying out investigations, Analyzing and interpreting data, Using mathematics and computational thinking, Constructing explanation** CCC: Patterns **Standard Content:** Solubility is the property that indicates how readily a solute dissolves in a solvent. A substance is a single, pure material. Substances form predictable, identifiable crystals when solutions evaporate. **Part 4:** Salt Saturations **SEP: Defining problems, Planning and carrying out investigations, Designing solutions, Obtaining, evaluating and communicating information.** CCC: **Standard Content:** Apply techniques used to separate mixtures and solutions.	could include melting an ice cube, dissolving salt in water, and combining baking soda and vinegar in a closed bag. (PS1.A, PS1.B)
Mixtures and Solutions **Investigations 5: Fizz Quiz** **Part 1:** Chemical Reactions **SEP: Planning and carrying out investigations, Analyzing and interpreting data, Constructing explanations** CCC: **Standard Content:** Some mixtures of substances result in chemical reactions. During reactions, starting substances (reactants) change into new substances (products). Formation of a gas or precipitate is evidence of a chemical reaction. **Part 2:** Reaction Products	**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) **5.2.2** Ask questions to **plan and carry out investigations** 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.

SEP: Planning and carrying out investigations, Analyzing and interpreting data, Constructing explanations, Obtaining, evaluating, and communicating information CCC: Cause and effect, System and system models **Standard Content:** Formation of a precipitate occurs in some chemical fractions. Some products of a reaction are soluble and can be observed only after evaporating the solution. Calcium carbonate reacts with acid. **Part 3:** Reaction in a Zip Bag **SEP: Asking questions, Developing and using models, Planning and carrying out investigations, Analyzing and interpreting data, Constructing explanations, Obtaining evaluating and communicating information** CCC: Scale, proportion and quantity, Energy and matter **Standard Content:** Some mixtures of substances result in a chemical reaction. Formation of a gas of precipitate is evidence of a chemical reaction.	Examples of substances could include powders, metals, minerals, or liquids. (PS1.A) **5.2.3 Plan and carry out investigations** 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) **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)

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.

FOSS	STANDARDS

Living Systems **Investigations 1: Systems** **Part 1:** Everyday Systems **SEP: Analyzing and interpreting data, Constructing explanations, Obtaining, evaluating and communicating information** CCC: System and system models **Standard Content:** A system is a collection of interacting objects, ideas, and/or procedures that together define a physical entity or process. **Part 2:** The Earth System **SEP: Developing and using models, Analyzing and interpreting data, constructing explanations, Obtaining, evaluating and communicating information** CCC: Energy and matter, Stability and change **Standard Content**: Earth can be described as the interaction of four earth systems: the rocky part (the geosphere), the atmosphere, the water (hydrosphere), and the complexity of living organisms (biosphere). Food Webs are subsystems within ecosystems. They describe the transfer of matter and energy within the system. **Part 3:** Kelp Forest Food Web **SEP: Asking questions, Developing and using models, Analyzing and interpreting data, Constructing explanations, Obtaining, evaluating and communicating information** CCC: System and system models, Scale, proportion and quantity, Energy and matter **Standard Content:** A kelp forest has similarities to a rainforest (vertical layering). Phytoplankton are the major producers in most aquatic systems. Food webs and competition for resources exist in marine systems. **Part 4:** Recycling **SEP: Asking questions, Planning and carrying out investigations, Analyzing and interpreting data, Engaging in argument from evidence,**	**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) **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) **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)

Obtaining, evaluating and communicating information CCC: System and system models, Stability and change **Standard Content:** Food webs are made up of producers (organisms that make their own food), consumers (organisms that eat other organisms to obtain food), and decomposers (organisms that consume and recycle dead organisms and organic waste).	
Living Systems **Investigations 2: Nutrient Systems** **Part 1:** Yeast Nutrition **SEP: Planning and carrying out investigations, Analyzing and interpreting data, Using mathematics and computational thinking, Constructing explanations, Obtaining, evaluating and communicating information** CCC: Energy and matter, Scale proportion and quantity, System and system models **Standard Content:** Yeast is a single-celled fungus. Dormant yeast cells can become active when provided with water, warmth and sugar as a food source. Carbon dioxide is a waste byproduct of yeast metabolism. A nutrient is a substance, such as sugar or starch, that is used by a cell to produce the energy needed to perform the function of life. **Part 2:** Plant Nutrition **SEP: Developing and using models, Planning and carrying out investigations, Analyzing and interpreting data, Constructing explanations, Engaging in argument from evidence, Obtaining, evaluating and communicating information** CCC: Energy and matter, System and system models **Standard Content:** Plants make their own food by photosynthesis. Chlorophyll is the green pigment that absorbs sunlight in the cells of producer organisms. Green plants cells make sugar (food) from carbon dioxide and water in the presence of sunlight, and release oxygen.	**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) **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) **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)

Part 3: Animal Nutrition **SEP: Planning and carrying out investigations, Analyzing and interpreting data, Constructing explanations, Engaging in argument from evidence, Obtaining, evaluating and communicating information** CCC: System and system models **Standard Content:** Animals obtain nutrients by eating other organisms, Digestion is the process used by animals to break down complex food items into simple nutrients.	
Living Systems **Investigations 3: Transport Systems** **Part 1:** Plant Vascular Systems **SEP: Developing and using models, Planning and carrying out investigations, Analyzing and interpreting data, Constructing explanations, Obtaining, evaluating and communicating information** CCC: System and system models, Structure and function, Energy and matter **Standard Content:** Scientists classify objects and information by organizing them into groups with similar attributes. Vascular bundles are arranged in predictable patterns of veins in the leaves of vascular plants. Vascular plants have specialized tissues for the transport of water, minerals and sugar to cells: xylem tubes carry water and minerals from the plant roots to all the cells in a one-way flow; phlegm tubes carry sugar from the leaves to all the cells that need it. **Part 2:** Circulatory System **SEP: Developing and using models, Constructing explanations, Obtaining, evaluating and communicating information** CCC: System and system models **Standard Content:** All cells have basic needs: water, food gas exchange, and waste disposal. Multicellular organisms have systems for transporting nutrients and wastes. The human circulatory system, blood, transports resources to cells and wastes from the cells.	**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) **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) **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)

Part 3: Respiratory System **SEP: Asking questions, Planning and carrying out investigations, Analyzing and interpreting data, Using mathematics and computational thinking, Constructing explanations, obtaining, evaluating and communicating information** CCC: Patterns, Scale, proportion and quantity, System and system models **Standard Content:** The human circulatory system, blood, transports resources to cells and wastes from the cells. All cells have basic needs: water, food gas exchange, and waste disposal. Multicellular organisms have systems for transporting nutrients and wastes.	
Living Systems **Investigation 4: Nutrient Systems** **Part 1:** Stimulus/Response **SEP: Asking questions, Planning and carrying out investigations, Analyzing and interpreting data, Using mathematics and computational thinking, Constructing explanations, Obtaining, evaluating and communicating information** CCC: System and system models, Scale proportion and quantity **Standard Content:** A stimulus is something that triggers (starts) a response. A stimulus is often information received through the senses. The stimulus might signal danger. A response is a reaction of a living thing to a stimulus. Response times is the length of time it takes for a person to respond to a stimulus. Sensory systems are involved in stimulus and response. **Part 2:** Attention **SEP: Analyzing and interpreting data, Constructing explanations, Obtaining, and communicating information** CCC: System and system models **Standard Content:** Animal adaptations include pattern and color that attract attention to warn predators off or attract a mate. Animals	**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) **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) **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)

communicate to warn others of danger, scare predators away, or locate others of their kind, including family members. **Part 3:** Instinct and Learning **SEP: Constructing explanations, Obtaining, evaluating and communicating information** CCC: Stability and change **Standard Content:** Instinctive behaviors such as knowing what to eat, how to find shelter, and how to migrate, help organisms survive. Some animals learn behaviors by watching adults or through trial and error. **Part 4:** Ecosystems **SEP: Analyzing and interpreting data, Constructing explanations, Obtaining, evaluating and communicating information** CCC: System and system models, Energy and matter **Standard Content:** Marine ecosystems have biotic (living) and abiotic (nonliving) parts. Phytoplankton are the base of the food chain in the ocean. The ocean plays an important role in the carbon cycle. Marine ecosystems demonstrate interacting parts involving the biosphere, atmosphere, hydrosphere and geosphere.	**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)