



**Course Description**  
**Middle School Science**  
**NGSS**



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## MS-PS1 Matter and Its Interactions

### Topic 1: Elements and Compounds

**Description:** [MS-PS1-1; MS-PS1-2] In this topic students will learn that there are a finite number of elements, each element is represented by a symbol, and the atoms of each element have a unique structure; two or more elements combine to form compounds which are represented by chemical formulas, and the smallest unit of a compound is a molecule; students will also learn to determine if a chemical reaction has occurred.

**Instruction Module** **What are Elements?:** In this Instruction Module, students learn that elements are the simplest form of matter and that about 117 elements have been discovered so far. They learn the names of some elements such as oxygen, hydrogen, nitrogen, and, carbon that make up the solid part of Earth, the ocean, the atmosphere, and living matter.

**Instruction Module** **Identifying Elements:** In this Instruction Module, students learn that an element can be identified by its properties. They learn that the atoms of each element have a unique structure that determines its properties. They also learn that each element is represented by a chemical symbol.

**Instruction Module** **What are Compounds?:** In this Instruction Module, students learn that two or more elements combine to form a compound and that the smallest unit of a compound is a molecule. They learn that compounds are represented by chemical formulas and can only be separated by chemical process such as electrolysis.

**Instruction Module** **Evidence of Chemical Changes:** In this Instruction Module, students understand that a chemical change results in the formation of new substances. They learn that a change in color, a change in temperature, the release of a gas, the formation of a precipitate, and a change in color are evidence of chemical changes.

**Glossary** **Elements and Compounds**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.



<b>Interactivity</b>	<b>The Substance Detector:</b> In this Interactivity, students classify a given substance as an element or a compound based on its symbol/chemical formula. They observe the substance undergoing a change and recognize it as a physical or a chemical change.
<b>Journals</b>	Journal 1 - Elements and Compounds Journal 2 - Elements and Compounds Journal 3 - Elements and Compounds
<b>Activities</b>	Elements and Compounds
<b>Quiz</b>	Elements and Compounds

## Topic 2: Metals and Nonmetals

**Description:** [MS-PS1-1] In this topic student will learn that elements are classified into metals, nonmetals, and metalloids, compare their physical properties such as thermal or electrical conductivity, luster, malleability, and ductility, and calculate the densities of some materials.

**Instruction Module** **Properties of Metals:** In this Instruction Module, students observe the properties of some metals and learn that metals have a shiny luster, are malleable and ductile, and are mostly good conductors of heat and electricity.

**Instruction Module** **Comparing Metals and Nonmetals:** In this Instruction Module, students observe and compare some physical properties of metals and nonmetals including ability to conduct heat and electricity, luster, malleability, and ductility and learn to tabulate the differences.

**Instruction Module** **Properties of Metalloids:** In this Instruction Module, students observe the properties of metalloids and recognize that they have some properties of metals and some of nonmetals. They learn that metalloids occupy the space between the metals and nonmetals on the periodic table.

**Instruction Module** **Calculating Density:** In this Instruction Module, students learn that the density of a substance is unique and can be used to identify a substance by using standard density charts. They learn that density can be calculated by dividing the mass of a substance by its volume. They understand that mass can be measured with a triple beam balance and the volume of an irregular shaped object can be measured using a graduated cylinder.



**Glossary** **Metals and Nonmetals**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity** **Test Your Metal:** In this Interactivity, students observe the physical properties of elements and classify them as metal, nonmetal, or metalloid. Then, given the mass and volume of the sample, they identify it by calculating its density and comparing the value with a density chart.

**Journals** Journal - Metals and Nonmetals

**Activities** Calculating Density to Identify Substances

**Quiz** Metals and Nonmetals

## Topic 3: Organic Compounds in the Living World

**Description:** [MS-PS1-1] In this topic students will learn that organic compounds contain carbon and other elements such as hydrogen, oxygen, phosphorus, nitrogen, or sulfur, and learn to develop models to describe their atomic composition.

**Instruction Module** **Organic Compounds in the Living World:** In this Instruction Module, students learn that carbohydrates, proteins, lipids and nucleic acids are organic compounds. They learn about the structural similarities and differences of these compounds and how they are utilized in our bodies.

**Glossary** **Organic Compounds in the Living World**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Journals** Journal - Organic Compounds and the Living World

**Quiz** Organic Compounds in the Living World

## Topic 4: The Periodic Table

**Description:** [MS-PS1-1] In this topic students will learn that elements are grouped in the



periodic table according to similarities of their properties.

<b>Instruction Module</b>	<b>The Periodic Table:</b> In this Instruction Module, students learn that all known elements are represented on the periodic table based on their atomic numbers. They understand that elements in a group have common properties and that properties change across a period.
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<b>Glossary</b>	<b>The Periodic Table</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
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<b>Interactivity</b>	<b>Lost and Found:</b> In this Interactivity, students identify the position of an element on the Periodic Table based on its atomic structure. The student also has to recognize whether an element is a metal, a nonmetal, or a metalloid based on its properties.
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<b>Journals</b>	Journal - The Periodic Table
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<b>Activities</b>	The Periodic Table
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<b>Quiz</b>	The Periodic Table
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## Topic 5: Structure of the Atom

**Description:** [MS-PS1-1] In this topic students will learn about the scientific theory of atoms by recognizing that atoms are the smallest unit of an element and are composed of sub-atomic particles, and the number of protons determine an element's identity and valence electrons determine its chemical properties, including reactivity.

<b>Instruction Module</b>	<b>Atoms:</b> In this Instruction Module, students are introduced to the structure of the atom. They learn about protons, neutrons, and electrons, their location in the atoms and their electrical charges. They learn about atomic number and mass number.
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<b>Instruction Module</b>	<b>Valence Electrons and Reactivity:</b> In this Instruction Module, students learn about electron shells and valence shells, and understand what is meant by a full electron shell. They learn that an element does not react easily with other elements when the valence shell of its atoms are full.
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<b>Instruction Module</b>	<b>Ionic and Covalent Bonds:</b> In this Instruction Module, students learn that ionic bonds form when atoms lose or gain electrons resulting in the formation of positive and negative ions which attract each other. They learn that covalent bonds form when atoms of elements share their electrons.
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<b>Glossary</b>	<b>Structure of the Atom</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Form a Bond:</b> In this Interactivity students will be able to infer which atoms would most likely form ionic bonds based on the number of electrons in their valence shell.
<b>Journals</b>	Journal - Structure of the Atom

**Activities**                      Structure of the Atom  
   Protons and Electrons

**Quiz**                              Structure of the Atom

## Topic 6: Chemical Reactions

**Description:** [MS-PS1-2; MS-PS1-5; MS-PS1-6] In this topic students will learn that chemical reactions can be represented by chemical equations, recognize the total number of atoms does not change in a chemical reaction and thus mass is conserved, and that energy is either released or absorbed during a chemical reaction.

**Instruction Module**                      **Chemical Symbols and Formula:** In this Instruction Module, students are introduced to chemical symbols and formulas. They learn that a chemical formula conveys information about the number of atoms of each element that combine to make a molecule of the compound.

**Instruction Module**                      **Chemical Reactions and Equations:** In this Instruction Module, students learn that chemical reactions result in the formation of new substances. They learn how to write chemical equations to represent chemical reactions. They understand that chemical equations need to be balanced so that the Law of Conservation of Mass holds true.

**Glossary**                              **Chemical Reactions**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity**                      **Balance the Chemical Equation:** In this Interactivity, students use the law of conservation of mass to balance chemical equations. They add/remove atoms and molecules in the reactants as well as products to balance the equation.



**Journals** Journal - Chemical Reactions and Equations

**Activities** Chemical Reactions and the Law of Conservation of Mass part 1  
Chemical Reactions and the Law of Conservation of Mass part 2

**Quiz** Chemical Reactions

## Topic 6: Particle Motion, Temperature, and Thermal Energy

**Description:** [MS-PS1-4] In this topic students will learn to relate thermal energy and the temperature of a substance to the kinetic energy of the particles of matter, and recognize that adding or removing thermal energy to a substance changes its temperature and can result in a change of state.

**Instruction Module** **Temperature:** In this Instruction module, students learn that temperature is a measure of the average kinetic energy of the moving particles of matter. They recognize the need of tools such as a thermometer and learn about the three scales of measuring temperature.

**Instruction Module** **What is Thermal Energy? :** In this Instruction Module, students learn that thermal energy of a substance refers to the total kinetic energy of the moving particles of matter in the substance. They recognize that the thermal energy of two substances can be different even when their temperatures are the same.

**Instruction Module** **Melting, Freezing, and Boiling Points:** In this Instruction Module, students observe and learn that adding or removing heat results in an increase or decrease in temperature. They learn that water changes state from solid to liquid at  $0^{\circ}\text{C}$  (melting point) and from liquid to gas at  $100^{\circ}\text{C}$  (boiling point).

**Glossary** **Particle Motion, Temperature, and Thermal Energy**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Quiz** Particle Motion, Temperature, and Thermal Energy



## MS-PS2 Motion and Stability: Forces and Interactions

### Topic 1: Force and Motion

**Description:** [MS-PS2-2] In this topic, students will learn to identify and describe the changes in the motion of an object when acted upon by unbalanced forces, calculate average speed, and measure and graph changes in motion.

**Instruction Module** **Effects of Force on Motion:** In this Instruction Module, students learn the pushes and pulls are called forces. They observe examples and changes caused by friction and gravity, and recognize that unbalanced forces can move an object at rest and change the speed and direction of a moving object.

**Instruction Module** **Measuring Distance and Speed:** In this Instruction Module, students observe and recognize that motion is relative. They learn to calculate the average speed of an object by dividing the total distance travelled by the total time taken to travel that distance and express it using the correct units of measurement. They also learn that the motion of an object can be depicted on a distance - time graph.

**Glossary** **Force and Motion**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity** **The Mass-matcher!:** In this Interactivity, students observe the effects of a pair of forces on an object and decide if the forces are balanced or unbalanced.

**Journals**  
Journal - Force and Motion  
Journal 2 - Force and Motion

**Activities**  
How the Direction of the Force Affects the Motion of an Object  
The Effect of Mass on the Motion of an Object  
Representing Changes in Motion Graphically – STEM

**Quiz** Force and Motion



## Topic 2: Newton's Laws of Motion

**Description:** [MS-PS2-1; MS-PS2-2] In this topic students will learn to differentiate between speed, velocity, and acceleration, explain that the change in an object’s motion depends on the force and the mass of the object, and apply Newton's Laws of Motion to describe the changes in motion.

**Instruction Module** **Newton's First Law of Motion:** In this Instruction Module, students learn to calculate average speed, and differentiate between speed and velocity. They observe examples and understand how Newton's First Law can explain the motion of objects. They learn about inertia and recognize the importance of wearing seat belts.

**Instruction Module** **Newton's Second Law of Motion:** In this Instruction Module, students learn about Newton's Second Law of motion. They observe examples and recognize that acceleration depends on the amount of force applied and the mass of the object and is mathematically expressed as  $\text{Force} = \text{Mass} \times \text{Acceleration}$

**Instruction Module** **Newton's Third Law of Motion:** In this Instruction Module, students learn about Newton's Third Law of motion. They observe examples and identify action-reaction force pairs.

**Instruction Module** **Bumper Cars and Newton's Laws:** In this Instruction Module, students observe the motion of bumper cars and understand that their motion can be described using Newton's Laws of motion.

**Glossary** **Newtons Laws of Motion**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity** **Motor Speedway Rally:** In this Interactivity, students “apply” different amounts of force on different masses. They observe the motion of the object and calculate acceleration in each case. They recognize the relationship between force, mass, and acceleration.

**Simulation** **Splat!:** In the Simulation, students “use” air pumps to apply varying amounts of force and observe the effect on a constant mass. Then they use a constant force on varying masses and observe the effects. They record their observations and arrive at a conclusion.

**Journals**  
Journal - Force and Acceleration  
Journal 2 - Force and Acceleration



<b>Activities</b>	Investigate and Describe Applications of Newton’s Laws Speed, Velocity, and Acceleration Investigating and Describing Applications of the Law of Action– Reaction Balanced and Unbalanced Forces Investigating and Describing Applications of Inertia
<b>Quiz</b>	Newton’s Laws of Motion

## Topic 3: Magnetic, Gravitational, and Electrical Forces

**Description:** [MS-PS2-3; MS-PS2-4; MS-PS2-5] In this topic students will compare and contrast magnetic and gravitational forces, relate the weight of an object to the gravitational force experienced by it, describe the forces between electrical charges, and investigate the effect of the number of turns of wire on the strength of an electromagnet.

**Instruction Module** **Magnet's Force:** In this Instruction Module, students observe examples and understand that magnets exert a force of attraction on certain materials such as iron. They also learn that like of poles of two magnets repel each other while unlike poles attract each other.

**Instruction Module** **Gravity and Magnetic Force:** In this Instruction Module, student learn that both gravity and magnetic forces are similar because they are invisible forces that can pull objects. They also learn the differences between the two forces. They understand that while gravity pulls all objects, magnetic forces pull magnetic materials, and that magnets can also push other magnets depending on the direction in which they point.

**Instruction Module** **Gravity and Weight:** In this Instruction Module, students learn that the gravitational force between two objects depends on the mass of the objects. They compare the weights of an object on Earth, on the Moon, and on Jupiter, and infer that weight depends on the gravitational force experienced by it.

**Instruction Module** **Electricity:** In this Instruction Module, students are introduced to static electricity. Students learn that charges are of two type - positive and negative; like charges repel each other while unlike charges attract each other. They also learn that almost all electrical appliances use current electricity, which are charges in motion.

**Instruction Module** **Electricity and Magnetism:** In this Instruction Module, students are introduced to magnetic fields, electrical fields, and electromagnetic fields. Students learn how to create an electromagnet and understand how electromagnets differ from permanent magnets. Students also learn how magnets are used to produce electricity.



<b>Glossary</b>	<b>Magnetic, Gravitational, and Electrical Forces.</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Simulation</b>	<b>Temperatures Effect On Magnetic Force:</b> In this Simulation, students conduct an experiment to investigate how temperature affects the force of a magnet. <b>Electromagnets - An Investigation:</b> In this Simulation, students conduct an experiment to investigate how the number of turns in the coil wrapped around a nail affects the strength of an electromagnet.
<b>Journals</b>	Journal – Force
<b>Activities</b>	Electrical Circuits – Electromagnets
<b>Quiz</b>	Magnetic, Gravitational, and Electrical Forces

## MS-PS3 Energy

### Topic 1: Kinetic Energy and Potential Energy

**Description:** [MS-PS3-1; MS-PS3-2] In this topic students will learn to describe the relationship of kinetic energy to the mass and speed of an object, recognize the variables that determine the potential energy of an object, and identify and explain transformations of mechanical energy.

**Instruction Module**      **Kinetic Energy:** In this Instruction Module, students observe and learn that kinetic energy is the energy possessed by moving objects. They learn that the kinetic energy of an object depends on the mass and speed of the object.

**Instruction Module**      **Potential Energy:** In this Instruction Module, students observe examples and learn that potential energy is the energy stored in objects because of their position or condition. They recognize that the potential energy of an object raised above the ground depends on its mass and the height to which it is raised.

**Instruction Module**      **Mechanical Energy Transformations:** In this Instruction Module, students observe an oscillating pendulum and learn that mechanical energy continuously changes from potential to kinetic and back to potential energy. They learn the pendulum eventually stops oscillating because energy is lost as heat due to friction. Students apply this understanding to explain the energy transformations in roller coaster rides.



<b>Glossary</b>	<b>Kinetic Energy and Potential Energy</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Is it Potential or Kinetic?:</b> In this Interactivity, students observe the movement of objects and identify the correct amounts of potential and kinetic energy at different positions of the objects.
<b>Simulation</b>	<b>Design the Ride:</b> In this simulation section, students change the height of the hills of a roller coaster and observe the effect on the movement of the roller coaster car. They record their observations, analyze the data, and arrive at a conclusion. This helps them to understand the energy conversions that take place in a roller coaster ride.
<b>Journals</b>	Journal - Potential and Kinetic Energy
<b>Activities</b>	Potential and Kinetic Energy
<b>Quiz</b>	Kinetic Energy and Potential Energy

## Topic 2: Thermal Energy Transfer

**Description:** MS-PS3-3; MS-PS3-4] In this topic students will learn that adding or removing thermal energy results in a temperature change, describe the processes of heat transfer including conduction, convection, and radiation, and conduct investigations to determine the relationship between the energy transferred and the type of matter.

<b>Instruction Module</b>	<b>Temperature:</b> In this Instruction module, students learn that temperature is a measure of the average kinetic energy of the moving particles of matter. They recognize the need of tools such as a thermometer and learn about the three scales of measuring temperature.
<b>Instruction Module</b>	<b>What is Thermal Energy?:</b> In this Instruction Module, students learn that thermal energy of a substance refers to the total kinetic energy of the moving particles of matter in the substance. They recognize that the thermal energy of two substances can be different even when their temperatures are the same.
<b>Instruction Module</b>	<b>Heat Transfer by Conduction:</b> In this Instruction Module, students learn that heat is transferred from an object at a higher temperature to an object at a lower temperature until both objects are at the same temperature. They also learn that conduction is the process in which heat is transferred through a substance from one particle to another



and mostly occurs in solids.

<b>Instruction Module</b>	<b>Heat Transfer by Convection:</b> In this Instruction Module, students learn that convection is a process of heat transfer in which the particles of matter move from the hot end to the cooler end, carrying the energy with them, and mostly occurs in liquids and gases. They learn that wind is a result of convection currents in the atmosphere, and earthquakes are a result of convection currents in Earth's mantle.
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<b>Instruction Module</b>	<b>Heat Transfer by Radiation:</b> In this Instruction Module, students learn that radiation is the process by which heat is transferred as electromagnetic waves and does not require a material medium. They learn that energy from the Sun is transferred to Earth by radiation.
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<b>Glossary</b>	<b>Thermal Energy Transfer</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
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<b>Simulation</b>	<p><b>Heat and Heat Transfer:</b> In this simulation, students set the temperatures of two materials whose containers are in contact with each other, observe the changes in temperature of both after an interval of time, and arrive at a conclusion about the direction in which thermal energy moves.</p> <p><b>Heat Transfer by Conduction:</b> In this simulation, students observe the time taken for heat to flow through different materials and, based on their observations, categorize the materials as thermal conductors and insulators.</p> <p><b>Thermal Energy - Conductor or Insulator?:</b> In this simulation students will classify materials as thermal insulators or thermal conductors by conducting a simple investigation.</p>
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<b>Journals</b>	Journal 1 - Heat Transfer Journal 2 - Heat Transfer
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<b>Activities</b>	Modeling Heat Transfer by Convection and Conduction Heat Transfer
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<b>Quiz</b>	Thermal Energy Transfer
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## Topic 3: Simple Machines

**Description:** [MS-PS3-5] In this topic students will learn that force and motion are related to energy and work and explain how simple machines help make work easier by changing the amount and/or direction of force or the distance.



<b>Instruction Module</b>	<b>Simple Machines and their Uses:</b> In this Instruction module, students learn about simple machines including inclined planes, wedges, screws, levers, pulleys, and wheel and axle. They understand how each of these simple machines changes the amount of force, the direction of force, or the distance through which the force is moved.
<b>Instruction Module</b>	<b>Mechanical Advantage and Efficiency:</b> In this Instruction module, students observe a pulley system and recognize that it can multiply force. They learn that the mechanical advantage of a machine is the number of times the machine multiplies the effort and is calculated by dividing the output force by the input force. They also understand that the efficiency of a machine is the ratio of the output energy to the input energy expressed as a percentage, and is always less than 100%.
<b>Glossary</b>	<b>Simple Machines</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>What's the Mechanical Advantage?:</b> In this Interactivity, students identify the input and output forces and calculate the MA (mechanical advantage) of inclined planes. They use the relation between the length and height of a ramp to its mechanical advantage to find the length of the ramp.
<b>Journals</b>	Journal - Simple Machines
<b>Activities</b>	Using Pulleys to do Work Using an Inclined Plane to do Work
<b>Quiz</b>	Simple Machines

## Topic 4: Force, Work, and Energy

**Description:** [MS-PS3-5] In this topic students will learn that work is done when a force moves an object in the direction of the force, and relate the work done to transfer and transformations of energy.

<b>Instruction Module</b>	<b>Work vs No Work:</b> In this Instruction module, students learn that work is done when a force moves an object through a distance in the direction of the force. They recognize that no work is done when force is applied but the object does not move in the direction of the force. They learn that the amount of work done is equal to the product of the force applied and the distance moved by the object in the direction of the force.
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<b>Instruction Module</b>	<b>Work, Energy, and Food:</b> In this Instruction module, students learn that that the chemical energy obtained from food is stored in the muscles and other parts of our body. They observe and recognize that this chemical energy is transferred and transformed into kinetic energy and potential energy when we do work, and some of it is transformed to heat or thermal energy.
<b>Instruction Module</b>	<b>Work and Simple Machines:</b> In this Instruction module, students learn that simple machines such as ramps, pulleys, and levers make work easier by changing the direction or amount of force and the distance moved, but the amount of work remains the same. They also learn that the input energy, or the work done on the machine, is always greater than the output energy, or the work done by the machine.
<b>Glossary</b>	<b>Force, Work, and Energy</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Work It!:</b> In this Interactivity, students observe different situations and figure out if work is being done. They also calculate the amount of work being done using the values of the force applied and the distance moved.
<b>Journals</b>	Journal 1 - Force, Work, and Energy Journal 2 - Force, Work, and Energy
<b>Activities</b>	The Energy Stored in Foods Work and Force: 1 Work and Force: 2 Calculating Work
<b>Quiz</b>	Force, Work, and Energy

## MS-PS4 Waves and Their Applications in Technologies for Information Transfer

### Topic 1: Sound and Light

**Description:** [MS-PS4-2] In this topic students will learn that sound is produced by mechanical vibrations and travels as sound waves, and that light travels as electromagnetic waves; they learn how light is reflected, absorbed or transmitted.



<b>Instruction Module</b>	<b>Sound Energy:</b> In this Instruction Module, students observe and infer that sound is produced by mechanical vibrations and travels as sound waves. They learn that sound needs matter to travel through and travels fastest through solids. They also learn that echoes are a result of the bouncing of sound waves.
<b>Instruction Module</b>	<b>Light and Matter:</b> In this Instruction Module students learn about light as a form of energy, its sources, and how it travels. They observe various examples and identify transparent, translucent, and opaque materials.
<b>Instruction Module</b>	<b>Reflection and Refraction of Light:</b> In this Instruction Module, students learn that light rays reflect off surfaces. They learn the difference between regular reflection and diffuse reflection. They also understand that light rays refract when they travel from one medium into another, and recognize instances of refraction.
<b>Instruction Module</b>	<b>Lenses and Their Uses:</b> In this Instruction Modules, students learn how light rays refract when they travel through concave and convex lenses. They understand how a telescopes make distant objects appear closer by using a combination of lenses to magnify the image. They also understand the role of the lens in the human eye and a camera.
<b>Glossary</b>	<b>Sound and Light</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Journals</b>	Forms of Energy
<b>Activities</b>	Why Rainbows Form Exploring the Properties of Light Light Reflection and Different Surfaces
<b>Quiz</b>	Sound and Light

## Topic 2: Using Light to Study the Universe

**Description:** [MS-PS4-2] In this topic students will learn that white light is a combination of light of various colors or wavelengths, and understand how scientists use the electromagnetic spectrum to study the universe.



<b>Instruction Module</b>	<b>Using Light to Study the Universe:</b> In this Instruction Module, students learn how scientists study the different wavelengths of light from distance stars and other objects in space and use it to gain information about the composition of the objects. They understand how scientists compare the absorption spectrums of stars to the emission spectrums of elements to understand the composition of stars.
<b>Glossary</b>	<b>Using Light to Study the Universe</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Star Light Star Bright:</b> In this Interactivity, students compare the absorption spectrum of stars and compare it with the emission spectrum of elements to analyze which element is present in the star.
<b>Journals</b>	The Universe- Distances and Sizes
<b>Activities</b>	Radio Astronomy Constructing a Model Hand-held Spectroscope
<b>Quiz</b>	Using Light to Study the Universe

## MS-LS1 From Molecules to Organisms: Structures and Processes

### Topic 1: Cell - The Basic Unit of Life

**Description:** [MS-LS1-1; MS-LS1-2] In this topic students will learn that all living things are made of cells – either one cell or many different numbers and types of cells, and that cells are capable of performing all life functions; they learn to compare and contrast eukaryotic cells and prokaryotic cells.

<b>Instruction Module</b>	<b>Cell The Basic Unit of Life:</b> In this Instruction Module, students learn that all living organisms are composed of cells and that the cell is the basic unit of life. They learn that organisms can be unicellular or multicellular. They understand that a single cell is capable of performing all life functions and that every cell has a cell membrane, cytoplasm and DNA.
<b>Instruction Module</b>	<b>Eukaryotic and Prokaryotic Cells:</b> In this Instruction Module, students learn about the structures of a prokaryotic and eukaryotic cell. They also learn to compare and contrast a typical prokaryotic and eukaryotic cell.



**Glossary** **Cell - The Basic Unit of Life**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity** **Sorting Cells:** In this Interactivity, students identify the components of cells that are common to both kinds of cells and the components which are present either in eukaryotic cells or in prokaryotic cells.

**Journals** Journal - Cell – The Basic Unit of Life

**Quiz** Cell - The Basic Unit of Life

## Topic 2: Plant vs Animal Cell

**Description:** [MS-LS1-1; MS-LS1-2] In this topic students will learn to compare and contrast the structure and function of plant and animal cells.

**Instruction Module** **Plant vs Animal Cell:** In this Instruction Module, students recognize that plant and animal cells are both eukaryotic cells. They learn about the structural components of both these types of cells, and compare and contrast the structure and functions of major organelles of plant and animal cells.

**Glossary** **Plant vs Animal Cell**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity** **Cell! Cell! Organelle!:** In this Interactivity, students “build” a plant cell and an animal cell by dragging and dropping the correct organelles to the appropriate cell.

**Journals** Journal 1 - Plant vs. Animal Cell  
Journal 2 - Plant vs. Animal Cell

**Activities** Observing Paramecia  
Comparing Plant and Animal Cells Organelles

**Quiz** Plant vs Animal Cell



## Topic 3: Tissues, Organs, and Organ Systems

**Description:** [MS-LS1-3] In this topic students will learn that cells form tissues and tissues form organs which interact in an organ system; they learn about the structure and functions of plant and animal tissues.

**Instruction Module** **Structural Hierarchy Cells To Organisms:** In this Instruction Module, students learn that multicellular organisms can either be simple or complex based on whether or not they exhibit structural hierarchy. They learn that the structural hierarchy exhibited by complex multicellular organisms from the smallest to the largest unit is cells to tissues to organs to organ systems to organism.

**Instruction Module** **Plant and Animal Tissues:** In this Instruction Module, students learn about the structure and functions of the three main types of plant tissues, namely dermal tissue, ground tissue and vascular tissue. They also learn about the structure and functions of the four main types of animal tissues, namely epithelial tissue, connective tissue, muscle tissue and nervous tissue.

**Glossary** **Tissues, Organs, and Organ Systems**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity** **Levels of Structural Organisation:** In this interactivity, students will recognize the levels of structural organization in plants and animals and arrange the levels according to their complexity. They will also sort different plant and animal structures according to their appropriate organizational level.

**Journals**  
Journal 1 - Cells to Organisms  
Journal 2 - Cells to Organisms

**Activities**  
Levels of Organization of Living Things

**Quiz**  
Tissues, Organs, and Organ Systems

## Topic 4: The Human Body System

**Description:** [MS-LS1-3] In this topic students will learnt to identify and describe the structure and functions of the major systems of the human body.



Instruction Module	<p><b>Respiratory And Circulatory Systems:</b> In this Instruction Module, students learn about the structural components of the respiratory and the circulatory systems. They understand that these systems are interconnected for the transport of gases in the human body. They understand how the respiratory system helps in the exchange of gases and the circulatory system helps in the transport of gases within the body.</p>
Instruction Module	<p><b>Skeletal And Muscular Systems:</b> In this Instruction Module, students learn how bones and muscles work together to facilitate movement. They learn that muscles are of two main types, namely voluntary and involuntary muscles. They learn that the region where two or more bones meet is called a joint and learn about the different types of joints in the human body.</p>
Instruction Module	<p><b>Digestive and Excretory Systems:</b> In this Instruction Module, students learn about the different components of the digestive system and how they aid in digestion. They also learn about the kidneys in the excretory system and how they work to eliminate wastes in the bloodstream.</p>
Instruction Module	<p><b>Integumentary System:</b> In this Instruction Module, students learn that the integumentary system is made of the skin, hair and nails. They learn about the different structural components of the skin and the functions of these components.</p>
Instruction Module	<p><b>Nervous System:</b> In this Instruction Module, students Learn about the components of the nervous system and their functions. They also understand how nerves carry electrical messages or impulses to and from the brain.</p>
Instruction Module	<p><b>Endocrine And Reproductive Systems:</b> In this Instruction Module, students learn that the endocrine system is made of structures called glands that release hormones to regulate some important functions in the body. They learn about the functions of some important endocrine glands. They also learn about the structural components of the male and female reproductive systems and their functions.</p>
Glossary	<p><b>The Human Body System</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.</p>
Interactivity	<p><b>Dr.Fix-it!:</b> In this Interactivity, students identify organs that are missing from an organ system and drag and drop the right organ to its right location in the organ system.</p>
Journals	Journal - Human Body Systems



**Activities**

Human Body Systems

**Quiz**

The Human Body System

## Topic 5: Structural Adaptations of Plants and Animals

**Description:** [MS-LS1-4] In this topic students will learn how structural adaptations increase the chances of organisms to survive and reproduce in their environments.

**Instruction Module**

**Plant Adaptations:** In this Instruction Module, students learn all plants have adaptations that help them survive in their environments. Students learn about root and leaf adaptations of plants in the tropical rainforests, tundra and hot deserts.

**Instruction Module**

**Internal Structural Adaptations:** In this Instruction Module, students understand that animals and plants have internal structural adaptations that increase their chances of survival in their environment. They understand the importance of some internal structural adaptations such as the hollow bones in some birds, gills in fish and xylem and phloem in plants.

**Glossary**

### Structural Adaptations of Plants and Animals

The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity**

**Name That Adaptation:** In the Interactive section of the module, students click on different parts of an organism and learn how that structure helps the organism to adapt to its environment. Then, they identify which of the adaptations is an internal structural adaptation.

**Quiz**

Structural Adaptations of Plants and Animals

## Topic 6: Adaptations to Environmental Changes

**Description:** [MS-LS1-4] In this topic students will learn how structural and behavioral adaptations increase an organism's chances of surviving seasonal and long-term changes in the environment.



<b>Instruction Module</b>	<b>Adaptations to Seasonal Changes:</b> In this Instruction Module, students learn that some environmental changes such as seasonal changes are short-term changes. They understand that plants and animals living in places with harsh winters have different physical and behavioral adaptations to cope with winter.
<b>Instruction Module</b>	<b>Migration:</b> In this Instruction Module, students learn that organisms in an ecosystem migrate to cope with changing environmental conditions. They understand that seasonal migration is short-term migration and removal migration is a long-term, permanent migration.
<b>Glossary</b>	<b>Adaptations to Environmental Changes</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Simulation</b>	<b>Colors and Heat Absorption:</b> In this simulation, students recognize that the addax antelope changes color in response to the seasons. Students investigate to determine how the change in coat color is an adaptation that aids the addax's survival.
<b>Activities</b>	Environmental Changes and Organisms
<b>Quiz</b>	Adaptations to Environmental Changes

## Topic 7: Factors Affecting Plant Growth

**Description:** [MS-LS1-5] In this topic students will learn how factors such as gravity and the availability of light, space, and water affect the growth of plants.

<b>Instruction Module</b>	<b>Forces Affecting Plant Growth:</b> In this Learning Object, students learn that certain forces acting on plants affect their growth. They understand how plants respond to stimuli such as gravity and light.
<b>Glossary</b>	<b>Factors Affecting Plant Growth</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Gravity and Plants:</b> In this Interactivity, students observe the direction of growth of roots and stems of plants and decide the direction of the force of gravity. They identify the parts of the plant that exhibit positive geotropism or negative geotropism.



Journals	Journal - Forces Affect Plant Growth
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Quiz Factors Affecting Plant Growth

## Topic 8: Factors Affecting Ecosystems

**Description:** [MS-LS1-5; MS-LS2-1; MS-LS2-4] In this topic students will learn that the abiotic and biotic factors in an ecosystem constantly interact with each other, and recognize the effects of natural calamities and human activities on ecosystems.

**Instruction Module** **Components of an Ecosystem:** In this Instruction Module, students learn that an ecosystem is composed of abiotic and biotic components. They understand that these components are constantly interacting with each other. They also understand the structural hierarchy within an ecosystem starting from an individual to population to community to finally an ecosystem.

**Instruction Module** **Factors Affecting Ecosystems:** In this Instruction Module, students learn that an ecosystem is made of abiotic and biotic components that are constantly interacting with one another. They understand how changes to any of these factors affect the ecosystem.

**Instruction Module** **Catastrophic Events and Ecosystems:** In this Instruction Module, students learn that hurricanes, tornadoes, forest fires, floods and even asteroids are catastrophic events. They learn how these events affect the different components of an ecosystem.

**Instruction Module** **Abiotic Factors Influencing the Ecosystem:** In this Instruction Module, students learn about the different abiotic factors in an ecosystem. They examine how these abiotic factors influence the biotic factors in the ecosystem.

**Instruction Module** **Human Impact on Ocean Ecosystems:** In this Instruction Module, students learn about the different ways in which oceans are important. They also learn about the negative impacts of human activities such as over-fishing and pollution on oceans and biodiversity. Finally they learn about different steps that human can take to preserve marine ecosystems.

**Glossary** **Factors Affecting Ecosystems**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity** **Ocean Ecosystem:** In this Interactivity, students observe changes in one component of an ecosystem and predict its possible effects on the rest of the ecosystem.

**Alexs Soil Lab:** In this Interactivity, students predict the type of



catastrophic event that has occurred in a region by examining the components of soil in that area.

**Trace the Waste:** In this Interactivity, students observe various human activities that could affect ocean ecosystems. They recognize the modes by which the pollution finally ends up in the ocean.

<b>Simulation</b>	<b>Rhize n Grow!</b> In this Simulation, students observe the growth of two sets of red clover plants, one that is inoculated with Rhizobium bacteria and the other which is untreated. They measure the height and observe the leaves of both sets of plants at intervals of two weeks and record their observations. They arrive at a conclusion regarding the interrelationship between Rhizobium bacteria and red clover plants.
<b>Journals</b>	Journal - Ecosystem – Levels of Organization Journal - Catastrophic Events and Ecosystems Journal - Human Impact on Ocean Ecosystems
<b>Activities</b>	Observing Biodiversity in a Schoolyard Microhabitat

**Quiz** Factors Affecting Ecosystems

## Topic 9: Variability and Survival

**Description:** [MS-LS1-5] In this topic students will learn that populations and species demonstrate variation; variations that favor growth and survival develop into adaptations through gradual processes over many generations.

<b>Instruction Module</b>	<b>Variations and Natural Selection:</b> In this Instruction Module, students learn that favorable variations in a population develop into adaptations over time. They understand how natural selection acts on variations.
<b>Glossary</b>	<b>Variability and Survival</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Simulation</b>	<b>Mass Matters?:</b> In the simulation, students “conduct” an investigation to determine if the mass of seeds (chestnut) affects the rate of germination. They group the seeds based on their mass and observe and compare the number of seeds that grow into plants in each group. They arrive at a conclusion based on their observations.
<b>Journals</b>	Journal - Variability And Survival



## Quiz

## Variability and Survival

### Topic 10: Photosynthesis, Respiration, and Energy

**Description:** [MS-LS1-6; MS-LS1-7; MS-LS2-3] In this topic students will learn to describe the role and processes of photosynthesis and cellular respiration, in the cycling of matter and flow of energy through organisms.

#### Instruction Module

**Photosynthesis:** In this Instruction Module, students understand that green plants are capable of producing their own food through photosynthesis. They learn about the different structures of a leaf that aid photosynthesis.

#### Instruction Module

**Respiration:** In this Instruction Module, students learn that oxygen is essential for organisms to survive. They understand how organisms such as human, breathe in oxygen and explain how this oxygen eventually reaches the cells to break down food and release chemical energy.

#### Glossary

#### Photosynthesis, Respiration, and Energy

The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

#### Simulation

**The Green Machine!:** In this simulation, students investigate the effect of light on the rate of photosynthesis by varying the intensity of light that plants receive and measuring the amount of oxygen released.

#### Journals

Journal - Photosynthesis And Energy Conversion  
Journal - Carbon Dioxide–Oxygen Cycle

#### Activities

Extracting Chlorophyll from Plant Leaves

## Quiz

## Photosynthesis, Respiration, and Energy

### Topic 11: Energy Flow in Ecosystems

**Description:** [MS-LS1-6; MS-LS2-3] In this topic students will learn that the flow of energy in an ecosystem is unidirectional, and can be represented using food chains, food webs, and energy pyramids.

#### Instruction Module

**The Food Chain:** In this Instruction Module, students learn that some organisms in an interconnected to each other based on who eats what and that this can be represented using a food chain. They learn that a food chain starts with a producer that is consumed by an herbivore,



which in turn is consumed by a carnivore. They understand that herbivores and carnivores are both consumers and that in a food chain the flow of energy is unidirectional, always from the producers to the carnivores.

<b>Instruction Module</b>	<b>Ecosystems–Energy Flow:</b> In this Instruction Module, students learn that energy flow in an ecosystem can be represented using food chains. They understand that food chains interconnect to form food webs that are more complex compared to food chains. They also learn that energy flow can be represented using an energy pyramid with the producers at the base of the pyramid and the top carnivores at the apex.
<b>Glossary</b>	<b>Energy Flow in Ecosystems</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Build the Food Chain:</b> In this Interactivity students create a viable food chain in order for energy to flow to the top predator and predict the amount of energy available at a particular trophic level.
<b>Journals</b>	Journal - Energy Flow In Ecosystems
<b>Activities</b>	Flow of Energy in Ecosystems
<b>Quiz</b>	Energy Flow in Ecosystems

## Topic 12: Cycling of Matter

**Description:** [MS-LS1-6; MS-LS2-3] In this topic students will learn that matter is continuously transferred within and between organisms and their environment, and describe the carbon, nitrogen, phosphorus, and water cycles.

<b>Instruction Module</b>	<b>Cycling of Matter:</b> In this Instruction Module, students learn to describe how nutrients such as carbon, hydrogen, nitrogen, oxygen and phosphorus are cycled in the environment through the carbon, nitrogen, phosphorus and water cycles.
<b>Instruction Module</b>	<b>Decomposition:</b> In this Instruction Module, students learn to describe the process of decomposition and to identify its importance in cycling nutrients in an ecosystem. They also learn to describe how decomposition can be used to make compost.
<b>Glossary</b>	<b>Cycling of Matter</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.



<b>Interactivity</b>	<b>Garbage to Garden!:</b> In this Interactivity, students “build” a compost pit choosing the correct materials for each layer in the compost pit.
<b>Journals</b>	Journal - Cycling Of Matter
<b>Activities</b>	Mini Compost in a Bottle
<b>Quiz</b>	Cycling of Matter

## Topic 12: Molecules of Food and Digestion

**Description:** [MS-LS1-7] In this topic students will learn that organic compounds contain carbon and other elements such as hydrogen, oxygen, phosphorus, nitrogen, or sulfur, and describe how large molecules of food are rearranged through chemical reactions forming new molecules that support growth and/or release energy.

<b>Instruction Module</b>	<b>Organic Compounds in the Living World:</b> In this Instruction Module, students learn that carbohydrates, proteins, lipids and nucleic acids are organic compounds. They learn about the structural similarities and differences of these compounds and how they are utilized in our bodies.
<b>Instruction Module</b>	<b>Nutrients and Digestion:</b> In this Instruction Module, students learn that carbohydrates, lipids and proteins are nutrients required by our bodies. They understand how these nutrients are broken down by the process of digestion and absorbed into the bloodstream.
<b>Glossary</b>	<b>Molecules of Food and Digestion</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Organic Kitchen:</b> In this Interactivity, students “conduct” tests using Benedict’s solution, Lugol’s solution, Biuret solution, and brown paper to identify the various organic compounds present in food items such as beans, dates, carrots, apples, and lobsters.
<b>Journals</b>	Journal - Organic Compounds and the Living World
<b>Activities</b>	Identifying Organic and Inorganic Compounds Food in the Body
<b>Quiz</b>	Molecules of Food and Digestion



## Topic 13: Stimulus and Response

**Description:** [MS-LS1-8] In this topic students will learn how organisms respond to internal and external stimuli, and understand how nerves carry impulses to and from the brain.

**Instruction Module** **Stimulus:** In this Learning Object, students learn to define and describe a stimulus. They learn that stimuli can either be internal or external stimuli. They understand the differences between the two. They also understand how stimuli help to restore homeostasis.

**Instruction Module** **Responses:** In this Instruction module, students learn to define responses. They also learn to describe different kinds of responses such as positive, negative, ignored and fight or flight responses.

**Instruction Module** **Nervous System:** In this Instruction Module, students Learn about the components of the nervous system and their functions. They also understand how nerves carry electrical messages or impulses to and from the brain.

**Glossary** **Stimulus and Response**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity** **Pair em Up!:** In this Interactivity, students observe how an organism responds to a stimulus and identify whether the stimulus is internal or external and also whether the response is learned or instinctive.

**Journals** Journal - Stimulus And Response

**Quiz** Stimulus and Response

## MS-LS2 Ecosystems: Interactions, Energy, and Dynamics

### Topic 1: Factors Affecting Ecosystems

**Description:** [MS-LS1-5; MS-LS2-1; MS-LS2-4] In this topic students will learn that the abiotic and biotic factors in an ecosystem constantly interact with each other, and recognize the effects of natural calamities and human activities on ecosystems.



<b>Instruction Module</b>	<b>Components of an Ecosystem:</b> In this Instruction Module, students learn that an ecosystem is composed of abiotic and biotic components. They understand that these components are constantly interacting with each other. They also understand the structural hierarchy within an ecosystem starting from an individual to population to community to finally an ecosystem.
<b>Instruction Module</b>	<b>Factors Affecting Ecosystems:</b> In this Instruction Module, students learn that an ecosystem is made of abiotic and biotic components that are constantly interacting with one another. They understand how changes to any of these factors affect the ecosystem.
<b>Instruction Module</b>	<b>Catastrophic Events and Ecosystems:</b> In this Instruction Module, students learn that hurricanes, tornadoes, forest fires, floods and even asteroids are catastrophic events. They learn how these events affect the different components of an ecosystem.
<b>Instruction Module</b>	<b>Abiotic Factors Influencing the Ecosystem:</b> In this Instruction Module, students learn about the different abiotic factors in an ecosystem. They examine how these abiotic factors influence the biotic factors in the ecosystem.
<b>Instruction Module</b>	<b>Human Impact on Ocean Ecosystems:</b> In this Instruction Module, students learn about the different ways in which oceans are important. They also learn about the negative impacts of human activities such as over-fishing and pollution on oceans and biodiversity. Finally they learn about different steps that human can take to preserve marine ecosystems.
<b>Glossary</b>	<b>Factors Affecting Ecosystems</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Ocean Ecosystem:</b> In this Interactivity, students observe changes in one component of an ecosystem and predict its possible effects on the rest of the ecosystem. <b>Alexs Soil Lab:</b> In this Interactivity, students predict the type of catastrophic event that has occurred in a region by examining the components of soil in that area. <b>Trace the Waste:</b> In this Interactivity, students observe various human activities that could affect ocean ecosystems. They recognize the modes by which the pollution finally ends up in the ocean.
<b>Simulations</b>	<b>Rhize n Grow!:</b> In this Simulation, students observe the growth of two sets of red clover plants, one that is inoculated with Rhizobium bacteria and the other which is untreated. They measure the height and observe the leaves of both sets of plants at intervals of two weeks and record their observations. They arrive at a conclusion regarding the interrelationship between Rhizobium bacteria and red clover plants.



**Journals** Ecosystem – Levels of Organization  
Catastrophic Events and Ecosystems  
Human Impact on Ocean Ecosystems

**Activities** Levels of Organization  
Observing Biodiversity in a Schoolyard Microhabitat

**Quiz** Factors Affecting Ecosystems

## Topic 2: Interrelationships between Organisms

**Description:** [MS-LS2-2] In this topic students will learn to explain patterns of interactions among organisms such as predator-prey and host-parasite interactions.

**Instruction Module** **Interrelationships between Organisms:** In this Instruction Module, students learn that organisms in an ecosystem interact with one another. They understand that these interactions are of different types, namely producer - consumer, predator - prey, and Host - parasite interactions.

**Glossary** **Interrelationships between Organisms**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Simulations** **Rhize n Grow!:** In this Simulation, students observe the growth of two sets of red clover plants, one that is inoculated with Rhizobium bacteria and the other which is untreated. They measure the height and observe the leaves of both sets of plants at intervals of two weeks and record their observations. They arrive at a conclusion regarding the interrelationship between Rhizobium bacteria and red clover plants.

**Journals** Interrelationships between Organisms

**Activities** Activity 1 - Interrelationships Between Organisms  
Activity 2 - Interrelationships Between Organisms  
Interdependence in Living Systems  
Depending on and Competing for Resources

**Quiz** Interrelationships between Organisms



## Topic 3: Photosynthesis, Respiration, and Energy

**Description:** [MS-LS1-6; MS-LS1-7; MS-LS2-3] In this topic students will learn to describe the role and processes of photosynthesis and cellular respiration, in the cycling of matter and flow of energy through organisms.

**Instruction Module** **Photosynthesis:** In this Instruction Module, students understand that green plants are capable of producing their own food through photosynthesis. They learn about the different structures of a leaf that aid photosynthesis.

**Instruction Module** **Respiration:** In this Instruction Module, students learn that oxygen is essential for organisms to survive. They understand how organisms such as human, breathe in oxygen and explain how this oxygen eventually reaches the cells to break down food and release chemical energy.

**Glossary** **Photosynthesis, Respiration, and Energy**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Simulations** **The Green Machine!:** In this simulation, students investigate the effect of light on the rate of photosynthesis by varying the intensity of light that plants receive and measuring the amount of oxygen released.

**Journals**  
Photosynthesis And Energy Conversion  
Carbon Dioxide–Oxygen Cycle

**Activities**  
Extracting Chlorophyll from Plant Leaves

**Quiz**  
Photosynthesis, Respiration, and Energy

## Topic 4: Energy Flow in Ecosystems

**Description:** [MS-LS1-6; MS-LS2-3] In this topic students will learn that the flow of energy in an ecosystem is unidirectional, and can be represented using food chains, food webs, and energy pyramids.

**Instruction Module** **The Food Chain:** In this Instruction Module, students learn that some organisms in an interconnected to each other based on who eats what and that this can be represented using a food chain. They learn that a food chain starts with a producer that is consumed by an herbivore, which in turn is consumed by a carnivore. They understand that herbivores and carnivores are both consumers and that in a food chain the flow of energy is unidirectional, always from the producers to the carnivores.



<b>Instruction Module</b>	<b>Ecosystems–Energy Flow:</b> In this Instruction Module, students learn that energy flow in an ecosystem can be represented using food chains. They understand that food chains interconnect to form food webs that are more complex compared to food chains. They also learn that energy flow can be represented using an energy pyramid with the producers at the base of the pyramid and the top carnivores at the apex.
<b>Glossary</b>	<b>Energy Flow in Ecosystems</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Build the Food Chain:</b> In this Interactivity students create a viable food chain in order for energy to flow to the top predator and predict the amount of energy available at a particular trophic level.
<b>Journals</b>	Energy Flow In Ecosystems
<b>Activities</b>	Flow of Energy in Ecosystems
<b>Quiz</b>	Energy Flow in Ecosystems

## Topic 5: Cycling of Matter

**Description:** [MS-LS1-6; MS-LS2-3] In this topic students will learn that matter is continuously transferred within and between organisms and their environment, and describe the carbon, nitrogen, phosphorus, and water cycles.

<b>Instruction Module</b>	<b>Cycling of Matter:</b> In this Instruction Module, students learn to describe how nutrients such as carbon, hydrogen, nitrogen, oxygen and phosphorus are cycled in the environment through the carbon, nitrogen, phosphorus and water cycles.
<b>Instruction Module</b>	<b>Decomposition:</b> In this Instruction Module, students learn to describe the process of decomposition and to identify its importance in cycling nutrients in an ecosystem. They also learn to describe how decomposition can be used to make compost.
<b>Glossary</b>	<b>Cycling of Matter</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Garbage to Garden!:</b> In this Interactivity, students “build” a compost pit choosing the correct materials for each layer in the compost pit.



**Journals**                      Cycling Of Matter

**Activities**                      Mini Compost in a Bottle

**Quiz**                              Cycling of Matter

## Topic 6: Watersheds

**Description:** [MS-LS2-5] In this topic students will recognize the significance of watersheds that support habitats and ecosystems, and discuss solutions to maintain them.

**Instruction Module**                      **Watersheds:** In this Instruction Module, students learn to define and describe a watershed. They understand the significance of watersheds and understand how watersheds are affected by natural and human activities.

**Glossary**                              **Watersheds**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Simulations**                              **Nitrogen Levels in Water:** In this Simulation, students collect water samples from different regions in a watershed and conduct water quality tests to discover the source of nitrogen that is entering the ocean.

**Activities**                              Human Activity in Watersheds  
pH Tolerance of Aquatic Organisms

**Quiz**                                      Watersheds

## MS-LS3 Heredity: Inheritance and Variation of Traits

### Topic 1: Heredity and Genes

**Description:** [MS-LS3-1] In this topic students will learn that heredity is the passage of genetic information from one generation to the next, and that DNA contains genes located in the chromosomes of each cell.

**Instruction Module**                      **Genes and Heredity:** In this Instruction Module students understand that genes are segments of DNA that code for a single trait. They learn that in eukaryotic cells, DNA is found in the nucleus in structures called chromosomes.



<b>Glossary</b>	<b>Heredity and Genes</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Packaging Fun:</b> In this Interactivity, students place labeled boxes one inside the other in the correct order to represent the location of genes within a cell.
<b>Journals</b>	Journal 1 - Heredity and Genes Journal 2 - Heredity and Genes
<b>Activities</b>	Heredity and Genes
<b>Quiz</b>	Heredity and Genes

## Topic 2: Types of Reproduction

**Description:** [MS-LS3-2] In this topic students will learn to compare and contrast asexual and sexual reproduction.

<b>Instruction Module</b>	<b>Asexual Reproduction:</b> In this Instruction Module, students learn that asexual reproduction involves only one parent and that the offspring produced are genetically identical to each other and to their parent. They will also learn to describe some methods of asexual reproduction such as fragmentation, budding, binary fission and vegetative propagation.
<b>Instruction Module</b>	<b>Sexual Reproduction:</b> In this Instruction Module, students learn that sexual reproduction requires two parents and that the offspring produced by sexual reproduction are genetically distinct from their parents and each other. They will also learn to describe some methods of sexual reproduction such as conjugation and the fertilization.
<b>Glossary</b>	<b>Types of Reproduction</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Whose Parent is that Anyway?:</b> In this Interactivity, students differentiate between sexual and asexual reproduction, classify asexual reproduction as binary fission, budding, fragmentation, regeneration, spore formation and vegetative reproduction. They recognize the advantages and disadvantages of sexual and asexual reproduction.
<b>Journals</b>	Journal - Types Of Reproduction



Activities

Types of Reproduction

Quiz

Types of Reproduction

## MS-LS4 Biological Evolution: Unity and Diversity

### Topic 1: Natural Selection and Selective Breeding

**Description:** [MS-LS4-4; MS-LS4-5; MS-LS4-6] In this topic students will learn to describe how genetic variations of traits increases an individual's probability of surviving and reproducing, explain how natural selection may lead to increases and decreases of specific traits in populations over time, and recognize how humans influence the inheritance of desired traits in organisms.

Instruction Module

**Variations and Natural Selection:** In this Instruction Module, students learn that favorable variations in a population develop into adaptations over time. They understand how natural selection acts on variations.

Instruction Module

**Factors Influencing Natural Selection:** In this Instruction Module, students understand that populations are constantly changing over time and this is due to the natural selection. They learn about different factors influencing natural selection such as variations within a population and environmental factors such as predators and the availability of food.

Instruction Module

**Selective Breeding:** In this Instruction Module, students learn that humans can create new species by selective breeding. They learn about common selective breeding such as inbreeding and hybridization that result in new breeds of animals and varieties of plants.

Glossary

#### Natural Selection and Selective Breeding

The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

Simulations

**Mass Matters?:** In the simulation, students “conduct” an investigation to determine if the mass of seeds (chestnut) affects the rate of germination. They group the seeds based on their mass and observe and compare the number of seeds that grow into plants in each group. They arrive at a conclusion based on their observations.

**Feed the Finch!:** In this Simulation, students investigate and find out if the shape of the beaks of finches is an adaptation to the kind of food available. They use different kinds of pliers to represent beaks and observe the type of food particles that can be picked up by each.



<b>Journals</b>	Journal - Variability And Survival Journal - Natural Selection and Selective Breeding Journal 2 - Natural Selection and Selective Breeding
<b>Activities</b>	Selective Breeding
<b>Quiz</b>	Natural Selection and Selective Breeding

## MS-ESS1 Earth's Place in the Universe

### Topic 1: The Sun, Moon, and Earth

**Description:** [MS-ESS1-1] In this topic students will learn to use a model of the Earth-Sun-Moon system to describe the cyclic patterns of lunar phases, tides, and seasons.

<b>Instruction Module</b>	<b>Earth's Rotation and Revolution:</b> In this Instruction Module, students learn that Earth rotates on its tilted axis from west to east causing the day and night cycle and the apparent movement of the Sun across the sky. They also learn that Earth revolves around the Sun, and the tilt of its axis in relation to the Sun causes the changes in seasons.
<b>Instruction Module</b>	<b>The Lunar Cycle:</b> In this Instruction Module, students learn that the phases of the Moon are a result of the relative positions of the Sun, Moon, and Earth. They understand that only parts of the Moon's lit up surface are visible from Earth, resulting in the apparent waxing and waning of the Moon.
<b>Instruction Module</b>	<b>Tides:</b> In this Instruction Module, students learn that the Moon's gravitational pull on Earth's waters results in tides. They learn that every point on Earth experiences two high tides and two low tides during a day, and the combined effect of the gravitational pull of the Sun and the Moon result in spring tides and neap tides.
<b>Glossary</b>	<b>The Sun, Moon, and Earth</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Phases and Tides:</b> In this Interactivity, students identify the phase of the moon given only the relative position of Sun, Moon, and Earth. Then they have to select the positions on earth that have high and low tide for that phase of the moon.
<b>Journals</b>	Journal 1 - The Sun, Moon, and Earth Journal 2 - The Sun, Moon, and Earth



**Activities**  
 Modeling What Causes Day and Night  
 Modeling What Causes the Seasons  
 Describing the Lunar Cycle

**Quiz**  
 The Sun, Moon, and Earth

## Topic 2: The Solar System

**Description:** [MS-ESS1-2; MS-ESS1-3] In this topic students will learn to describe the properties of the objects in the Solar System, compare various historical models of the Solar System, and recognize how technology is essential to explore outer space, including manned explorations.

**Instruction Module**  
**The Sun:** In this Instruction Module, students learn how the process of fusion that occurs within the core of the Sun produces vast amounts of energy. They learn how this energy is transferred through the different layers of the Sun including the radiative zone, the convective zone, and the photosphere, from where it is released into space as heat and light.

**Instruction Module**  
**The Solar System:** In this Instruction Module, students learn about the location, the movements, and some of the physical properties of the objects in our solar system such as the planets, the Galilean moons, the asteroid belt, meteors, and comets.

**Instruction Module**  
**History of Space Exploration:** In this Instruction Module, students learn about the geocentric and heliocentric models of the solar system. They learn how inventions and development of equipment such as telescopes and space transportation have helped in space explorations.

**Glossary**  
**The Solar System**  
 The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity**  
**The Spotlight:** In this Interactivity, students identify the planets with the help of some clues and determine their correct location in the solar system.

**Journals**  
 Journal - The Solar System  
 Journal 2 - The Solar System

**Activities**  
 The Solar System  
 Describing Celestial Bodies

**Quiz**  
 The Solar System



## Topic 3: Galaxies

**Description:** [MS-ESS1-2] In this topic students will learn that galaxies are made of gas, dust, and stars, held together by gravity, compare the characteristics of different types of galaxies, and recognize that our solar system is part of the Milky Way galaxy.

**Instruction Module** **Galaxies:** In this Instruction Module, students learn that galaxies are made of gas, dust, and stars. They learn about the characteristics of spiral, elliptical, and irregular galaxies and understand that galaxies are constantly changing or evolving. They recognize that our solar system is part of the Milky Way galaxy.

**Glossary** **Galaxies**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Journals** Journal - The Universe

**Quiz** Galaxies

## Topic 3: The Universe - Distances and Sizes

**Description:** [MS-ESS1-3] In this topic students will learn that the enormous distances between objects in space are measured in units called light years.

**Instruction Module** **Distances in Light-Years:** In this Instruction Module, students learn that a light year is the distance traveled by light in one year. They understand why a light year is a convenient unit to measure large distances and sizes in the universe.

**Glossary** **The Universe - Distances and Sizes**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Activities**  
Modeling Distances Using Light Years: Part 1  
Modeling Distances Using Light Years: Part 2  
Modeling Sizes Using Light Years: Part 1  
Modeling Sizes Using Light Years: Part 2

**Quiz** The Universe - Distances and Sizes



## Topic 4: Evidence of Changes on Earth

**Description:** [MS-ESS1-4] In this topic students will learn how fossils are formed and recognize the significance of using sedimentary rock sequences and fossils as evidence of past environments and living organisms. From the shape of the continents and the fossils found across continents, they understand that the continents were once joined, as proposed by Wegener.

### Instruction Module

**How are Fossils Formed?:** In this Instruction Module, students learn that sedimentary rocks are formed over millions of years and plant and animal remains are buried in these rocks as fossils.

### Instruction Module

**Clues About Past Environments:** In this Instruction Modules, students observe examples of trace fossils and make inferences about environmental conditions that existed in the past. They learn how such fossils provide important clues about environmental conditions in the past.

### Instruction Module

**Evidence of Pangaea:** In this Instruction Module, students are introduced to various evidence that suggest that in the past, all present-day continents were joined to form one giant landmass called Pangaea. Students learn to evaluate the evidence.

### Glossary

#### Evidence of Changes on Earth

The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

### Journals

Journal 1 - Learning from the Past  
Journal 2 - Learning from the Past  
Journal 3 - Learning from the Past

### Activities

Fossils as Evidence of the Past

### Quiz

Evidence of Changes on Earth

## MS-ESS2 Earth's Systems

### Topic 1: The Rock Cycle

**Description:** [MS-ESS2-1] In this topic students will learn to identify the patterns within the rock cycle and relate them to the processes of weathering, erosion, sedimentation, compaction, cementation, metamorphosis, and melting.



**Instruction Module** **Rocks:** In this Instruction Module, students learn that rocks are of three basic types, metamorphic. They learn about the processes involved in the formation of these rocks and in which rocks can be converted from one form to another.

**Glossary** **The Rock Cycle**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity** **Rock Transformer:** In this Interactivity, students identify the process that formed a given rock sample and then “transform” it into another rock type by choosing the right process.

**Journals** Journal - Rock Cycle

**Activities** Modeling the Rock Cycle Descriptive Investigation

**Quiz** The Rock Cycle

## Topic 2: Earth's Layers and Tectonic Plates

**Description:** [MS-ESS2-1; MS-ESS2-2; MS-ESS2-3] In this topic students will learn to identify the layers of Earth, and explain how the movement of tectonic plates can alter Earth's surface.

**Instruction Module** **Layers of Earth:** In this Instruction Module, students learn that Earth is divided into the crust, mantle, and core.

**Instruction Module** **Tectonic Plates:** In this Instruction Module, students learn that Earth's crust is broken in pieces called tectonic plates that float atop the molten mantle and that the movements of these tectonic plates can alter Earth's surface and create earthquakes, ocean basins, volcanoes and mountains.

**Glossary** **Earths Layers and Tectonic Plates**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity** **Building Earth and Matching Plates:** In this Interactivity, students recognize the different layers of the Earth and what it is made up of, by “building” a model Earth. They also recognize the different tectonic plates and their location on the world map.

**Journals** Journal 1 - Plate Tectonics  
Journal 2 - Plate Tectonics



<b>Activities</b>	Modeling the Structural Layers of the Earth Major Tectonic Plates
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**Quiz** Earths Layers and Tectonic Plates

### Topic 3: Theory of Plate Tectonics

**Description:** [MS-ESS2-1; MS-ESS2-2; MS-ESS2-3] In this topic students will learn to explain how the Continental Drift theory, sea floor spreading, and observations that volcanoes and earthquakes occurred most frequently at specific areas led to the development of the Theory of Plate Tectonics, and recognize the effects of plate tectonics on the crustal features on Earth.

**Instruction Module** **Theory of Plate Tectonics:** In this Instruction Module, students learn how the Continental Drift theory, the discovery of sea floor spreading, and observations that volcanoes and earthquakes occurred most frequently at specific areas around the world led scientists to develop the Theory of Plate Tectonics.

**Instruction Module** **Effects of Plate Tectonics:** In this Instruction Module, students learn that plate boundaries are classified as convergent, divergent, or transform boundaries based on their relative movement. They learn that divergent boundaries lead to the formation of crustal features such mid-ocean ridges, rift valleys, and fault block mountains; convergent boundaries lead to the formation of features such as trenches, volcanoes, and folded mountains; transform boundaries result in strike-slip faults and cause earthquakes.

**Glossary** **Theory of Plate Tectonics**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity** **Tectonic Trouble:** In this Interactivity, students identify divergent, convergent, and transform boundaries based on their description and then identify the crustal features associated with each of them.

**Simulation** **Flow of Lava:** In this simulation, students investigate to find out if the thickness of the lava affects its flow rate and the type of volcanic structure that is formed. They compare liquids of different thicknesses. They observe and record the time taken by each liquid to flow down a funnel. Based on the data, they arrive at a conclusion.

**Journals**  
Journal 1 - Effects of Plate Tectonics  
Journal 2 - Effects of Plate Tectonics  
Journal 3 - Effects of Plate Tectonics

**Activities**  
Evidence that Supports Plate Tectonics Theory  
Crustal Features and Plate Tectonics  
3-D Mindmapping

**Quiz** Theory of Plate Tectonics



## Topic 4: Processes that Change Earth's Surface

**Description:** [MS-ESS2-2] In this topic students recognize that Earth's surface is continuously altered by the processes of weathering, erosion, and deposition, and recognize the effects of natural disasters such as hurricanes, tornadoes, forest fires, floods, and asteroid crashes.

**Instruction Module** **Weathering:** In this Instruction Module, students learn about the process of weathering and understand how mechanical weathering differs from chemical weathering. They learn about the agents of weathering including water, wind, ice, temperature changes, and organisms, and understand how weathering changes the surface of Earth.

**Instruction Module** **Erosion:** In this Instruction Module, students will learn about the process of erosion and understand how wind, water, and ice act as agents of erosion. They learn how erosion changes the surface of Earth.

**Instruction Module** **Deposition:** In this Instruction Module, students learn about the process of deposition and understand how landforms such as deltas, alluvial fans, sand dunes, and moraines are a result of deposition by water, wind, and glaciers.

**Instruction Module** **Catastrophic Events and Ecosystems:** In this Instruction Module, students learn how natural disasters such as hurricanes, tornadoes, forest fires, floods, and even asteroid crashes are catastrophic events that affect the various components of an ecosystem.

**Glossary** **Processes that Change Earths Surface**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Interactivity** **Alex's Soil Lab:** In this Interactivity, students predict the type of catastrophic event that has occurred in a region by examining the components of soil in that area.

**Simulation** **Dissolve and Resolve:** In this simulation students understand the effect of acid rain on different types of rocks. They test how acid affects marble, limestone, quartz, and granite by submerging them in acid that has a pH level similar to that of acid rain. They measure and record how much mass, if any, the rocks lost after 24 hours. They analyze the data collected and arrive at a conclusion.

**Journals**  
Journal - Slow Changes In Ecoregions  
Journal - Catastrophic Events and Ecosystems

**Quiz** Processes that Change Earth's Surface

## Topic 5: Water Cycle

**Description:** [MS-ESS2-4] In this topic students will learn about the importance of the water cycle and describe the processes involved in it including evaporation, condensation, and



precipitation.

**Instruction Module** **The Water Cycle:** In this Instruction Module, students are introduced to the water cycle. Students learn to identify and describe the different processes that are part of the water cycle such as evaporation, condensation, precipitation, infiltration, and transpiration.

**Glossary** **Water Cycle**  
The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.

**Journals**  
Journal 1 - The Water Cycle  
Journal 2 - The Water Cycle

**Activities**  
The Water Cycle - Descriptive Investigation

**Quiz**  
Water Cycle

## Topic 6: Climate and Weather

**Description:** [MS-ESS2-4; MS-ESS2-5; MS-ESS2-6] In this topic students will learn how differences in air pressure, the flow of air masses, the unequal heating of land and oceans, and convection currents affect weather conditions and the climate of a place.

**Instruction Module** **Weather and Weather Maps:** In this Instruction Module, students understand the difference between weather and climate. They learn about the role of the Sun in creating high pressure and low pressure regions, thus affecting the weather of a place. They also learn about the symbols on a weather map used to represent high and low pressures, and warm and cold fronts.

**Instruction Module** **The Sun's Influence on Atmosphere and Oceans:** In this Instruction Module students learn that the energy from the Sun causes convection currents in the atmosphere. They also understand that unequal heating of the oceans and differences in salinity cause surface currents and deep ocean currents. They recognize how these ocean currents affect the climate and weather in all parts of the world.

**Instruction Module** **Influence of Oceans on Weather and Climate:** In this Instruction Module, students recognize the role of the oceans in the water cycle and in the creation of hurricanes. They understand the influence of ocean currents on the weather and climate of a place. They also learn what causes *El Niño* and how it affects the weather globally.



Glossary	Climate and Weather The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
Interactivity	<b>Predict the Weather:</b> In this Interactivity, students recognize the types of weather associated with high/low pressure and warm/cold fronts.
Journals	Journal - Climate and Weather Journal 2- Climate and Weather
Activities	Convection Currents El Niño Using Weather Maps to Predict Weather How Accurate are Weather Reports? Constructing a Model of a Psychrometer Constructing a Model of an Anemometer
Quiz	Climate and Weather

## MS-ESS3 Earth and Human Activity

### Topic 1: Energy Resources and Effects on Environment

**Description:** [MS-ESS3-1; MS-ESS3-3; MS-ESS3-5] In this topic students will learn about renewable and nonrenewable energy resources and will be able to describe how their use affects the environment.

**Instruction Module** **Energy Resources:** In this Instruction Module, students learn to distinguish between renewable and nonrenewable energy resources. They also learn to identify examples of renewable and non-renewable energy resources.

**Instruction Module** **Fossil Fuels:** In this Instruction Module, students understand that coal, oil and natural gas are fossils used and that they can be used to produce electricity. They also understand the advantages and disadvantages of using fossil fuels.

**Instruction Module** **Nuclear Energy:** In this Instruction Module, students understand how nuclear energy can be utilized to generate electricity. They also understand the advantages and disadvantages of using nuclear energy.

**Instruction Module** **Hydroelectricity:** In this Instruction Module, students understand how hydropower, the energy stored in moving water, can be utilized to generate electricity. They also understand the advantages and disadvantages of using hydropower.



<b>Instruction Module</b>	<b>Geothermal Energy</b> : In this Instruction Module, students understand how geothermal energy or the energy stored in hot springs and geysers, can be utilized to generate electricity. They also understand the advantages and disadvantages of using geothermal energy.
<b>Instruction Module</b>	<b>Biomass</b> : In this Instruction Module, students understand how biomass can be utilized to generate electricity. They also understand the advantages and disadvantages of using biomass.
<b>Instruction Module</b>	<b>Solar Energy</b> : In this Instruction Module, students understand how solar energy can be utilized to generate electricity. They also understand the advantages and disadvantages of using solar energy.
<b>Instruction Module</b>	<b>Wind Energy</b> : In this Instruction Module, students understand how wind energy can be utilized to generate electricity. They also understand the advantages and disadvantages of using wind energy.
<b>Glossary</b>	<b>Energy Resources and Effects on Environment</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Energize the Gadgets</b> : In this Interactivity, students identify an energy resource based on the clues provided and then classify it as renewable and nonrenewable.
<b>Activities</b>	Energy Matters Comparing Solar Ovens The Effect of Color on Heat Absorption in a Solar Collector
<b>Quiz</b>	Energy Resources and Effects on Environment

## Topic 2: Human Impact on Oceans and Watersheds

**Description:** [MS-ESS3-1; MS-ESS3-3] In this topic students will learn how human activities impact oceans and watersheds, and recognize the importance of minimizing these impacts.

**Instruction Module** **Human Impact on Ocean Ecosystems** In this Instruction Module, students learn about the different ways in which oceans are important. They also learn about the negative impacts of human activities such as over-fishing and pollution on oceans and biodiversity. Finally they learn about different steps that humans can take to preserve marine ecosystems.



<b>Instruction Module</b>	<b>Watersheds:</b> In this Instruction Module, students learn to define and describe a watershed. They understand the significance of watersheds and understand how watersheds are affected by natural and human activities.
<b>Glossary</b>	<b>Human Impact on Oceans and Watersheds</b> The interactive multimedia glossary provides both linguistic and non-linguistic representations of key terms related to science concepts presented in the Instruction Modules and Interactivities.
<b>Interactivity</b>	<b>Trace the Waste:</b> In this Interactivity, students observe various human activities that could affect ocean ecosystems. They recognize the modes by which the pollution finally ends up in the ocean.
<b>Simulations</b>	<b>Nitrogen Levels in Water:</b> In this Simulation, students collect water samples from different regions in a watershed and conduct water quality tests to discover the source of nitrogen that is entering the ocean.
<b>Journals</b>	Human Impact on Ocean Ecosystems
<b>Activities</b>	Human Activity in Watersheds pH Tolerance of Aquatic Organisms
<b>Quiz</b>	Human Impact on Oceans and Watersheds