AGENDA
SCHOOL DISTRICT OF MANAWA
CURRICULUM COMMITTEE MEETING

Date: February 5, 2019 **Time: 4:00 p.m.** **Place: Board Room, MES, 800 Beech Street, Manawa**

Board Committee Members: Scheller (C), Pohl, Hollman

In Attendance:

Timer: _____ Recorder: _____

1. Science Curriculum Mapping Gr. K-8 (Information / Action)
2. Financial Literacy Curriculum Map (Information / Action)
3. Business and Personal Law Curriculum Map (Information / Action)
4. Curriculum Committee Planning Guide (Information / Action)
5. Next Meeting Date _____
6. Next Meeting Items:
    a.
    b.
7. Adjourn

Course Name:	Kindergarten Science		
Credits:	N/A		
Prerequisites:	N/A		
Description:	A comprehensive collection of Science topics: Trees and Weather, Materials and Motion, and Animals.		
Academic Standards:	Wisconsin's Science Standards		
Units:	**Unit Length:**	**Unit Standards:**	**Unit Outcomes:**
Trees and Weather	Three Months	SCI.ESS2.D SCI.LSI.A SCI.LS1.C	Students will learn about the different parts and uses of trees. Students will be able to identify different types of weather.
Materials and Motion	Three Months	PS1-1 PS1-3 PS2-1 PS2-2	Students will explore different materials (wood, paper, and fabric). Students will learn pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
Animals Two By Two	Three Months	LS-1 ESS2-2 ESS3-1	Students will explore some common land and water animals. Students will learn what animals need to live and grow.

Unit Name: **Trees and Weather**	**Length:** Three Months
Standards: SCI.ESS2.D SCI.LSI.A SCI.LS1.C	**Outcomes:** Students will learn about the different parts and uses of trees. Students will be able to identify different types of weather.
Essential Questions: What are the parts of a tree? What are the shapes of leaves? How are they different? How and why is Earth constantly changing? How do trees change throughout the year?	**Learning Targets:** I can identify different types of weather (sunlight, wind, snow, rain). I can identify the parts of a tree (branches, leaves, trunk, roots). I can tell what plants need to survive (water, light).
Topic 1: **Observing Trees**	**Length:** Four Weeks
Standard(s): SCI.LS1.A.1 SCI.LS1.C.K	**Academic Vocabulary:** branches, leaves, trunk, roots
Lesson Frame: Observing Schoolyard Trees	I can discuss how trees are useful to people and wild animals.
Lesson Frame: Tree Parts	I can use picture and words cards to identify the main parts of trees.
Lesson Frame: Tree Puzzles	I can use puzzles to learn and compare the different shapes of trees.
Lesson Frame: Tree-Silhouette Cards	I can analyze and match tree silhouettes.
Performance Tasks: Teacher observation and journals.	Notes:
Topic 2: **Observing Leaves**	**Length:** Four Weeks
Standard(s): SCI.LSI.A	**Academic Vocabulary:** edge, lobed, toothed, rounded, tip
Lesson Frame: Leaf Walk	I can observe differences and similarities between leaves on trees.
Lesson Frame: Leaf Shapes	I can observe and match leaf shapes.
Lesson Frame: Comparing Leaves	I can tell how leaves are different.
Lesson Frame: Matching Leaf Silhouettes	I can match leaves based on their shape, size, and edges.
Lesson Frame: Leaf Books	I can create a book of various leaves.
Performance Tasks: Teacher observation and journals.	Notes:

Topic 4: **Trees through the Seasons**	**Length:** Four Weeks
Standard(s): SCI.ESS2.D	**Academic Vocabulary:** monitor, overcast, partly cloudy, temperature, thermometer, weather, weather instrume
Lesson Frame: Weather Calendar	I can tell and record the daily weather.
Lesson Frame: Recording Temperature	I can use a thermometer to tell the temperature.
Lesson Frame: Wind Directions	I can make a windsock to use to tell about wind direction.
Performance Tasks: Teacher observation and weather graph.	Notes:

Unit Name: **Materials and Motion**	**Length:** Three Months
Standards: PS1-1 PS1-3 K-PS2-1 K-PS2-2	**Outcomes:** Students will explore different materials (wood, paper, and fabric). Students will learn pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
Essential Questions: How can you change the shape of wood? How can paper be made strong to form a bowl? How are fabrics different? What causes objects to move?	**Learning Targets:** I can describe different kinds of materials (wood, paper, and fabric). I can construct an object made from a small set of pieces (particleboard, plywood, and papier-mache). I can compare the effects of different strengths or directions of pushes and pulls on an object.
Topic 1: **Getting to Know Wood**	**Length:** Three Weeks
Standard(s): PS1-1 PS1-3	**Academic Vocabulary:** sink, float, compare, test, sawdust, shavings, waterlogged, evaporate, plywood, particleboard
Lesson Frame: Observing Wood	I can observe different kinds and forms of wood found in my home and school environment.
Lesson Frame: Wood and Water	I can observe how wood and water interact.
Lesson Frame: Testing a Raft	I can find ways to sink floating wood samples by attaching paper clips to wood with rubber bands.
Lesson Frame: Sanding Wood	I can use my knowledge of wood and lear how to change wood.
Lesson Frame: Sawdust and Shavings	I can compare sawdust and shavings.
Lesson Frame: Making Particleboard	I can make particleboard.
Lesson Frame: Making Plywood	I can make plywood from thin strips of wood and glue.
Performance Tasks: Create Particleboard Create Plywood Teacher Observation Journals	Notes:
Topic 2: **Getting to Know Paper**	**Length:** Three Weeks
Standard(s): PS1-1 PS1-3	**Academic Vocabulary:** paper, chipboard, constructions paper, corrugated cardboard, corrugated paper, facial tissue, newsprint, paper Towel, tagboard, waxed paper
Lesson Frame: Paper Hunt	I can observe and compare the properties of ten kinds of paper.
Lesson Frame: Using Paper	I can use crayons, pencils, and marking pens to explore and compare the properties of paper that make it suitable or unsuitable for writing and drawing.

Lesson Frame: Paper and Water	I can drop water on ten different paper samples and observe and compare the results.
Lesson Frame: Paper Recycling	I can explore papermaking and recycling.
Lesson Frame: Papier-Mache	I can use wheat paste to mold strips of newspaper over a small container.
Performance Tasks: Make paper from facial tissue. Teacher Observation Journals	Notes:
Topic 3: **Getting to Know Fabrics**	**Length:** Three Weeks
Standard(s): PS1-1 PS1-3	**Academic Vocabulary:** burlap, cloth, conserve, corduroy,denim, fabric, recycle, reuse, texture, thread
Lesson Frame: Feely Boxes and Fabric Hunt	I can observe the properties of ten different fabrics (burlap, corduroy, denim, fleece, knit, ripstop nylon, satin, seersucker, sparkle organza, and terry cloth).
Lesson Frame: Taking Fabric Apart	I can investigate the structure of woven fabrics by disassembling and comparing loosely woven burlap and tightly woven wool plaid.
Lesson Frame: Water and Fabric	I can investigate how fabrics interact with water.
Lesson Frame: Graphing Fabric Uses	I can think about the kinds of fabric that would make a good pair of pants and other items of clothing.
Lesson Frame: Reuse and Recycle Resources	I can explore natural resources and the need to reuse and recycle materials.
Lesson Frame: Building Structure	I can place cups of water outdoors in the sunshine and shade and compare the water temperature after at least 15 minutes.
Performance Task: Build a structure from materials to block sunlight. Teacher Observation Journals	Notes:
Topic 4: **Getting Things to Move**	**Length:** Three Weeks
Standard(s): PS1-1 PS1-3	**Academic Vocabulary:** cause, collide, collision, direction, distance, affect, gravity, pull, push, speed, strength
Lesson Frame: Pushes and Pulls	I can observe and describe how a push or pull causes something to move.
Lesson Frame: Colliding Objects	I can use balls and ramps to achieve different speeds.
Lesson Frame: Rolling Outdoors	I can find slopes in the schoolyard that can be used to set balls in motion.
Lesson Frame: Balloon Rockets	I can observe a balloon-rocket system to find out how far the air in the balloon will propel the system along the flight line.

Performance Task: Observe and describe how objects move. Create balloon-rockets. Journals Teacher Observation	Notes:

Unit Name: **Animals Two by Two**	**Length:** Three Months
Standards: K-LS-1 K-ESS2-2 K-ESS3-1	**Outcomes:** Students will explore some common land and water animals. Students will learn what animals need to live and grow.
Essential Questions: What do animals such as fish and birds need to live and grow? What do animals such as snails need to live and grow? What do animals such as worms need to live and grow? What do animals such as isopods need to live and grow?	**Learning Targets:** I can describe what plants and animals need to survive. I can explain how plants and animals (including humans) can change the environment to meet their needs. I can use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.
Topic 1: **Goldfish and Guppies**	**Length:** Three Weeks
Standard(s): K-LS1-1 K-ESS2-2 K-ESS3-1	**Academic Vocabulary:** aquarium, bill, compare, female, male, fin, gill, guppy, scale
Lesson Frame: The Structure of Goldfish	I can observe goldfish living in a simple aquarium.
Lesson Frame: Caring for Goldfish	I can learn how to care for goldfish.
Lesson Frame: Goldfish Behavior	I can add a tunnel to the aquarium to observe how the fish respond.
Lesson Frame: Comparing Guppies to Goldfish	I can compare the structures and behaviors of guppies to those of goldfish, and identify the guppies by gender.
Lesson Frame: Comparing Schoolyard Birds	I can go bird watching to observe and compare the structures and behaviors of two types of common schoolyard birds.
Performance Tasks: Teacher Observation Journals	Notes:
Topic 2: **Water and Land Snails**	**Length:** Three Weeks
Standard(s): K-LS1-1 K-ESS2-2 K-ESS3-1	**Academic Vocabulary:** land snail, sea animal, tentacle, terrarium, vial, water snail
Lesson Frame: Observing Water Snails	I can explore two kinds of aquatic snails.
Lesson Frame: Shells	I can observe seashells.
Lesson Frame: Land Snails	I can collect and get to know local land snails.
Performance Tasks: Teacher Observations Journals	Notes:

Topic 3: **Big and Little Worms**	**Length:** Three Weeks
Standard(s): K-LS1-1 K-ESS2-2 K-ESS3-1	**Academic Vocabulary:** bristle, clitellum, segment
Lesson Frame: The Structure of Redworms	I can dig through a terrarium to discover that there are redworms living in the soil.
Lesson Frame: Redworm Behavior	I can focus on the movement and behavior of redworms.
Lesson Frame: Comparing Redworms to Night Crawlers	I can discover a new kind of worm in their terrarium- night crawlers.
Performance Task: Teacher Observations Journals	Notes:
Topic 4: **Pill Bugs and Sow Bugs**	**Length:** One Months
Standards: K-LS1-1 K-ESS2-2 K-ESS3-1	**Academic Vocabulary:** antenna, ball, carapace, isopod, jagged, moisture, pill bug, sow bug
Lesson Frame: Isopod Observation	I can investigate two kinds of isopods (sowbugs and pill bugs).
Lesson Frame: Identifying Isopods	I can compare the isopods and sort them into two groups.
Lesson Frame: Isopod Movement	I can go the the schoolyard to find isopods.
Lesson Frame: Animals Living Together	I can build a class terrarium to observe how several animals live together.
Performance Task: Teacher Observation Journals	Notes:

Course Name:	First Grade Science		
Credits:	n/a		
Prerequisites:	n/a		
Description:	Science topics including Sound and Light, Air and Weather, and Plants and Animals.		
Academic Standards:	Next Generation Science Standards		
Units:	**Unit Length:**	**Unit Standards:**	**Unit Outcomes:**
Sound and Light	1st Quarter	I can plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. I can make observations to construct an evidence-based account that objects can be seen only when illuminated. I can plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light. I can use tools and materials to design and build a device that uses light or sound to solve the problem of communication over a distance.	Students will understand vibrating objects make sound; sound always comes from vibrating matter. Objects stop sound when they stop vibrating.
Plants and Animals	2nd Quarter	I can use materials to design a solution to a human problem by mimicking how plants and/or animals use their external part to help them survive, grow, and meet their needs. I can make observations to construct evidence-based account that young plants and animals are like, but not exactly like, their parents.	Seeds need water to grow into new plants. Not all plants grow alike. Plant roots take in water and nutrients, and leaves make food from sunlight. Seeds are alive and grow into new plants. Plants have different structures that function in growth and survival. Individuals of the same kind (of plant or animal) look similar but also vary in many ways. Plants need water, nutrients, air, space, and light; animals need water, food, air, and space with shelter. A habitat is a place where plants and animals live. Plants and animals live in different environments and have structures and behaviors that help them survive. Engineers learn from nature to solve problems.
Air and Weather	4th Quarter	I can use observations of the sun, moon, and stars to describe patterns that can be predicted. I can make observations at different times of year to relate the amount of daylight to the time of year.	Weather describes conditions in the air outside. Temperature describes how hot or cold the air is. Temperature is measured with a thermometer. Clouds are made of liquid water drops that fall to Earth as rain. Wind moves clouds in the sky. The Sun and Moon can be observed moving across the sky; we see them at different locations in the sky, depending on the time of day or night.

Physical Science: **Sound and Light**	**Length:** 12 weeks
Standards: I can plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. I can make observations to construct an evidence-based account that objects can be seen only when illuminated. I can plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light. I can use tools and materials to design and build a device that uses light or sound to solve the problem of communication over a distance.	**Outcomes:** Students will understand vibrating objects make sound; sound always comes from vibrating matter. Objects stop sound when they stop vibrating.
Topic 1: **Sound and Vibrations**	**Length:** 3 weeks
Essential Questions: What causes sound? What kinds of sounds are easy to identify? What information does sound give us?	**Learning Targets:** Vibration is a rapid back-and-forth motion. Vibrating objects make sound; sound always comes from a vibrating object. Objects stop making sound when they stop vibrating. Sound can make objects vibrate. Sounds can convey information. Ears are one kind of sound receiver. Sound sources can be natural or human-made. Words can describe the sounds objects make.
Standard(s): PS4.A: Wave Properties - Sound can make matter vibrate, and vibrating matter can make sound.	**Academic Vocabulary:** back-and-forth motion, compare, ear, hear, identify, information, listen, loud, observe, pluck, property, soft, sound, sound receiver, sound source, table fiddle, tuning fork, vibrate, vibration
Lesson Frame: Part 1 - Making Sounds	Students will know that vibration is a rapid back-and-forth motion. Vibrating objects make sound; sound always comes from a vibrating object. Objects stop making sound when they stop vibrating.
Lesson Frame: Part 2 - Hearing Sounds	Students will know vibrating objects make sound; sound always comes from a vibrating object. Sound can make objects vibrate. Sounds can convey information. Ears are one kind of sound receiver.
Lesson Frame: Part 3 - Outdoor Sounds	Students will know ears are one kind of sound receiver. Sound sources can be natural or human-made. Words can describe the sounds objects make.
Performance Tasks: Identify a variety of sound sources and receivers. Plan and carry out sound investigations (rubber bands, tongue depressors, table fiddle, book fiddle, tuning forks, tone generator). Analyze and interpret sound information.	Notes: Science Notebook Entry: Making sounds, hearing sounds, answer the focus question. Science Resources Book - "Vibrations and Sound", "Listen to This" Online Activity - "Sorting Sounds" Investigation 1 I-Check
Topic 2: **Changing Sound**	**Length:** 3 weeks

Essential Questions: How can we make loud and soft sounds? How can we make low-pitched and high-pitched sounds? How does sound travel from the source to the receiver? How can we use sound to communicate over long distances?	**Learning Targets:** Vibration is a rapid back-and-forth motion. Vibrating objects make sound; sound always comes from a vibrating source. Volume is how loud or soft a sound is. Pitch is how high or low a sound is. Large objects tend to vibrate slower than small objects. High-pitched sounds come from objects that vibrate rapidly. A system is made of parts that work together. Sound vibrations travel through objects and the air. Drawings can show how sound travels from a source to the receiver. Engineers design communication devices.
Standard(s): PS4.A, PS4.C, LS1.D, ETS1.A, ETS1.B, ETS1.C	**Academic Vocabulary:** Communicate, direction (away, toward), gentle, guitar, har, high-pitched, instrument, Kalimba, length, low-pitched, medium-pitched, message, pitch, spoon-gong system, string, system, travel, volume, xylophone
Lesson Frame: Part 1 - Changing Volume	Students will know vibration is a rapid back-and-forth motion. Vibrating objects make sound; sound always comes from a vibrating source. Volume is how loud or soft a sound is.
Lesson Frame: Part 2 - Changing Pitch	Students will know pitch is how high or low a sound is. Large objects tend to vibrate slower than small objects. High-pitched sounds come from objects that vibrate rapidly.
Lesson Frame: Part 3- Spoon-Gong Systems	Students will know a system is made of parts that work together. Sound vibrations travel through objects and the air. Drawings can show how sound travels from a source to the receiver.
Lesson Frame: Part 4 - Sound Challenges	Students will know vibrating objects make sound; sound always comes from a vibrating object. Engineers design communication devices.
Performance Tasks: Design a device to send messages by modifying two spoon-gong systems.	Notes: Science Notebook Entry - Changing volume, changing pitch, the Kalimba, spoon-gong systems, string-cup telephone Science Resources Book - "Animal ears and Hearing", "Strings in Motion", "More Musical Instruments" Investigation 2 I-Check
Topic 3: **Light and Shadows**	**Length:** 3 weeks
Standards: PS4.B	**Academic Vocabulary:** block, dark, flashlight, light, light source, opaque, shade, shadow, sun, sunlight, translucent, transparent

Essential Questions: What makes a shadow? How can we use the Sun to create shadows? What happens when different materials block light?	**Learning Targets:** Light sources are objects or systems that give off light. Shadows are the dark areas that result when light is blocked. To make a shadow, you need a light source, an object to block the light, and a surface in back of the object. The length and direction of the shadow depends on the position of the light source. Shadows change during the day because the position of the Sun changes in the sky. Light travels away from a source in all directions. Materials that are opaque block light. Materials that are transparent allow light to pass through them. Materials that are translucent allow some light to pass through them.
Lesson Frame: Part 1 - Making Shadows	Students will know light sources are objects or systems that give off light. Shadows are the dark areas that result when light is blocked. To make a shadow, you need a light source, an object to block the light, and a surface in back of the object.
Lesson Frame: Part 2 - Sun and Shadows	Students will know shadows are the dark areas that result when light is blocked. The length and direction of the shadow depends on the position of the light source. Shadows change during the day because the position of the Sun changes in the sky.
Lesson Frame: Part 3 - Light and Materials	Students will know light travels away from a source in all directions. Materials that are opaque block light. Materials that are transparent allow light to pass through them. Materials that are translucent allow some light to pass through them.
Performance Tasks: Plan and carry out shadow investigations. Analyze and interpret data about materials blocking light	Notes: Science Notebook Entry - Making shadows, sun and shadows, light and materials Science Resources Book - "Playing in the light" Video - "Light and Shadows", "All About Light", "My Shadow" Investigation 3 I-Check
Topic 4: **Light and Shadows**	**Length:** 3 weeks
Standards: PS4.B, PS4.C, LS1.D, ETS1.A, ETS1.B, ETS.C	**Academic Vocabulary:** angel, eye, light detector, mirror, model, redirect, reflect, reflection, vision.
Essential Questions: How can we redirect a light beam? What can we see with a mirror? What can be seen with no light? How can we communicate with light?	**Learning Targets:** Light sources are objects or systems that give off light. A mirror can be used to redirect light. Light travels in straight lines. Mirror images are the result of light reflected from a surface. Light travels in straight lines. Mirror images are the result of light reflected from a surface. Light travels in straight lines. An image produced by something that reflects, such as a mirror, is always reversed. Light is necessary for animals to see. Animal eyes receive light from objects and transfer the light to the brain to interpret as vision. Animal eyes are not all the same. There are different sizes, shapes, and placements on the head. Light can be used to communicate over long distances. Flashing lights of different colors communicate different information.
Lesson Frame: Part 1 - Mirrors and Light Beams	Students will know that light sources are objects or systems that give off light. A mirror can be used to redirect light. Light travels in straight lines.

Lesson Frame: Part 2 - Reflections	Students will know mirror images are the result of light reflected from a surface. Light travels in straight lines. An image produced by something that reflects, such as a mirror, is always reversed.
Lesson Frame: Part 3 - Eyes and Seeing	Light is necessary for animals to see. Animal eyes receive light from objects and transfer the light to the brain to interpret as vision. Animal eyes are not all the same. There are different sizes, shapes, and placements on the head.
Lesson Frame: Part 4 - Designing with Light	Students will know light travels in straight lines. Light can be used to communicate over long distances. Flashing lights of different colors communicate different information.
Performance Tasks: Plan and carry out investigations with light and mirrors. Meet design challenges using light and mirrors.	Notes: Sciences Notebook Entry - Mirrors and Light Beams, Reflections, Eyes and Seeing, Designing with Light Science Resources Book - "Reflections", "Seeing the Light", "Communicating with Light" Video - "Light and Darkness" Investigation 4 I-Check

Unit Name: **Plants and Animals**	**Length:** 12 weeks
Standards: I can use materials to design a solution to a human problem by mimicking how plants and/or animals use their external part to help them survive, grow, and meet their needs. I can make observations to construct evidence-based account that young plants and animals are like, but not exactly like, their parents.	**Outcomes:** Seeds need water to grow into new plants. Not all plants grow alike. Plant roots take in water and nutrients. Leaves make food from sunlight. Seeds are alive and grow into new plants. Plants have different structures that function in growth and survival. Individuals of the same kind (of plant or animal) look similar but also vary in many ways. Plants need water, nutrients, air, space, and light; animals need water, food, air, and space with shelter. A habitat is a place where plants and animals live. Plants and animals live in different environments and have structures and behaviors that help them survive. Engineers learn from nature to solve problems.
Topic 1: **Grass and Grain Seeds**	**Length:** 6 weeks
Essential Questions: What happens to ryegrass and alfalfa seeds in moist soil? What happens to the grass and alfalfa plants after we mow them? How does a wheat seed grow? How many different kinds of plants live in an area of the schoolyard?	**Learning Targets:** Students will know seeds need water to grow into new plants. Seeds need water to begin growth. Plants need water, nutrients, air, and space to grow. Students will know not all plants grow alike. There are variations in structures that serve the same function. Some plants die if they are cut near the ground, while others continue to live. Students will know wheat and other cereals that we eat come from seeds called grains. Seeds are alive and grow into new plants. Seeds need water to begin growth. Plants have different structures for growth and survival. Plant roots take in water and nutrients. Leaves make food from sunlight.
Standards: LS1.1, LS1.2	**Academic Vocabulary:** alfalfa, blade, fertilizer, function, grain, lawn, leaf, light, mow, nutrient, observe, plant, root, ryegrass, seed, soil, sprout, stem, structure, variation, wheat
Lesson Frame: Part 1 - Lawns	Students will know seeds need water to grow into new plants. Seeds need water to begin growth. Plants need water, nutrients, air, and space to grow.
Lesson Frame: Part 2 - Mowing the Lawn	Students will know not all plants grow alike. There are variations in structures that serve the same function. Some plants die if they are cut near the ground, while others continue to live.
Lesson Frame: Part 3 - Wheat	Students will know wheat and other cereals that we eat come from seeds called grains. Seeds are alive and grow into new plants. Seeds need water to begin growth. Plants have different structures that function growth and survival. Plant roots take in water and nutrients, and leaves make food from sunlight.
Lesson Frame: Part 4 - Variation in Plants and Animals	Students will know not all plants grow alike. There are variations in structures that serve the same function. Individuals of the same kind look similar but also vary in many ways.
Performance Tasks: Observe what happens when young ryegrass and alfalfa plants are cut near the soil surface. Sprout wheat seeds in straws and monitor growth, using a graph.	Notes: Science notebook entry - Growing a Lawn, Plant Picture, Growing and Mowing a Lawn, Growing Wheat, answer the focus question Science Resources Book - "What Do Plants Need?", "The Story of Wheat", "Variation" Video - How Plants Grow, Animal Growth Investigation 1 I-Check
Topic 2: **Terrariums**	**Length:** 6 weeks

Standard(s): LS1.A, LS1.D, LS3.B, ETS1.B	**Academic Vocabulary:** behavior, desert, forest, grassland, habitat, map, map key, ocean, pond, predator, rainforest, shelter, survive, system, terrarium, tundra
Lesson Frame: Setting Up Terrariums	Students will know plants and animals need food, water, air and space; plants need sunlight to make food. A terrarium is a model habitat where plants and animals live in soil. A habitat is a place where plants and animals live.
Lesson Frame: Animals in the Terrarium	Students will know there are many different habitats around the world. Many changes take place in a terrarium habitat over time.
Lesson Frame: Habitat Match	Students will know a habitat is a place where plants and animals live. It provides what a plant or animal needs to live. Plants and animals have structures and behaviors that help them survive in different habitats. Habitats can be wet, dry, cold, or hot. Different plants and animals survive in each different habitat.
Lesson Frame: Squirrel Behavior	Students will know plants and animals habitats have features that will help them survive. Animals have sensory structures that provide them with information about their surroundings. Individuals of the same kind look similar but can vary in many ways. Engineers learn from nature in order to solve human problems.
Performance Tasks: Design and build a model habitat (a terrarium system) provides for the needs of a small community of plants and animals. Make observations of terrariums over time and record them on a map and class charts through drawing and writing.	Notes: Science Notebook Entry - Terrarium map, answer the focus question Science Resource Book - "What Do Animals Need?", "Plants and Animals Around the World", "Learning from Nature" Video - How Plants Live in Different Places, Animal Growth Investigation 3 I-Check

Unit Name: **Air and Weather**	**Length:** 12 weeks
Standards: I can use observations of the sun, moon, and stars to describe patterns that can be predicted. I can make observations at different times of year to relate the amount of daylight to the time of year.	**Outcomes:** Weather describes conditions in the air outside. Temperature describes how hot or cold the air is. Temperature is measured with a thermometer. Clouds are made of liquid water drops that fall to Earth as rain. Wind moves clouds in the sky. The Sun and Moon can be observed moving across the sky; we see them at different locations in the sky, depending on the time of day or night.
Topic 1: **Observing the Sky**	**Length:** 6 weeks
Essential Questions: When you look up at the sky, what do you see, and how does it change?	**Learning Targets:** Weather describes conditions in the air outside. Temperature describes how hot or cold the air is. Temperature is measured with a thermometer. Wind moves clouds in the sky. Clouds are made of liquid water drops that fall to Earth as rain; water is also in the air as a gas that we can't see. The sun rises in the east, moves across the sky, and sets each day at predictable times. The sun warms the Earth. The moon can be observed moving across the sky; we see them at different locations in the sky, depending on the time of day or night.
Standard(s): ESS1.1, ESS1.2	**Academic Vocabulary:** change, cirrus, cloud, cold, cool, cumulus, day, degrees Celsius, degrees Fahrenheit, describe, hot, measure, meteorologist, moon, night, overcast, partly cloudy, pattern, rain gauge, rainy, record, snowy, star, stratus, sun, sunny, sunrise, sunset, symbol, temperature, thermometer, warm, water vapor, weather, weather conditions, weather instrument
Lesson Frame: Part 1 - Weather Calendars	Students will know weather describes the conditions of the air outside.
Lesson Frame: Part 2 - Measuring Temperatures and Daylight	Students will know that temperature describes how hot or cold the air is. Temperature is measured with a thermometer. The sun rises in the east, moves across the sky, and sets each day at predictable times. The sun warms the Earth.
Lesson Frame: Part 3 - Watching Clouds	Students will know that wind moves clouds in the sky. Clouds are made of liquid water drops that fall to Earth as rain; water is also in the air as a gas that we can't see.
Lesson Frame: Part 4 - Observing the Moon	Students will know that the moon can be seen sometimes at night and during the day. It looks different every day, but looks the same again every 4 weeks. The moon can be observed moving across the sky; we see it at different locations in the sky, depending on the time of day or night. There are more stars in the night sky than anyone can count.

Performance Tasks: Observe and record air conditions using weather instruments, and hours of daylight to look for patterns. Record moon observations to look for patterns.	Notes: Science Notebook Entry - Answer the focus question, Thermometer Picture Science Resources Book - “What Is the Weather Today?”, “Clouds”, “Water in the Air”, “Changes in the Sky” Online Activity - “Cloud Catcher” Investigation 2 I-Check
Topic 2: **Looking for Change**	**Length:** 6 weeks
Essential Questions: How do daylight and weather change through the seasons?	**Learning Targets:** Daily changes in temperature and weather type can be observed, compared, and predicted over a month. The sun and moon can be observed moving across the sky; we see them at different locations in the sky, depending on the time of day or night. Each season has a typical weather pattern that can be observed, compared, and predicted. The number of hours of daylight changes predictably through the seasons.
Standard(s): ESS1.1, ESS1.2	**Academic Vocabulary:** fall, graph, hibernate, migrate, season, spring, summer, winter
Lesson Frame: Part 1 - Change over a Month	Students can organize and graph the class weather data recorded over a period of 4 weeks. The class can continue recording the weather on the calendar and then graph the following month. Students also revisit the Moon calendar and look for patterns over the month.
Lesson Frame: Part 2 - Daylight Through the Year	Students can look at the amount of daylight on the same day of each month over the year. Students describe the pattern they observe and predict the number of hours of daylight on their birthday that year. They compare the actual hours to their predicted number of hours.
Lesson Frame: Part 3 - Comparing the Seasons	Students can move from recording weather data on a calendar to creating seasonal graphs of the weather and temperature. Each season, the class creates new graphs and compares them with graphs from the preceding seasons.
Lesson Frame: Part 4 - Extensions	
Performance Tasks: Graph weather observations taken over a period of a month. Look for patterns in local weather conditions and temperatures throughout the seasons. Monitor and record the changing appearance of the moon over a month. Monitor and record the number of changing number of daylight hours over a year.	Notes: Science Notebook Entry - Answer the focus question, Hours of Daylight Science Resources Book - "Changes in the Sky", "Seasons", "Getting Through the Winter" Online Activity - "What's the Weather?" Investigation 4 I-Check
Topic 3: Investigation 1 - **Exploring Air**	**Length:** 2 weeks

Essential Questions: What is air and what can it do?	**Learning Targets:** Air is a gas and is all around us, including in the sky. Air is matter and takes up space. Air makes objects move. Air moves from place to place. Moving air is wind. Air resistance affects how things move. Air can be compressed.
Standard(s): (Engineering Standards) I can ask questions, make observations, gather information about a situation people want to change to define a simple problem that can be solved through the developments of a new or improved object or tool. I can develop a simple sketch, drawing, or physical model to illustrate how shapes of an object helps it function as needed to solve a given problem. I can analyze data from tests to two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs."	**Academic Vocabulary:** air, air resistance, barrel, blow, bubble, canopy, compress, distance, engineer, gas, matter, move, parachute, plunger, pressure, push, rocket, submerge, syringe, system, tube, wind
Lesson Frame: Part 1 - Air Is There	Students can discover properties of air by observing interactions of air with objects.
Lesson Frame: Part 2 - Parachutes	Students can design and engineer parachutes and observe how they interact with air to solve a problem.
Lesson Frame: Part 3 - Pushing on Air	Students can use syringes to investigate air. Students will discover that air can be compressed and under pressure can push objects around.
Lesson Frame: Part 5- Balloon Rockets	Students can set up balloon rocket systems and find out how far they propel in a flight line.
Performance Tasks: Discover properties of air by observing interactions of air with objects. Design and engineer parachutes and observe how they interact with air to solve a problem. Demonstrate that compressed air can be used to make things move.	Notes: Science Notebook Entry - Air is There, Parachutes, Pushing on Air, Balloon Rockets Science Resources Book - "What is All Around Us?" Video: "Friction and Air Resistance" Investigation 1 i-check Answer the Focus Questions

Course Name:	Second Grade Science		
Credits:	N/A		
Prerequisites:	N/A		
Description:	A comprehensive of Science topics including: Physical Science, Life Science, Earth Science, and Engineering Design.		
Academic Standards:	Next Generation Science Standards		
Units:	**Unit Length:**	**Unit Standards:**	**Unit Outcomes:**
Solids and Liquids	1 Quarter	I can classify different kinds of materials by their observable properties. I can determine which materials have the properties that are best suited for an intended purpose. I can construct an object made of pieces that can be disassembled and made into a new object. I can explain how some changes can be reversed by heating and cooling.	Everything is made of matter. There are three states of matter.
Insects and Plants	1 Quarter	I can plan and conduct an investigation to determine if plants need sunlight and water to grow. I can develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. I can make observations of plants and animals to compare the diversity of life in different habitats.	All living things have needs to survive in their environment.
Pebbles, Sand, and Silt	1 Quarter	I can compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. I can develop a model to represent the shapes and kinds of land and bodies of water in an area. I can obtain information to identify where water is found on Earth and that it can be solid or liquid.	Earth's landforms and bodies of water are constantly changing.
Engineering Design	1 Quarter	I can ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. I can develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. I can analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	Making observations and analyzing information can help improve our lives.

Unit Name: Physical Science-**Solids and Liquids**	**Length:** 1 quarter
Standards: I can classify different kinds of materials by their observable properties. I can determine which materials have the properties that are best suited for an intended purpose. I can construct an object made of pieces that can be disassembled and made into a new object. I can explain how some changes can be reversed by heating and cooling.	**Outcomes:** Everything is made of matter. There are three states of matter. Each state has different uses.
Essential Questions: How do properties of materials relate to their use? How do you observe, describe, and compare properties of solids and liquids?	**Learning Targets:** Solids are made of materials that have different properties. Liquids can be classified by their observable properties. Successful towers are built using the correct materials intended for the task. When heated or cooled, properties of materials are changed.
Topic 1: **Solids**	**Length:** 4 weeks
Standard(s): I can describe a solid. I can classify different kinds of materials by their observable properties. I can construct an object made of pieces that can be disassembled and made into a new object. I can determine which materials have the properties that are best suited for an intended purpose.	**Academic Vocabulary:** solid, liquid, gas, matter, observe, properties, flexible, rigid
Lesson Frame: Solid Objects and Materials	I can: identify solid objects and materials by their properties.
Lesson Frame: Group Solid Objects	I can: sort objects into collections based on their properties.
Lesson Frame: Construct with Solids	I can: use knowledge of material properties to design structures.
Performance Tasks: States of Matter Graphic Organizer Interactive Notebook Completion of Rubric	Notes: Activities may vary depending on individual needs. Baggies of materials in FOSS Kit various videos Solids & Liquids student book: pages 3-30
Topic 2: **Liquids**	**Length:** 2 weeks
Standard(s): I can describe a liquid. I can classify different kinds of materials by their observable properties.	**Academic Vocabulary:** Liquids, bubbly, foamy, viscous, translucent, transparent, flow
Lesson Frame: Liquids in Bottles	I can: describe the properties of liquids.
Lesson Frame: Properties of Liquids	I can: describe how liquids can be different from each other.

Lesson Frame: Liquid Level	I can: explain how liquids change in containers.
Performance Tasks: Interactive Notebook Completion of Rubric Liquid Properties Graphic Organizer	Notes: Activities may vary depending on individual needs Liquids in bottles FOSS Video: *All about Properties of Matter* FOSS Online Activity: *Falling Bottle Puzzle* *Solids & Liquids student book: pages 31-37*
Topic 3: **Solids, Liquids, and Water**	**Length:** 2 weeks
Standard(s): I can explain how some changes can be reversed by heating and cooling.	**Academic Vocabulary:** disappear, reversible, evaporate, crystal, dissolve, layers, melting, freezing
Lesson Frame: Solids and Water	I can: describe what happens when solids are mixed with water.
Lesson Frame: Liquids and Water	I can: describe what happens when liquids are mixed with water.
Lesson Frame: Changing Properties	I can: describe how properties of materials chance when they are heated or cooled.
Performance Tasks: Interactive Notebook Completion of Rubric Solid materials graphic organizer Liquids with water graphic organizer	Notes: Activities may vary depending on individual needs Solids & Liquids student book: pages 44-76 solid materials in bags FOSS activity Heating and Cooling FOSS video Solids and Liquids FOSS activity Change It!

Unit Name: Life Science- **Insects and Plants**	**Length:** One Quarter
Standards: I can plan and conduct an investigation to determine if plants need sunlight and water to grow. I can develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. I can make observations of plants and animals to compare the diversity of life in different habitats.	**Outcomes:** Plants, animals, and insects depend on their habitats for survival.
Essential Questions: How do plants and insects meet their needs?	**Learning Targets:** Plants need sunlight and water to grow. Plants depend on other living and nonliving things to pollinate and disperse seeds.. Animals live in the appropriate habitat that provides all of their needs.
Topic 1: **Plants Need Sunlight and Water**	Length: 2 Weeks
Standard(s): I can plan and conduct an investigation to determine if plants need sunlight and water to grow.	**Academic Vocabulary:** seed, disperse, pollinate, habitat
Lesson Frame: Observe Plants	I can: make observations of plants with different variables.
Lesson Frame: Identify What Plants Need	I can: determine if plants need sunlight and water to grow.
Performance Tasks: Plan and conduct an investigation to determine if plants need sunlight and water to grow. Completion of Rubric. Graphic Organizers	Notes: Leveled readers library books various videos Activities may vary depending on individual needs
Topic 2: **Seed dispersal and plant pollination**	**Length:** 2 weeks
Standard(s): Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.	**Academic Vocabulary:** seed, mimic, dispersal, pollination
Lesson Frame: How Do Seed Travel?	I can: design a simple model of an animal that mimics seed dispersal.
Lesson Frame: Bees and other insects help some plants move pollen.	I can: investigate how an insect moves pollen.
Performance Tasks: Design a model to show one way seeds are dispersed. Participate in the representation of pollination. Completion of Rubric. Graphic Organizer	Notes: use cheetos or some other food that will stick to children's fingers Leveled readers library books various videos Activities may vary depending on individual needs
Topic 3: **Animal Habitats**	**Length:** 4 weeks
Standard(s): I can make observations of plants and animals to compare the diversity of life in different habitats.	**Academic Vocabulary:** wetland, forest, desert, habitat, diversity, physical features, environment

Lesson Frame: Wetland Habitat	I can: make observations of plants, insects, and animals that live in a wetland habitat.
Lesson Frame: Forest Habitat	I can: make observations of plants, insects, and animals that live in a forest habitat.
Lesson Frame: Desert Habitat	I can: make observations of plants, insects, and animals that live in a desert habitat.
Lesson Frame: Compare Habitats	I can: compare the diversity of life in the different habitats.
Performance Tasks: Design and build a Habitat Completion of Rubric	Notes: Leveled readers library books various videos Activities may vary depending on individual needs

Unit Name: Earth Science-**Pebbles, Sand, and Silt**	**Length:** 1 quarter
Standards: I can compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. I can define weathering. I can define erosion. I can develop a model to represent the shapes and kinds of land and bodies of water in an area. I can obtain information to identify where water is found on Earth and that it can be solid or liquid.	**Outcomes:** Earth is made up of landforms and water that is constantly changing.
Essential Questions: How are Earth's landforms and bodies of water changing overtime?	**Learning Targets:** Earth's landforms are changed by erosion and weathering. Earth has many different landforms. Earth has different types of water sources. Earth's water sources can be solid or liquid.
Topic 1: **Soil and Water**	**Length:** 3 weeks
Standard(s): I can compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. I can define weathering. I can define erosion.	**Academic Vocabulary:** erosion, weathering
Lesson Frame: Soil and Water	I can: describe different types of soil.
Lesson Frame: Erosion	I can: explain the process of erosion.
Lesson Frame: Weathering	I can: tell how weathering is different from erosion.
Performance Tasks: Soil- graphic organizer interactive notebook completion of rubric	Notes: FOSS student book p. 3-23, 44-49, 68-78 FOSS video- All About Soil Various erosion and weathering videos
Topic 2: **Landforms**	**Length:** 3 weeks
Standard(s): I can develop a model to represent the shapes and kinds of land and bodies of water in an area.	**Academic Vocabulary:** pond, river, stream, ocean, lake, landforms, volcano, valley, canyon, mesa, butte, beach, delta, plain, mountain, plateau, hill, island
Lesson Frame: Land and Water	I can: design a landform to represent the land and water on Earth. I can: label the different types of land and water on my landform.
Lesson Frame: Types of Land	I can: name and describe landforms found on Earth.
Lesson Frame: Types of Water	I can: name and describe water found on Earth.

Performance Tasks: Land/water graphic organizer Land/water model Interactive notebook completion of rubric	Notes: FOSS student book p.24-30 Various Videos Various books Land/water model
Topic 3: **Natural Water Sources**	**Length:** 2 weeks
Standard(s): I can obtain information to identify where water is found on Earth and that it can be solid or liquid.	**Academic Vocabulary:** Fresh water, salt water, streams, rivers, lake, ocean, glaciers, precipitation
Lesson Frame: Where is Water Found?	I can: name where water is found on Earth.
Lesson Frame: States of Water	I can: name different states that water can be in.
Performance Tasks: States of water graphic organizer Interactive Notebook Completion of Rubric	Notes: FOSS student book p. 50-67 Various videos

Unit Name: **Engineering Design**	**Length:** One Quarter
Standards: I can ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. I can develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. I can analyze data from test of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	**Outcomes:** By designing and modifying an existing design, you are able to improve the outcome of a tool's purpose or performance.
Essential Questions: How can you design or improve a given tool to improve its function to solve a problem?	**Learning Targets:** Understand that by asking questions, making observations and gathering information, you are able to design and modify a tool that will solve a given problem.
Topic 1: **STEM-Pumpkin Picker**	**Length:** 1 week
Standard(s): I can ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. I can develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. I can analyze data from test of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	**Academic Vocabulary:** engineer, sketch, design, modify
Lesson Frame: Pumpkin Picker	I can: design a pumpkin picker that will pick many pumpkins at one time using the given material.
Performance Tasks: Design and build a model to represent an object that can improve or solve a given problem.	Notes: Use various materials to build and solve the given problem.
Topic 2: **STEM-Turkey Transporter**	**Length:** 1 week

Standard(s): I can ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. I can develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. I can analyze data from test of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	**Academic Vocabulary:** engineer, sketch, design, modify, transporter
Lesson Frame: Turkey Transporter	I can: design a tool that will transport a turkey with the given material.
Performance Tasks: Design and build a model to represent an object that can improve or solve a given problem.	Notes: Use various materials to build and solve the given problem.
Topic 3: STEM-Pilgrim Shelter	**Length:** 1 week
Standard(s): I can ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. I can develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. I can analyze data from test of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	**Academic Vocabulary:** engineer, sketch, design, modify , shelter
Lesson Frame: Pilgrim Shelter	I can: use the given material to design a shelter for pilgrims.
Performance Tasks: Design and build a model to represent an object that can improve or solve a given problem.	Notes: Use various materials to build and solve the given problem.
Topic 4: **STEM-Float your Boat**	**Length:** 1 week
Standard(s): I can ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. I can develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. I can analyze data from test of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	**Academic Vocabulary:** engineer, sketch, design, modify , float

Lesson Frame: Float Your Boat	I can: use the given material to design a boat that will float and hold cargo.
Performance Tasks: Design and build a model to represent an object that can improve or solve a given problem.	Notes: Use various materials to build and solve the given problem.
Topic 5: **STEM-Block the Water**	**Length:** 1 week
Standard(s): I can ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. I can develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. I can analyze data from test of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	**Academic Vocabulary:** engineer, sketch, design, modify
Lesson Frame: Block the Water	I can: design a tool that will block water from flowing through a given space.
Performance Tasks: Design and build a model to represent an object that can improve or solve a given problem.	Notes: Use various materials to build and solve the given problem.
Topic 6: **STEM-The Green House**	**Length:** 1 week
Standard(s): I can ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. I can develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. I can analyze data from test of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	**Academic Vocabulary:** engineer sketch design modify greenhouse
Lesson Frame: The Green House	I can: use the given material to create a structure like a greenhouse to help a plant grow.
Performance Tasks: Design and build a model to represent an object that can improve or solve a given problem.	Notes: Use various materials to build and solve the given problem.

Topic 7: **STEM-Seed Transporter**	**Length:** 1 week
Standard(s): I can ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. I can develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. I can analyze data from test of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	**Academic Vocabulary:** engineer, sketch, design, modify, transporter
Lesson Frame: Seed Transporter	I can: design a tool that will transport seeds to a new location for growth.
Performance Tasks: Design and build a model to represent an object that can improve or solve a given problem.	Notes: Use various materials to build and solve the given problem.

Topic 8: **STEM-The Nature of Objects**	**Length:** 1 week
Standard(s): I can ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. I can develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. I can analyze data from test of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	**Academic Vocabulary:** engineer, sketch, design, modify
Lesson Frame: The Nature of Objects	I can: collect items from nature to use in the construction of objects for given purposes.
Performance Tasks: Design and build a model to represent an object that can improve or solve a given problem.	Notes: Use various materials to build and solve the given problem.

Course Name:	Third Grade Science		
Credits:	N/A		
Prerequisites:	N/A		
Description:	General Education 3rd Grade Science Curriculum		
Academic Standards:	Next Generation Science Standards		
Units:	**Unit Length:**	**Unit Standards:**	**Unit Outcomes:**
Motion and Matter	12 weeks	* I can understand the effects of balanced and unbalanced forces on motion. * I can understand motion and the factors that affect motion. * I can show cause and effect relationships of magnetism. * I can engineer an effective cart design.	Motion is caused by force but it can be affected by variables.
Water and Climate	12 weeks	*I can discuss typical weather conditions expected during a particular season. *I can read about and understand information to describe climates in different regions of the world. *I can state how the design of building/structure reduces the impact of a weather-related hazard.	The Earth's water plays many important roles in people's lives as well as can cause damage.
Structures of Life	12 weeks	*I can draw and label models of lifecycles. *I can explain how an organism's behaviors help them grow, and reproduce. *I can understand how an animal and its traits are influenced by its environment. *I can examine how adaptations help plants and animals survive. *I can examine how fossils teach us about animals and their environments from long ago.	Organism's structures help them grow, survive, and reproduce. Organisms are affected by their environment.

Unit Name: **Motion and Matter**	**Length:** 12 weeks
Standards: * I can understand the effects of balanced and unbalanced forces on motion. * I can understand motion and the factors that affect motion. * I can show cause and effect relationships of magnetism. * I can engineer an effective cart design.	**Outcome:** Motion is caused by force but it can be affected by variables.
Essential Questions: How does force and gravity affect the movement and how can force be changed?	**Learning Targets:** *Students learn motion of an object is determined by force (pushes and pulls). *Students make predictions of outcomes based on knowledge of gravity and magnetism. *Students describe matter including its states and properties.
Topic 1: **Forces**	**Length:** 4 weeks
Standard(s): I can understand the effects of balanced and unbalanced motion.	**Academic Vocabulary:** magnetic force, push, pull, attract, repel, gravity, balanced and unbalanced motion
Lesson Frame: Two Forces	I can: -describe how magnetism and gravity are alike and different. -explore what happens when magnets interact with other magnets.
Lesson Frame: Magnetic-Force Investigation	I can -collect data on what affects magnetic force.
Lesson Frame: More about Forces	I can -describe what causes a change in motion.
Performance Tasks: interactive notebook Foss videos, graphic organizers, and student resource book completion of rubric	Notes: Hands on lessons include: Magnet exploration How magnets interact with other objects: desks, paper, wood etc. Magnet Magic Trick
Topic 2: **Patterns of Motion**	**Length:** 4 weeks
Standard(s): I can understand motion and the factors that affect motion.	**Academic Vocabulary:** system, axle, friction, variable
Lesson Frame: Wheel and Axle Systems	I can -make a system using trial and error to learn what works best. -describe how friction causes and object to stop.
Lesson Frame: Predicting Motion of New Systems	I can -observe and measure patterns in motion to predict what will happen next.
Lesson Frame: Twirly Birds	I can -apply variable to affect how gravity works on object's motion.

Performance tasks: interactive notebook Foss videos, graphic organizers, and student resource book completion of rubric	Notes: Hands on activities: Use discs and shafts to make a wheel and axle system Use cups and ramps with weights to see how different designs affect motion Use different variables such as weight and length of wings to see how it changes how gravity affects flight
Topic 3: **Engineering**	**Length:** 4 weeks
Standard(s): I can show a cause and effect relationship related to motion	**Academic Vocabulary:** system, axle, friction, variable, magnetic force, push, pull, attract, repel, gravity, balanced and unbalanced motion
Lesson Frame: From Here to There	I can: -use what I have learned about motion to design a working cart
Lesson Frame: Distance Challenge	I can: -improve on an original design by asking how it can work even better. -collect data.
Lesson Frame: Cart Tricks	I can: -combine my knowledge of magnetism, gravity, and wheels and axles(motion) to create a cart trick.
Performance Tasks: interactive notebook Foss videos, graphic organizers, and student resource book completion of rubric	Notes: design of a successful cart with limited supplies testing carts for best design designing a cart trick
End of Unit Engineering and Design tied into cart building and magic trick.	

Unit Name: **Water and Climate**	**Length:** 12 weeks
Standards: *I can discuss typical weather conditions expected during a particular season. *I can read about and understand information to describe climates in different regions of the world. *I can sate how the design of building/structure reduces the impact of a weather-related hazard.	**Outcomes:** Earth's water impacts weather, climate, and people including causing hazards.
Essential Questions: How does the Earth's water affect climate, weather, and the people who live in certain areas?	**Learning Targets:** Students will understand the Earth's water and it's forms. Students will understand the water cycle and its importance to weather and climate. Students will learn the difference between weather and climate as well as track weather info. Students will use what they know about severe weather and its effect on people to design a system against floods.
Topic 1: **Water Observations**	**Length:** 4 weeks
Standard(s): *I can sate how the design of building/structure reduces the impact of a weather-related hazard.	**Academic Vocabulary:** absorb, repel, interact, properties, slope, surface tension
Lesson Frame: Drops of Water	I can -understand the different properties of water. -observe how water acts on different surfaces. -relate what I have learned to water flow in nature.
Lesson Frame: Water on a Slope	I can -observe how water acts on a slope. -relate what I have learned to water flow in nature. -predict the shape of water as it flows after noticing patterns in water movement.
Lesson Frame: Water in Nature	I can -collect samples and record action of water on natural surfaces.
Performance Tasks: interactive notebook Foss videos, graphic organizers, and student resource book completion of rubric	Notes: Hands on learning: Water actions on Diff. Surfaces Water domes and the shape of water Water on slopes Outdoor Observation of water in nature
Topic 2: **Hot Water, Cold Water** (section 3,4,5)	**Length:** 4 weeks
Standard(s): *I can read about and understand information to describe climates in different regions of the world.	**Academic Vocabulary:** sink, float, liquid, solid, gas, density
Lesson Frame: Sinking and Floating	I can -explain why things sink and float.

Lesson Frame: Water as Ice	I can -name the 3 states of water (matter) and describe how/why water turns to a solid (ice).
Lesson Frame: Ice Outdoors	I can -describe how temperature affects water and animals. -reason how animals can stall alive in cold climates.
Performance Tasks: interactive notebook Foss videos, graphic organizers, and student resource book completion of rubric	Notes: Hands on Activities include: Using colored water of diff temps to see how it affects sinking and floating Compare the density of water and ice Explore putting ice in diff places outdoors(including burying it) to see how it is affected.
Topic 3: **Weather and Water** (parts 2,5, and supplemental materials on water cycle)	**Length:** 4 weeks
Standard(s): *I can discuss typical weather conditions expected during a particular season. *I can read about and understand information to describe climates in different regions of the world.	**Academic Vocabulary:** evaporate, condensation, precipitation, water vapor
Lesson Frame: Evaporation	I can -explain the process of evaporation. -record the effects of variables like temp. on speed of evap.
Lesson Frame: Condensation	I can -define condensation and the conditions needed to make it happen.
Lesson Frame: Water Cycle	I can -draw and label a diagram of the water cycle as well as explain it.
Performance Tasks: interactive notebook Foss videos, graphic organizers, and student resource book completion of rubric	Notes: Hands on Activities Include: Paper towel evaporation activity Making condensation on beverages of diff temps. Make a water cycle in a bag
Topic 4: **Seasons and Climate** (Foss kit and supplemental activities from Weather Unit Purchased)	**Length:** 3 weeks
Standard(s): *I can discuss typical weather conditions expected during a particular season. *I can read about and understand information to describe climates in different regions of the world.	**Academic Vocabulary:** climate, weather, season, typical, embankment, sluice
Lesson Frame: Seasonal Weather	I can -describe the role of the sun in weather. -review data on historical weather in our area and notice patterns.
Lesson Frame: Describing Climate	I can -describe the difference between climate and weather. -name different climates and the regions they are located in relation to the equator.

Lesson Frame: Weather Related Hazards	I can -describe some damage that weather can cause. -show ways that people currently deal with weather damage.
Performance Tasks: supplemental unit materials Unit on Weather from TPT interactive notebook Foss videos, graphic organizers, and student resource book completion of rubric	Notes: Hands on Activities include: Group data analysis Design a way to help stop flooding of a Lego house with limited materials using knowledge of water
*End of Unit Engineering and Design: Create a boat that floats from limited materials, design, improve your design, and restructure a boat that shows you have knowledge of sinking, floating, and density.	

Unit Name: **Structures of Life**	**Length:** 12 weeks
Standards(s): *I can draw and label models of lifecycles. *I can explain how an organism's behaviors help them grow, and reproduce. *I can understand how an animal and its traits are influenced by its environment. *I can examine how adaptations help plants and animals survive. *I can examine how fossils teach us about animals and their environments from long ago.	**Outcomes:** All living things are affected by their environment which changes over time.
Essential Questions: How does an organism's environment affect how it grows, reproduces, and survives?	**Learning Targets:** *Students note living things have needs and they grow and change. *Living things change due to their environment. *Students can describe how characteristics or living things help it mate, reproduce, and survive.
Topic 1: **Origin of Seeds**	**Length:** 4 weeks
Standard(s): *I can draw and label models of lifecycles. *I can explain how an organism's behaviors help them grow and reproduce. *I can explain how adaptations help plants and animals survive.	**Academic Vocabulary:** germinate, reproduce, embryo, disperse, seedling
Lesson Frame: Seed Search	I can -name the parts of a bean seed and see what happens when water is added to a seed. -look at and compare different kinds of seeds and their characteristics. -define what parts of a plant help it reproduce.
Lesson Frame:Seed soak/sprout (combined)	I can -describe what a plant needs from its environment to reproduce.
Lesson Frame: Seed Dispersal	I can -I can explain how a plants adaptations help it disperse in order to reproduce.
Performance Tasks: interactive notebook Foss videos, graphic organizers, and student resource book completion of rubric seed hunt outdoors	Notes: Hands on activities: seed exploration of different seeds and outdoor search seed soak and sprout
Topic 2: **Meet the Crayfish**	**Length:** 4 weeks
Standard(s): *I can explain how an organism's behaviors help them grow, and reproduce. *I can understand how an animal and its traits are influenced by its environment. *I can examine how adaptations help plants and animals survive.	**Academic Vocabulary:** adaptation, behavior, territory, structure, function

Lesson Frame: Crayfish Structures	I can -I can describe and label crayfish structures and talk about their purpose.
Lesson Frame: Adaptation/Behavior combined	I can -describe and define adaptation as associated with crayfish. -find and apply knowledge of crayfish adaptations to other species. -describe and view how a crayfish's behavior helps it survive in its territory.
Lesson Frame: Compare crayfish and other animals	I can -compare what I have learned about crayfish structures and apply it to other animals.
Performance Tasks: interactive notebook Foss videos, graphic organizers, and student resource book completion of rubric seed hunt outdoors	Notes: Hands on activities: seed hunt walk outdoors handling live crayfish sprouting and taking apart bean seeds online games "Crayfish vs. Snail vs. Mantis ***FIELD TRIP TO CENTRAL WISCONSIN ENVIR. STATION FOR: ANIMAL ADAPTATIONS EXPLORATION
Topic 3: **Human and Dino bodies**	Length: 4 weeks
Standard(s): *I can examine how fossils teach us about animals and their environments from long ago.	**Academic Vocabulary:** function, inherit, skeleton
Lesson Frame: Counting Bones	I can -describe the function of a skeleton and some are in the inside and some outside. -be familiar with human and animal bones.
Lesson Frame: Joints and Muscles	I can -describe how our skeleton supports us but we need joints and muscles to help us move.
Lesson Frame: Dino Bones see TE pg 301 and SB pg 81 **supplemental materials also needed	I can -list what dinosaur bones can tell us about them.
Performance Tasks: interactive notebook Foss videos, graphic organizers, and student resource book completion of rubric	Notes: Fossil exploration taping joints leg model Mr. Bones puzzle
* End of unit Engineering and Design Project: Make an imaginary animal and describe its environment. Use your knowledge of adaptations and growth, survival etc. to create a realistic critter that has structures to help it grow, reproduce, and survive in its environment.	

Course Name:	Fourth Grade Science		
Credits:	n/a		
Prerequisites:	n/a		
Description:	Students will explore the area of energy, through electricity and magnetism. Students will explore environments and how living organisms depend on them and one another for survival. Students will explore soil, rocks, and landforms to study changes in the Earth's surface.		
Academic Standards:	Next Generation Science Standards		
Units:	**Unit Length:**	**Unit Standards:**	**Unit Outcomes:**
Energy	12 weeks	I can use evidence to construct an explanation relating the speed of an object to the energy of that object. I can make observations to provide evidence that energy can be transferred from place to place by sound, light heat, and electric currents. I can ask questions and predict outcomes about the changes in energy that occur when objects collide. I can apply scientific ideas to design, test, and refine a device that converts energy from one form to another. I can develop model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. I can develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. I can generate and compare multiple solutions that use patterns to transfer information. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	Energy is everywhere, electricity and magnetism are related, energy transfers through waves, repeating patterns of motion, that result in sound and motion.

Environments	12 weeks	I can construct an argument that plants and animals have internal and external structure that function to support survival, growth, behavior, and reproduction. I can use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	Organisms have structures and behaviors that serve functions in growth, survival and reproduction and living organisms depend on one another and on their environment for their survival and the survival of populations
Soil, Rocks, and Landforms	12 weeks	I can identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. I can make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. I can analyze and interpret data from maps to describe patterns of Earth's features. I can obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. I can generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	Students will have firsthand experiences with soils and rocks and modeling experiences using tools such as topographic maps and stream tables to study changes to rocks and landforms at Earth's surface.

Unit Name: **Energy**	**Length:** 12 weeks
Standards: I can use evidence to construct an explanation relating the speed of an object to the energy of that object. I can make observations to provide evidence that energy can be transferred from place to place by sound, light heat, and electric currents. I can ask questions and predict outcomes about the changes in energy that occur when objects collide. I can apply scientific ideas to design, test, and refine a device that converts energy from one form to another. I can develop model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. I can develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. I can generate and compare multiple solutions that use patterns to transfer information. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	**Outcomes:** Energy is everywhere, electricity and magnetism are related, energy transfers through waves, repeating patterns of motion, that result in sound and motion.
Topic 1: **Energy and Circuits**	**Length:** 5 days
Essential Questions: 1. What is needed to light a bulb? 2. What is needed to make a complete pathway for current to flow in a circuit? 3. How can you light two bulbs brightly with one D-cell? 4. Which design is better for manufacturing long strings of lights - series or parallel?	**Learning Targets:** Students will understand that an electric circuit is a system that includes a complete pathway through which electric current flows from an energy source to its components. Students will understand that conductors are materials through which electric current can flow: all metals are conductors. Students will understand the difference between a series circuit and a parallel circuit. Students will understand that the energy of two energy sources adds when they are wired in a series, delivering more energy than a single source. Two cells in parallel deliver the same energy as a single cell.
Standard(s): I can make observations to provide evidence that energy can be transferred from place to place by sound, light heat, and electric currents. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	**Academic Vocabulary:** component, energy source, circuit, electric current, terminal, contact points, filament, component, insulators, conductor, insulator, closed circuit, open circuit, switch, parallel circuit, series circuit.
Lesson Frame: Lighting a Bulb	I can make a complete circuit to light a bulb.

Lesson Frame: Conductors and Circuits	I can make a pathway for a current to flow. I can determine which materials can complete the pathway and which cannot.
Lesson Frame: Series and Parallel Circuits	I can light two bulbs with on D-cell.
Lesson Frame: Solving the String-of-Lights Problem	I can decide which type of circuit would be the best design for a string of lights.
Performance Task: Using wires, an energy source and a bulb, light the bulb. Use a switch and motor to make a circuit. Determine which materials can complete a pathway. Devise a series circuit to operate two bulbs. Wire two bulbs in parallel. Analyze a design to light a string of lights. Interactive notebook.	Notes: Student copies of Energy book Materials in FOSS kits Various videos mentioned in FOSS TE Online activities I Check Assessment
Topic 2: **The Force of Magnetism**	**Length:** 4 days
Essential Questions: 1. What materials stick to magnets? 2. What happens when two or more magnets interact? 3. What happens when a piece of iron comes close to or touches a permanent magnet?	**Learning Targets:** Students will understand that magnets stick to objects that contain iron. Students will learn that magnets are surrounded by an invisible magnetic field, when an object enters a magnetic field, the object becomes a temporary magnet. All magnets have two poles. Students will learn the magnetic force acting between magnets declines as the distance between them increases. Earth has a magnetic field.
Standard(s): I can make observations to provide evidence that energy can be transferred from place to place by sound, light heat, and electric currents. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved	**Academic Vocabulary:** attract, compass, force, gravity, induced magnetism, interact, iron, magnet, magnetic field, magnetic, North pole, opposite, permanent magnet, pole, repel, South pole, steel, temporary magnet.
Lesson Frame: Magnets and Materials	I can determine what materials stick to magnets.
Lesson Frame: Magnetic Fields	I can understand what happens when two or more magnets interact. I can understand what happens when a piece of iron comes close to or touches a permanent magnet.
Lesson Frame: Magnetic Force	I can understand what happens to the force of attraction between two magnets as the distance between them changes.

Performance Tasks: Students discover that iron-containing objects stick to magnets. Students generate a rule for magnetic interaction with materials. Observe two sides of a magnet are different, that magnetism acts through air, most metals and all nonmetals, bringing a magnet close to a piece of iron induces magnetism, there is an invisible field surrounding every magnet. Using a balance, measure the force of attraction between magnets. Interactive notebook.	Notes: Student copies of Energy book Materials in FOSS kits Various videos mentioned in FOSS TE Online activities I Check Assessment
Topic 3: **Electromagnets**	**Length:** 4 days
Essential Questions: How can you turn a steel rivet into a magnet that turns on and off? How does the number of winds of wire around a core affect the strength of the magnetism? How can you reinvent the telegraph using your knowledge of energy and electromagnetism?	**Learning Targets:** Students will understand that a magnetic field surrounds a wire through which electric current is flowing. Students will understand the magnetic field produced by a current carrying wire can induce magnetism in a piece of iron or steel. Students will understand an electromagnet is made by sending electric current through an insulated wire wrapped around an iron core. Students will understand the number of winds of wire affects the strength of the magnetism. Students will understand a telegraphic system is an electromagnet based technology used for long distance communication.
Standard(s): I can make observations to provide evidence that energy can be transferred from place to place by sound, light heat, and electric currents. I can apply scientific ideas to design, test, and refine a device that converts energy from one form to another. I can generate and compare multiple solutions that use patterns to transfer information. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved	**Academic Vocabulary:** code, coil, core, electromagnet, electromagnetism, key, rivet, telegraph
Lesson Frame: Building an Electromagnet	I can turn a steel rivet into a magnet that turns on and off.
Lesson Frame: Changing the Strength	I can determine the number of winds of wire around a core affect the strength of the magnetism.
Lesson Frame: Reinventing the Telegraph	I can reinvent the telegraph using knowledge of energy and electromagnetism.

Performance Tasks: Students discover a steel core becomes a magnet when current flows through an insulated wire around the steel core. Students experiment to find out how the number of winds of wire affects the strength of magnetism. Students apply their knowledge of circuitry and electromagnetism to build a telegraph, they invent a code and send messages to each other, they wire two telegraph units together using long wires.	Notes: Student copies of Energy book Materials in FOSS kits Various videos mentioned in FOSS TE Online activities I Check Assessment
Topic 4: **Energy Transfer**	**Length:** 4 days
Essential Questions: 1. What do we observe that provides evidence that energy is present? 2. How does the starting position affect the speed of a ball rolling down a ramp? 3. What happens when objects collide?	**Learning Targets:** Students will understand energy is evident whenever there is motion, electric current, sound, light, or heat. Energy can be transferred from place to place. Students will understand that objects in motion have energy. The faster an object moves, the more kinetic energy it has Students will understand when objects collide, energy transfers between objects, changing their motion Students will understand kinetic energy is energy of motion, potential energy is energy of position. Objects at higher positions have more potential energy than objects at lower positions.
Standard(s): I can use evidence to construct an explanation relating the speed of an object to the energy of that object. I can ask questions and predict outcomes about the changes in energy that occur when objects collide. I can generate and compare multiple solutions that use patterns to transfer information. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	**Academic Vocabulary:** collide, collision, friction, fuel, heat, Kinetic energy, potential energy, sound, stationary, transfer of energy
Lesson Frame: Presence of Energy	I can explore evidence of energy when sound, heat and light are produced and when objects are in motion.
Lesson Frame: Rolling Balls Down Slopes	I can investigate how variables affect the speed of a rolling ball.
Lesson Frame: Collisions	I can test variables of mass and starting position to find out how these variables affect energy transfer.

Performance Tasks: Observe and compare the behavior of balls on ramps Design and conduct controlled experiments to find out how collisions affect the transfer of energy	Notes: Student copies of Energy book Materials in FOSS kits Various videos mentioned in FOSS TE Online activities I Check Assessment
Topic 5: **Waves**	**Length:** 4 days
Essential Question: 1. How are waves involved in energy transfer? 2. How does light travel? 3. How can you make a motor run faster using solar cells?	**Learning Targets:** Students will understand that waves: are a repeating pattern of motion that transfer energy from place to place, there are sound waves, light waves, radio waves, microwaves, and ocean waves, waves have properties - amplitude, wavelength, and frequency. Students will understand that light travels in a straight line and can reflect off surfaces, an object is seen only when light from that object enters and is detected by an eye, and light can refract when it passes from one transparent material into another Students will understand two energy sources deliver more power than a single source
Standard(s): I can develop model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. I can develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. I can generate and compare multiple solutions that use patterns to transfer information. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved	**Academic Vocabulary:** amplitude, compression cycle, frequency, mirror, peak ray, reflect, reflection, refract, refraction, solar cell trough, wave, wavelength
Lesson Frame: Forms of Waves	I can understand the general properties of waves - amplitude, wavelength, and frequency.
Lesson Frame: Light Travels	I can understand how light travels.
Lesson Frame: Engineering with Solar Cells	I can understand and use alternative energy sources.
Performance Tasks: Experience waves through firsthand experiences using ropes, demonstrations with waves in water, spring toys, and a sound generator Use mirrors to experience reflecting light, students build a conceptual model about how light travels Design series and parallel solar cell circuits and observe the effect on the speed of a motor. Read about alternative energy sources	Notes: Student copies of Energy book Materials in FOSS kits Various videos mentioned in FOSS TE Online activities I Check Assessment

Unit Name: **Environments**	**Length:** 12 weeks
Standards: I can construct an argument that plants and animals have internal and external structure that function to support survival, growth, behavior, and reproduction. I can use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	**Outcomes:** Organisms have structures and behaviors that serve functions in growth, survival and reproduction and living organisms depend on one another and on their environment for their survival and the survival of populations
Topic 1: **Environmental Factors**	**Length:** 4 days
Essential Questions: 1. How do mealworm structures and behaviors help them grow and survive? 2. What moisture conditions do isopods prefer? 3. What light conditions do isopods prefer? 4. What are the characteristics of animals living in the leaf-litter environment?	**Learning Targets:** Students will describe how an environment is everything living and nonliving that surrounds and influences an organism. Students will describe the relationship between environmental factors and how well organisms grow. Students will describe animal structures and behaviors that function to support survival, growth, and reproduction. Students will demonstrate how by controlling some factors they affect other factors. Students will describe how organisms (specifically isopods) have a preferred set of environmental conditions.
Standard(s): I can construct an argument that plants and animals have internal and external structure that function to support survival, growth, behavior, and reproduction. I can use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	**Academic Vocabulary:** adult, antennae, behavior, condition, darkling beetle, environment, environmental factors, function, inference, isopod, larva, life cycle, living, mealworm, molting, nonliving, observation, organism, pillbug, preferred environment, pupa, pupate, sow bug, stage, structure
Lesson Frame: Observing Mealworms	I can use the structure and behavior of mealworms to provide a proper environment for them to survive
Lesson Frame: Designing an Isopod Environment	I can learn how isopods respond to environmental factors of water and light. I can create an isopod environment
Lesson Frame: Leaf-Litter Critters	I can become familiar with small animals living in natural ground litter

Performance Tasks: Observe mealworms, determine what is needed to provide a proper environment for them to survive. Keep the environments at room temperature have one environment at a colder temperature. Conduct two different investigations to find out how isopods respond to factors of water and light Collect, observe, and sort small animals living in natural ground litter. Use a Critter Replicator to become familiar with the anatomical parts of animals they find. Use a concept grid to organize the information they have gathered	Notes: Student copies of Environment book Materials in FOSS kits Various videos mentioned in FOSS TE Online activities I Check Assessment
Topic 2: **Ecosystems**	**Length:** 4 days
Essential Questions: 1. What are the environmental factors in an aquatic system? 2. What are the roles of organisms in a food chain? 3. How does food affect a population in its home range? 4. How do animals use their sense of hearing?	**Learning Targets:** Students will explain how aquatic environments include living and nonliving factors. Students will describe how organisms that live in water have structures to meet their needs. Students will explain that an ecosystem is the interaction of organisms with one another and the nonliving environment. Students will explain how organisms have structures that allow them to feed and compete for resources. Students will explain that producers make their own food, which is used by animals (consumers). Students will explain that decomposers eat and recycle the nutrients in the system. Students will explain that animals have different systems for obtaining oxygen. Students will describe how organisms interact in ecosystems. Students will explain that when environments change, plants and animals survive and reproduce, move to new locations, or die. Students will describe how animals communicate to warn others of danger, scare off predators, and locate others of their kind. Students will explain how organisms have sensory systems to gather information about their environment and act on it. Students will describe how animals detect sounds, interpret, and act on them.
Standard(s): I can construct an argument that plants and animals have internal and external structure that function to support survival, growth, behavior, and reproduction. I can use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	**Academic Vocabulary:** algae, aquarium, aquatic environment, carnivore, carrying capacity, competition, consumer, decomposer, ecosystem, elodea, energy, food chain, food web, freshwater environment, herbivore, home range, interaction, microorganism, omnivore, phytoplankton, population, predator, prey, producer, zooplankton
Lesson Frame: Designing an Aquarium	I can describe the environmental factors in an aquatic system
Lesson Frame: Food Chains and Food Webs	I can discuss the roles of organisms in a food chain

Lesson Frame: Population Simulation	I can describe how food affects a population
Lesson Frame: Sound Off	I can replicate how animals use their sense of hearing
Performance Tasks:	Notes: Student copies of Environment book Materials in FOSS kits Various videos mentioned in FOSS TE Online activities I Check Assessment
Topic 3: **Brine Shrimp Hatching**	**Length:** 4 days
Essential Questions: 1. How can we find out if salinity affects brine shrimp hatching? 2. How does salinity affect the hatching of brine shrimp eggs? 3. Does changing the salt environment allow the brine shrimp eggs to hatch? 4. What are some benefits of having variation within a population?	**Learning Targets:** Students will explain that brine shrimp are crustaceans that live in marine or salt-pond environments. Students will describe how environmental factors (living or nonliving) are one part of an environment. Students will describe the range of tolerance organisms have for environmental factors. Students will explain how there are optimum conditions for reproduction and growth within a range of tolerance. Students will describe how brine shrimp can hatch in a range of salt concentrations. Students will explain that when environments change, plants and animals survive and reproduce, move to new locations, or die. Students will describe how humans impact natural environments. Students will describe how individuals of the same kind differ in characteristics, and sometimes the differences give individuals an advantage in surviving and reproducing.
Standard(s): I can construct an argument that plants and animals have internal and external structure that function to support survival, growth, behavior, and reproduction. I can use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	**Academic Vocabulary:** brine, brine shrimp, concentration, controlled experiment, inherited trait, migrate, optimum, range of tolerance, reproduce, salinity, salt lake, survive, thrive, tolerance, variation, viable
Lesson Frame: Setting Up the Environment	I can identify if salinity affects brine shrimp hatching.
Lesson Frame: Determining Range of Tolerance	I can determine how salinity affects the hatching of brine shrimp eggs.
Lesson Frame: Determining Viability	I can determine how changing the salt environment allows the brine shrimp eggs to hatch.

Lesson Frame: Variation in a Population	I can understand some benefits of having variation within a population.
Performance Tasks:	Notes: Student copies of Environment book Materials in FOSS kits Various videos mentioned in FOSS TE Online activities I Check Assessment
Topic 4: **Range of Tolerance**	**Length:** 4 days
Essential Question: 1. How much water is needed for early growth of different kinds of plants? 2. What is the salt tolerance of several common farm crops? 3. How does mapping the plants in the schoolyard help us to investigate environmental factors? 4. What are some examples of plant adaptations?	**Learning Targets:** Students will describe the range of tolerance organisms have for factors in its environment. Students will describe the specific requirements for successful growth, development, and reproduction that organisms need. Students will describe the optimum conditions that are most favorable to an organism. Students will explain that adaptations are structures and behaviors of an organism that help it survive and reproduce. Students will explain the relationship that exists between environmental factors and how well organisms grow.
Standard(s): I can construct an argument that plants and animals have internal and external structure that function to support survival, growth, behavior, and reproduction. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	**Academic Vocabulary:** adaptation, dominant plant, drought, irrigate, plant distribution, salt-sensitive, salt-tolerant
Lesson Frame: Water or Salt Tolerance and Plants	I can determine how much water is needed for early growth of different kinds of plants. I can determine the salt tolerance of several common farm crops.
Lesson Frame: Plant Patterns	I can map plants in the schoolyard to investigate environmental factors.
Lesson Frame: Plant Adaptations	I can identify some examples of plant adaptations.
Performance Tasks:	Notes:Student copies of Environment book Materials in FOSS kits Various videos mentioned in FOSS TE Online activities I Check Assessment

Unit Name: **Soil, Rocks, and Landforms**	**Length:** 12 weeks
Standards: I can identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. I can make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. I can analyze and interpret data from maps to describe patterns of Earth's features. I can obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. I can generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	**Outcomes:** Students will have firsthand experiences with soils and rocks and modeling experiences using tools such as topographic maps and stream tables to study changes to rocks and landforms at Earth's surface.
Topic 1: **Soils and Weathering**	**Length:** 4 days
Essential Questions: 1. What is soil? 2. What causes big rocks to break down into smaller rocks? 3. How are rocks affected by acid rain? 4. What's in our schoolyard soil?	**Learning Targets:** Students will describe soil by their properties. Students will describe the amounts of earth materials and humus that soil is made of. Students will explain weathering as the breakdown of rocks and minerals at/near the Earth's surface. Students will explain the physical-weathering processes of abrasion and freezing as the breaking of rocks and minerals into smaller pieces. Students will explain that chemical weathering occurs when exposure to water and air changes rocks and minerals into something new.
Standard(s): I can make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	**Academic Vocabulary:** abrasion, acid rain, basalt, calcite, chemical reaction, chemical weathering, clay, conglomerate, earth material, expand, freeze, granite, gravel, humus, limestone, marble, model, pebble, physical weathering, rock, sand, sandstone, silt, soil, system, weathering
Lesson Frame: Soil Composition	I can describe soils by their properties.
Lesson Frame: Physical Weathering	I can understand physical weathering.
Lesson Frame: Chemical Weathering	I can understand chemical weathering.
Lesson Frame: Schoolyard Soils	I can describe schoolyard soils by its properties.

Performance Tasks: Students observe and compare four different soils, they will speculate where each of the four came from: mountain, desert, river delta, or forest. Students tumble rocks and freeze water to see how these two types of physical weathering can break rocks. Students conduct an investigation to test rocks with "acid rain." Students collect and observe different soils from several locations in the schoolyard.	Notes: Student copies of Soils, Rocks, and Landforms book Materials in FOSS kits Various videos mentioned in FOSS TE Online activities I Check Assessment
Topic 2: **Landforms**	**Length:** 4 days
Essential Questions: 1. How do weathered rock pieces move from one place to another? 2. How does slope affect erosion and deposition? 3. How do floods affect erosion and deposition? 4. Where are erosion and deposition happening in our schoolyard? 5. How do fossils get in rocks and what can they tell us about the past?	**Learning Targets:** Students will describe how weathered rocks can be reshaped by erosion and deposition. Students will explain that erosion is the transport of weathered rock material by moving water or wind. Students will explain that deposition is the settling of sediments when the speed of moving water or wind declines. Students will explain how the rate and volume of erosion relates to the energy of moving water or wind. Students will explain that the energy of moving water depends on the mass of water in motion and its velocity. Students will describe how fossils provide evidence of organisms that lived long ago and clues to changes in past environments.
Standard(s): I can identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. I can make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved	**Academic Vocabulary:** alluvial fan, basin, canyon, cast, delta, deposition, erosion, flood, floodplain, fossil, imprint, landform, meander, mold, mountain, petrification, preserved remains, river channel, river mouth, sediment, sedimentary rock, slope, superposition, valley
Lesson Frame: Erosion and Deposition	I can understand how water moves earth's materials from one location to another.
Lesson Frame: Stream-Table Investigations	I can understand how environmental variables can affect erosion and deposition.
Lesson Frame: Schoolyard Erosion and Deposition	I can decide if erosion and deposition are happening in our schoolyard.
Lesson Frame: Fossil Evidence	I can understand how the sedimentation process can result in fossils.
Performance Tasks: Use stream tables to observe that water moves earth materials from one location to another Use stream tables to learn how environmental variables can affect erosion and deposition Look for evidence of erosion in our schoolyard Watch a video, make models, and read to learn about how sedimentation can result in fossils.	Notes: Student copies of Soils, Rocks, and Landforms book Materials in FOSS kits Various videos mentioned in FOSS TE Online activities I Check Assessment

Topic 3: **Mapping Earth's Surface**	**Length:** 4 days
Essential Questions: 1. How can we represent the different elevations of landforms? 2. How can we draw the profile of a mountain from a topographic map? 3. How can scientists and engineers help reduce the impacts that events like volcanic eruptions might have on people? 4. What events can change Earth's surface quickly?	**Learning Targets:** Students will demonstrate how topographic maps use contour lines to show the shape and elevation of the land. Students will explain how a change in elevation between two adjacent contour lines is always uniform. Students will describe how contour lines affect slope. Students will describe a profile as a side view or cross-section of a landform. Students will draw a profile map from information given on a topographic map. Students will describe how the surface of the Earth is constantly changing. Students will describe how catastrophic events have the potential to change the Earth's surface. Students will explain how scientists and engineers can do things to reduce the impacts of natural Earth processes on humans.
Standard(s): I can make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. I can analyze and interpret data from maps to describe patterns of Earth's features. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved	**Academic Vocabulary:** contour interval, contour line, crust, earthquake, elevation, landslide, lava, magma, mantle, profile, satellite cone, sea level, topographic map, volcano
Lesson Frame: Making a Topographic Map	I can understand and create a topographic map.
Lesson Frame: Drawing a Profile	I can create a two-dimensional profile.
Lesson Frame: Mount St. Helens Case Study	I can compare two topographic maps.
Lesson Frame: Rapid Changes	I can understand processes that cause rapid changes to Earth's surface.
Performance Tasks: Build a model mountain of MT. Shasta, trace outlines creating a topographic map Use topographic maps to produce two-dimensional profiles Compare two topographic maps. Draw profiles of Mount St. Helens before and after eruption Think about processes that cause rapid changes to Earth's surfaces	Notes: Student copies of Soils, Rocks, and Landforms book Materials in FOSS kits Various videos mentioned in FOSS TE Online activities I Check Assessment
Topic 4: **Natural Resources**	**Length:** 4 days

Essential Questions: 1. What are natural resources and what is important to know about them? 2. How are natural resources used to make concrete? 3. How do people use natural resources to make or build things?	**Learning Targets:** Students will explain how natural resources are taken from the environment and used by humans. Students will explain natural resources as renewable or nonrenewable and describe which resources are which. Students will explain alternative sources of energy (solar, wind, and geothermal energy). Students will describe the earth materials that make concrete. Students will explain how natural resources are important for shelter and transportation. Students will explain how scientists and engineers work to improve how people use natural resources.
Standard(s): I can obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. I can generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. I can define a simple design problem reflecting a need or a want that includes specific criteria for success and constraints on materials, time, or cost. I can generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. I can plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	**Academic Vocabulary:** aggregate, cement, concrete, fossil fuel, geothermal power, natural resource, nonrenewable resource, renewable resource, solar energy, wind power
Lesson Frame: Introduction to Natural Resources	I can review what I have learned in the module about soils, rocks, and landforms.
Lesson Frame: Making Concrete	I can make a concrete stepping stone.
Lesson Frame: Earth Materials in Use	I can identify what natural resources were used to construct objects.
Performance Tasks: Write a story or draw a concept map to bring ideas together about what they have learned in this module, focusing on renewable and nonrenewable resources Use local natural resources to make a stepping stone Walk around the school searching for materials in use	Notes: Student copies of Soils, Rocks, and Landforms book Materials in FOSS kits Various videos mentioned in FOSS TE Online activities I Check Assessment

Course Name:	5th Grade Science		
Credits:	n/a		
Prerequisites:	n/a		
Description:	General Education 5th Grade Science Curriculum		
Academic Standards:	Next Generation Science Standards		
Units:	**Unit Length:**	**Unit Standards:**	**Unit Outcomes:**
Earth and Sun	43 Sessions	5-ESS1-2 5 -PS2-1 5-ESS1-2 5-PS1-1 5-ESS2-1 5-ESS2-2	Shadows change because of the Sun's position and how it changes in the sky. Day is when half of the Earth's surface is illuminated by sunlight and night is when half of the Earth's surface is in its own shadow. The solar system includes the Sun and other objects that orbit it, including Earth, the Moon, other planets, satellites, and smaller objects. Gravity is the force that keeps the planets and other objects in orbit. Air is a mixture of gases held by gravity near Earth's surface. Earth's atmosphere has different layers and most of the air is found in the troposphere. Evaporation and condensation contribute to the movement of water through the water cycle, redistributing water over Earth's surface. The Sun's energy drives the weather.
Living Systems	14 Sessions	5-ESS2-1 5-LS2-1	A system is a collection of interacting parts that together constitute a whole or perform a function. Systems are often composed of subsystems. Earth can be described as the interaction of four earth systems: the rocky part (the geosphere), the atmosphere, the water (the hydrosphere), and the complexity of living organisms (the biosphere). Food webs are subsystems within ecosystems. They describe the transfer of matter and energy within the system. Food webs are made up of producers (organisms that make their own food), consumers (organisms that eat other organisms to obtain food), and decomposers (organisms that consume and recycle dead organisms and organic waste).
Mixtures and Solutions	27 Sessions	5-PS1-1 5-PS1-2 5-ETS1-1 5-ETS1-2 5-ETS1-3 5-PS1-1 5-PS1-2 5-PS1-3 5-ETS1-1 5-ETS1-2 5-PS1-4	A mixture is two or more materials together. Mixtures can be separated into the materials used to make the mixture. The mass of a mixture is equal to the mass of its parts. A solution is a mixture in which a substance dissolves in water to make a transparent liquid. Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria).

Unit Name: **Earth and Sun**	**Length:** 43 sessions
Standard(s): 5-ESS1-2 Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. 5 -PS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. 5-ESS1-2 Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. 5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen. 5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. 5-ESS2-2 Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	**Outcomes:** Shadows change because of the Sun's position and how it changes in the sky. Day is when half of the Earth's surface is illuminated by sunlight and night is when half of the Earth's surface is in its own shadow. The solar system includes the Sun and other objects that orbit it, including Earth, the Moon, other planets, satellites, and smaller objects. Gravity is the force that keeps the planets and other objects in orbit. Air is a mixture of gases held by gravity near Earth's surface. Earth's atmosphere has different layers and most of the air is found in the troposphere. Evaporation and condensation contribute to the movement of water through the water cycle, redistributing water over Earth's surface. The Sun's energy drives the weather.
Topic 1: **The Sun**	**Length:** 11 sessions
Standard(s): 5-ESS1-2 Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	**Academic Vocabulary:** Axis, Compass, Day, Night, North Pole, North Star, Orbit, Orientation, Revolution, Rotation Shadow, Sun, Sunrise, Sunset
Essential Questions: How and why does your shadow change during the day? What can be learned by studying the length and direction of shadows? What causes day and night?	**Learning Targets:** The student will understand that shadows are the dark areas that result when light is blocked. The student will learn that shadows change during the day because the position of the Sun changes in the sky. The student will discover that the length and direction of a shadow depends on the Sun's position in the sky. The student will know that day is the half of Earth's surface being illuminated by sunlight, night is the half of Earth's surface in its own shadow.
Lesson Frame: Shadow Shifting	I can understand how and why my shadow changes during the day.
Lesson Frame: Sun Tracking	I can learn that shadows change because of the position of the Sun and how it changes in the sky.
Lesson Frame: Day and Night	I can discover what causes day and night.

Performance Tasks: Survey Benchmark Assessment Notebook entries Analyze and discuss text Investigation 1 I-Check Assessment	**Notes:** Science Resources Book: "Changing Shadows", "Sunrise and Sunset" Online Activities: "Shadow Tracker", "Tutorial: Sun Tacking", "Seasons" Videos from Earth and Sun T.E. Student copies of Earth and Sun text FOSS kit materials I Check Assessment Student Science Notebooks
Topic 2: Planetary Systems	**Length:** 21 sessions
Standard(s): 5 -PS2-1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. 5-ESS1-2 Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	**Academic Vocabulary:** asteroid, asteroid belt, comet, constellation, crescent Moon, dwarf planet, first-quarter Moon, force, full Moon, gas giant planet, gibbous Moon, gravity, Kuiper belt, lunar cycle, Moon, night sky, new Moon, phase, planet,solar system, star, terrestrial planet, third-quarter Moon, waning Moon, waxing Moon
Essential Questions: How can you explain why we see some natural objects only in the night sky, some only in the day sky, and some at both times? How would you describe the size of and distance between Earth, the Moon, and the Sun? How does the shape of the Moon change over 4 weeks? How do the parts of the solar system interact? Why do stars appear to move across the night sky?	**Learning Targets:** The student will learn that the solar system includes the Sun and the objects that orbit it, including Earth, the Moon, seven other planets, their satellites, and smaller objects. The student will understand that the Moon is much smaller than the Earth and orbits at a distance equal to about 30 Earth diameters. The student will learn that the Sun is 12,000 Earth diameters away from Earth and is more than 100 times larger than Earth. The student will understand that the pulling force of gravity keeps the planets and other objects in orbit by continuously changing their direction of travel. The student will know that a great deal of light travels through space to Earth from the Sun and from distant stars. The student will learn that stars are at different distances from Earth. The student will learn that stars are different sizes and have different brightnesses.
Lesson Frame: Night-Sky Observations	I can explain why I see some natural objects only in the night sky, some only in the day sky, and some at both times.
Lesson Frame: How Big and How Far?	I can describe the size and distance between Earth, the Moon, and the Sun.
Lesson Frame: Phases of the Moon (optional)	I can describe the phases of the Moon and why the shape of the moon changes every 4 weeks.
Lesson Frame: The Solar System	I can analyze and interpret data about the interaction of the parts of the solar system.
Lesson Frame: Stars	I can learn that stars are at different distances from Earth. I can determine that stars are different sizes and have different brightnesses.

Performance Tasks: Performance Assessment Notebook entries Analyze and discuss text Investigation 2 I-Check Assessment	Notes: Science Resources Book: The Night Sky, Looking through Telescopes, Comparing the Size of the Earth and the Moon, Apollo 11 Space Mission, How Did Earth's Moon Form?, Exploring the Solar System, Planets of the Solar System, Why Doesn't Earth Fly Off into Space?, Stargazing, Star Scientists, Our Galaxy Online Activities: Lunar Calendar, Star Maps, Stellar Motions Videos from Earth and Sun T.E. Student copies of Earth and Sun text FOSS kit materials I Check Assessment
Topic 3: **Earth's Atmosphere**	**Length:** 4 sessions
Standard(s): 5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen. 5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. 5-ESS2-2 Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	**Academic Vocabulary:** air, air pressure, atmosphere, barometer, compress, hygrometer, mass, matter, troposphere, weather
Essential Questions: What is air? What is Earth's atmosphere?	**Learning Targets:** The student will understand that air is a mixture of gases held by gravity near Earth's surface. The student will understand that air has mass, takes up space, and is compressible. The student will determine that most of Earth's air resides in the troposphere, the layer of the atmosphere closest to Earth's surface. The student will understand that weather happens in the troposphere.
Lesson Frame: The Air Around Us	I can define air as a mixture of gases held by gravity near Earth's surface. I can explain that air has mass, takes up space, and is compressible.
Lesson Frame: The Atmosphere	I can recognize that Earth's atmosphere has different layers and most of the air is found in the troposphere.

Performance Tasks: Performance Assessment Notebook entries Analyze and discuss text Investigation 3 I-Check Assessment	**Notes:** Science Resources Book: What is Air, Earth's Atmosphere Online Activities: Tutorial: Air and Atmosphere Videos from Earth and Sun T.E. Student copies of Earth and Sun text FOSS kit materials I Check Assessment Student Science Notebooks
Topic 4: **Water Planet**	**Length:** 7 sessions
Standard(s): 5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen. 5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. 5-ESS2-2 Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	**Academic Vocabulary:** climate, climatologist, condensation, condense, dew, drought, evaporate, evaporation, fog, fresh water, glacier, groundwater, hurricane, ice cap, lake, ocean, recycle, river, saltwater, severe weather, thunderstorm, tornado, water cycle, water vapor
Essential Questions: What causes condensation to form? How does water vapor get into the air? What is the water cycle?	**Learning Targets:** The student will define condensation as the process by which gas (water vapor) changes into liquid (water). The student will identify evaporation as the process by which liquid changes into gas. The student will recall that as temperature increases, the rate of evaporation increases. The student will recognize that most of Earth's water (97%) is salt water in the ocean and that Earth's freshwater is found in many locations including the atmosphere, lakes and rivers, soil, ground ice, groundwater, and glaciers. The student will determine that evaporation and condensation contribute to the movement of water through the water cycle, redistributing water over Earth's surface. The student will recognize that the Sun's energy drives weather.
Lesson Frame: Water Cycle	I can draw and label a model of the water cycle.
Lesson Frame: Condensation	I can explain what causes condensation to form.
Lesson Frame: Evaporation	I can determine how water vapor gets into the air.

Performance Tasks:	**Notes:**
Performance Assessment Notebook entries Analyze and discuss text Posttest	Science Resources Book: Condensation, Where is Earth's Water?, The Water Cycle Online Activities: Water Cycle Game Videos: Water Cycle Student copies of Earth and Sun text FOSS kit materials I Check Assessment Student Science Notebooks

Unit Name: **Living Systems**	**Length:** 14 sessions
Standards: 5-ESS2-1 Model of 4 Earth's spheres interactions 5-LS2-1 Model of matter in an environment	**Outcomes:** A system is a collection of interacting parts that together constitute a whole or perform a function. Systems are often composed of subsystems. Earth can be described as the interaction of four earth systems: the rocky part (the geosphere), the atmosphere, the water (the hydrosphere), and the complexity of living organisms (the biosphere). Food webs are subsystems within ecosystems. They describe the transfer of matter and energy within the system. Food webs are made up of producers (organisms that make their own food), consumers (organisms that eat other organisms to obtain food), and decomposers (organisms that consume and recycle dead organisms and organic waste).
Topic 1: **Systems**	**Length:** 14 sessions
Standard(s): 5-ESS2-1 Model of 4 Earth's spheres interactions 5-LS2-1 Model of matter in an environment	**Academic Vocabulary:** aquatic ecosystem, algae, atmosphere, bacteria, biosphere, carnivore, compost, consumer, decomposer, ecosystem, energy, food chain, food web, freshwater ecosystem, geosphere (lithosphere), herbivore, hydrosphere, interact, kelp forest, living, marine ecosystem, microorganism, nonliving, omnivore, phytoplankton, predator, prey, producer, recycle, redworm, subsystem, system, terrestrial ecosystem, zooplankton
Essential Questions: How can you identify a system? Is planet Earth a system? What organisms are both predators and prey in the kelp forest ecosystems? What happens when compost worms interact with organic litter?	**Learning Targets:** A system is a collection of interacting objects, ideas, and/or procedures that together define a physical entity or process. A subsystem is a small system that is inside a larger system. Earth can be described as the interaction of four earth systems: the rocky part (the geosphere), the atmosphere, the water (the hydrosphere), and the complexity of living organisms (the biosphere). Food webs are subsystems within ecosystems. They describe the transfer of matter and energy within the system. A kelp forest has similarities to a rainforest (vertical layering). Phytoplankton are the major producers in most aquatic systems. Food webs and competition for resources exist in marine systems. Food webs are made up of producers (organisms that make their own food), consumers (organisms that eat other organisms to obtain food), and decomposers (organisms that consume and recycle dead organisms and organic waste).
Lesson Frame: Everyday Systems	I can tell a subsystem within a larger system.
Lesson Frame: The Earth System	I can develop and create a model to describe the interaction between geosphere, atmosphere, hydrosphere, and biosphere proving Earth is a system. I can explain the difference between a food chain and a food web. I can categorize producers, consumers, and decomposers.
Lesson Frame: Kelp Forest Food Web	I can understand competition for resources. I can develop and create a model to describe the movement of matter among plants, animals, decomposers, and the environment.
Lesson Frame: Recycling	I can describe a decomposers role as a recycler in the ecosystem. I can assemble a worm habitat to show decomposition in nature.

Performance Tasks: Survey Benchmark Assessment Notebook entries Analyze and discuss text Create Worm Habitats Investigation 1 I-Check Assessment	Notes: Science Resources Student book, read "Introduction to Systems", "Is Earth a System?", "The Biosphere", "Monterey Bay National Marine Sanctuary", "Comparing Aquatic and Terrestrial Ecosystems", "Nature's Recycling System" FOSS videos: "Physical Systems", "Web of Life: Life in the Sea" Food web cards, from FOSS kit Performance Assessment Checklist (for worm activity) Online activities: "Food Webs" simulation and can create additional food webs in different ecosystems FOSS kit materials

Unit Name: **Mixtures and Solutions**	**Length:** 27 sessions
Standards: 5-PS1-1 5-PS1-2 5-ETS1-1 5-ETS1-2 5-ETS1-3 5-PS1-1 5-PS1-2 5-PS1-3 5-ETS1-1 5-ETS1-2 5-PS1-4	**Outcomes:** A mixture is two or more materials together. Mixtures can be separated into the materials used to make the mixture. The mass of a mixture is equal to the mass of its parts. A solution is a mixture in which a substance dissolves in water to make a transparent liquid. Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria).
Topic 1: **Separating Mixtures**	**Length:** 12 sessions
Essential Questions: How can a mixture be separated? Where does the solid material go when a solution is made? How can you separate a mixture of dry materials? Are there materials outdoors that will dissolve in water?	**Learning Targets:** A mixture is two or more materials intermingled. An aqueous solution is a mixture in which a substance disappears (dissolves) in water to make a clear liquid. Mixtures can be separated into their constituents. The mass of a mixture is equal to the mass of its constituents. Mixtures can be separated into their constituents. Mixtures and solutions can be separated, using screens, filters, and evaporation. Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). A mixture is two or more materials intermingled. An aqueous solution is a mixture in which a substance disappears (dissolves) in water to make a clear liquid.
Standard(s): 5-PS1-1 5-PS1-2 5-ETS1-1 5-ETS1-2 5-ETS1-3	**Academic Vocabulary:** constraint, criteria, crystal, diatomaceous earth, dissolve, engineer, evaporation, extract, filter, gravel, magnet, mass, mixture, powder, property, salt, screen, separate, solute, solution, solvent, transparent
Lesson Frame: Making and Separating Mixtures	I can define the word mixture. I can formulate a mixture of different materials. I can utilize appropriate tools to separate a mixture. I can restate that a solution can't be separated the same as a solids mixture.
Lesson Frame: Separating a Salt Solution	I can recognize that mixtures can be broken down into constituent parts. I can infer and then design an investigation to see where salt has gone, while mass remains the same.

Lesson Frame: Separating a Dry Mixture	I can design a solution to a problem and test my design.
Lesson Frame: Outdoor Solutions	I can test natural items to see if they create solutions. I can experiment with separation methods on created solutions.
Performance Tasks: Survey Benchmark Assessment Student notebook entries Predicting and designing an investigation Investigation 1 I-Check Assessment	Notes: copy: *Mixtures, Separations* workbook entries online activities: *Tutorial: Mixtures, Tutorial: Solutions, Separating Mixtures, Virtual Investigation: Separating Mixtures* Resources book: "Mixtures", "Taking Mixtures Apart", "Science Practices", "Engineering Practices", "Extracts", "The Story of Salt" (optional) FOSS video: *Elements, Compounds, and Mixtures,* Materials from the FOSS kits in science lab Response Sheet- Investigation 1 (assess in Part 2) Performance Assessment Checklist (assess in Part 3) Review Outdoor Safety
Topic 2: **Reaching Saturation**	**Length:** 13 sessions
Essential Questions: Is there a limit to the amount of salt that will dissolve in 50 mL of water? Does it always take the same amount of solid materials to saturate 50 mL of water? What is the identity of the mystery substance? What is in our water sample? What is a design to remove salt from ocean water?	**Learning Targets:** A solution is saturated when as much solid material as possible has dissolved in the liquid. Solutions are composed of a solvent (liquid) and a solute (solid); the solute is dissolved in the solvent. A solution is saturated when as much solid material as possible has dissolved in the liquid. Solubility is the property that indicates how readily a solute dissolves in a solvent. Solubility varies from substance to substance and is affected by kind of solvent, temperature, and other factors. Solubility is the property that indicates how readily a solute dissolves in a solvent. A substance is a single, pure material. Substances form predictable, identifiable crystals when solutions evaporate. Apply techniques used to separate mixtures and solutions.
Standard(s): 5-PS1-1 5-PS1-2 5-PS1-3 5-ETS1-1 5-ETS1-2	**Academic Vocabulary:** citric acid, Epsom salts, insoluble, saturated solution, soluble, solubility, substance, supersaturated
Lesson Frame: Salt Saturation	I can report that a solution is saturated when as much solid material as possible has dissolved in the liquid.
Lesson Frame: Epsom Salt Saturation	I can restate that solubility is the property that indicates how readily a solute dissolves in a solvent. I can recall that solubility varies from substance to substance and is affected by kind of solvent, temperature, and other factors.
Lesson Frame: The Saturation Puzzle	I can cite examples of substances that are pure materials. I can formulate and carry out a plan to identify an unknown substance. I can illustrate that substances form predictable, identifiable crystals when solutions evaporate.

Lesson Frame: What's in Your Water?	I can utilize tools and techniques to test local water quality. I can clearly communicate my design ideas.
Performance Tasks: Student notebook entries Participate in salt-and-bottle activity Engage in argumentation/provide evidence to support their claim. Devise a solution to remove dissolved salt water. Investigation 4 I-Check Assessment	Notes: **Student Resource Book:** "The Bends", "A Sweet Solution", "Sour Power", "East Bay Academy for Young Scientists", "Drinking Ocean Water", "Creative Solutions", **videos:** *The Water Cycle* **Online Activities:** "Tutorial: Saturation", "Virtual Investigation: Solubility" Response Sheet-Investigation 4 (notebook sheet 15) for assessing part 2 Performance Assessment Checklist- for part 3
Topic 3: **Fizz Quiz**	**Length:** 2 sessions
Essential Questions: What is the effect of mixing two substances with water?	**Learning Targets:** Some mixtures of substances result in a chemical reaction. During reactions, starting substances (reactants) change into new substances (products). Formation of a gas or precipitate is evidence of a chemical reaction.
Standard(s): 5-PS1-4	**Academic Vocabulary:** Investigation 5: Fizz Quiz baking soda, calcium chloride, gas, carbon dioxide, precipitate, chemical reaction, products, reactants
Lesson Frame: Chemical Reactions	I can demonstrate that some mixtures of substances result in a chemical reactions. I can repeat that during a reaction, starting substances (reactants) change into new substances (products). I can report that formation of a gas or precipitate is evidence of a chemical reaction.
Performance Tasks: Student notebook entries Carry out an investigation Analyze and Interpret data	Notes: **online activities:** "Fizz Quiz" **Resources book:** "Ask a Chemist" Materials from the FOSS kits in science lab

Course Name:	6th Grade Science
Credits:	N/A
Prerequisites:	N/A
Description:	Students will explore weather through focusing on the causes and effects of wind and water on the environment and the impact of global warming upon the Earth. Students will explore organisms focusing on both internal and external structures that produce and affect life. Students will explore robotics focusing on the force and energy necessary for operation, the design and coding aspects, and the advancements and contributions to society.
Academic Standards:	Next Generation Science Standards

Units:	**Unit Length:**	**Unit Standards:**	**Unit Outcomes:**
Weather and Water	48 sessions	MS.ESS1.1 MS.ESS2.4 MS.ESS2.5 MS.ESS2.6 MS.ESS3.2 MS.ESS3.4 MS.ESS3.5	Weather is the product of predictable patterns and circumstances. Climate is the average weather collected over time.Climate changes over time due to natural Earth cycles and human-induced changes.
Diversity of Life	60 sessions	MS.LS1.1 MS.LS1.2 MS.LS1.3 MS.LS1.4 MS.LS1.5 MS.LS1.6 MS.LS1.7 MS.LS3.2	All living things are made of cells. All organisms exhibit common characteristics and have certain requirements. Plants reproduce in a variety of ways. Genes are responsible for an organism's traits. Asexual reproduction results in offspring with identical genetic information. Sexual reproduction results in offspring with genetic variation, similar to parents but not identical. Organisms have structures and behaviors that enhance their chances of surviving and reproducing in their environment. Biodiversity is the wide range of existing life-forms that have adapted to the variety of conditions on Earth.
Robotics	24 sessions	MS.PS2.2 MS. PS2.3 MS.PS2. 5 MS.PS3.2 MS. PS3.5 MS. ESS3.4 MS. ETS1.1 MS. ETS1.2 MS. ETS1.3 MS. ETS1.4	Force is a push or pull. Friction is a force that acts to oppose a force acting to put a mass in motion. Magnets have two poles; like poles repel and opposite poles attract. Magnets are surrounded by an invisible magnetic force field that acts through space and through all nonmagnetic materials. Energy cannot be created or destroyed, only transferred. Energy sources are either renewable or nonrenewable. Coding is used to allow robots to act without manual control. Technological advancements contribute to our society. Technological advancements are increasing at an alarming rate. Force and friction are both factors that affect robot coding.

Unit Name: **Weather and Water**	**Length:** 48 sessions
Standards: MS.ESS1.1 MS.ESS2.4 MS.ESS2.5 MS.ESS2.6 MS.ESS3.2 MS.ESS3.4 MS.ESS3.5	**Outcomes:** Weather is the product of predictable patterns and circumstances. Climate is the average weather collected over time.Climate changes over time due to natural Earth cycles and human-induced changes.
Topic 1: **What is Weather?**	**Length:** 4 sessions
Standard(s): MS.ESS2.4 MS.ESS2.5 MS.ESS3.2	**Academic Vocabulary:** air pressure, climate, forecast, humidity, meteorologist, meteorology, precipitation, prediction, severe weather, temperature, weather, wind
Essential Questions: What is weather? How can we measure the weather?	**Learning Targets:** Students will learn that weather is the condition of Earth's atmosphere at a given time in a given place. Students will understand that severe weather has the potential to cause death and destruction in the environment. Students will identify meteorology as the science of weather, and meteorologists are the people who study Earth's weather. Students will comprehend that weather and climate are different.
Lesson Frame: Into the Weather	I can explain the difference between weather and climate.
Lesson Frame: Local Weather	I can identify the different ways to measure the weather of any location.
Performance Tasks: Science notebook entries Observations	Notes:
Topic 2: **Where's the Air?**	**Length:** 4 sessions
Standard(s): MS.ESS2.5	**Academic Vocabulary:** air, atmosphere, compress, exosphere, expand, mass, matter, mesosphere, particle, permanent, gas, pressure, state, stratosphere, thermosphere, troposphere, variable gas, weight

Essential Questions: What is air? What is the atmosphere?	**Learning Targets:** Students understand the air is matter; it occupies space, has mass, and can be compressed. Students will learn that the atmosphere is the layers of gases surrounding Earth. Students will identify that weather happens in the troposphere, the layer of the atmosphere closest to Earth's surface. Students will recognize that the troposphere is a mixture of nitrogen, oxygen, and other gases, including argon, carbon dioxide, and water vapor.
Lesson Frame: The Air around Us	I can prove that air is matter and it occupies space, has mass, and can be compressed.
Lesson Frame: Earth's Atmosphere	I can identify the various layers of the atmosphere and their compositions.
Performance Tasks: Science notebook entries Observations Investigation 1-2 I-Check	Notes:
Topic 3: **Air Pressure and Wind**	**Length:** 3 sessions
Standard(s): MS.ESS2.5	**Academic Vocabulary:** atmospheric pressure, bar, barometer, density, equilibrium, isobar, kinetic energy, millibar (mb)
Essential Questions: How does pressure affect air? What happens when two areas of air have different pressures?	**Learning Targets:** Students will comprehend that pressure exerted on a gas reduces its volume and increases its density. Students will understand that wind is a large-scale movement of air. Students will learn that air tends to move from regions of high pressure to regions of low pressure. Students will identify that air pressure is represented on a map by contour lines called isobars.
Lesson Frame: Air-Pressure Inquiry	I can demonstrate how pressure affects air.
Lesson Frame: Pressure Maps	I can identify the isobars on a pressure map. I can explain how pressure creates wind.
Performance Tasks: Science notebook entries Observations Investigation 3 I-Check	Notes:
Topic 4: **Convection**	**Length:** 6 sessions
Standard(s): MS.ESS2.6	**Academic Vocabulary:** convection, convection cell, energy transfer, fluid, model

Essential Questions: What is the relationship between layering of fluids and density? How does heat affect density of fluids? How do gases flow in the atmosphere	**Learning Targets:** Students will understand that density is the ratio of a mass to its volume. Students will recognize that if two solutions have equal volumes but differ in mass, the one with the greater mass is more dense. Students will learn that as matter heats up, it expands, causing the matter to become less dense. Students will identify that convection is the circulation of fluid that results from energy transfer; relatively warm masses rise and relatively cool masses sink.
Lesson Frame: Density of Fluids	I can compare the density of various matters and/or solutions to identify what will float or sink.
Lesson Frame: Convection of Water	I can explain how the variation of temperature within a fluid causes convection within that fluid.
Lesson Frame: Convection of Air	I can explain how the variation of temperature within a gas causes convection within that gas.
Performance Tasks: Science notebook entries Observations Investigation 4 I-Check	Notes:
Topic 5: **Heat Transfer**	**Length:** 6 sessions
Standard(s): MS.ESS1.1 MS.ESS2.6	**Academic Vocabulary:** absorb, climatologist, climatology, differential heating, evidence, heat, latitude, radiant energy, radiation, ray, solar angle, wave
Essential Questions: How does weather differ between locations? How does the Sun affect the temperature of locations on Earth? What factors affect the surface temperature on Earth?	**Learning Targets:** Students will determine that latitude is a factor that affects local weather and climate. Students will recognize that the angle at which light from the Sun strikes the surface of Earth is the solar angle. Students will understand that the lower the solar angle is, the less intense the light is on Earth's surface. Students will recognize that the sun is the major source of energy that heats the atmosphere, and solar energy is transferred by radiation. Students will determine that heat is the increase of kinetic energy of particles.
Lesson Frame: Latitude	I can explain how latitude affects weather and climate.
Lesson Frame: Solar Angle	I can demonstrate how solar angle affects affects weather and climate.
Lesson Frame: Heating Earth	I can explain how radiation heats the earth. I can demonstrate how heat is the result of kinetic energy of particles.
Performance Tasks: Science notebook entries Observations Investigation 5 I-Check	Notes:
Topic 6: Air Flow	**Length:** 4 sessions

Standard(s): MS.ESS2.5 MS.ESS2.6	**Academic Vocabulary:** air mass, conduction, Coriolis effect, jet stream, land breeze, prevailing winds, sea breeze
Essential Questions: How does the atmosphere heat up? How does energy from the Sun affect wind on Earth? What affects the direction of global winds?	**Learning Targets:** Students will determine that energy can move from one material to another by conduction. Students will learn that differential heating of Earth's surface by the Sun can create high- and low-pressure areas. Students will recognize that local winds blow in predictable patterns determined by local differential heating. Students will understand that convection cells and Earth's rotation determining prevailing winds on Earth.
Lesson Frame: Conduction	I can explain how energy transfers from one material to another through conduction.
Lesson Frame: Local Winds	I can explain how differential heating causes predictable wind patterns.
Lesson Frame: Global Winds	I can identify the predictable wind patterns caused by the rotation of the earth and convection cells.
Performance Tasks: Science notebook entries Observations Investigation 6 I-Check	Notes:
Topic 7: **Water in the Air**	**Length:** 7 sessions
Standard(s): MS.ESS2.4	**Academic Vocabulary:** condensation, condensation nucleus, dew point, evaporation, precipitation, saturated, transpiration
Essential Questions: Is there water vapor in the air? How does energy transfer when water changes phases? What causes clouds to form?	**Learning Targets:** Students will determine that water changes from gas to liquid by condensation. Students will verify that water changes from liquid to gas (vapor) by evaporation. Students will recognize that temperature change, which is evidence of energy transfer, accompanies evaporation. Students will learn that the dew point is the temperature at which air is saturated with water vapor and vapor condenses into liquid. Students will recognize that increasing the pressure of a given volume of air increases the temperature of air.
Lesson Frame: Is Water Really There?	I can demonstrate how condensation occurs.
Lesson Frame: Phase Change and Energy Transfer	I can explain how temperature affects the physical state of gases and liquids.
Lesson Frame: Clouds and Precipitation	I can describe how clouds are formed and the point at which precipitation will occur.

Performance Tasks: Science notebook entries Observations Investigation 7 I-Check	Notes:
Topic 8: **Meteorology**	**Length:** 5 sessions
Standard(s): MS.ESS2.5 MS.ESS2.6 MS.ESS3.2	**Academic Vocabulary:** cold front, radiosonde, warm front
Essential Questions: Why are data from weather balloons important? What information can you get from a weather map?	**Learning Targets:** Students will learn that weather balloons travel high in the atmosphere and collect physical data using a radiosonde. Students will understand that the data from weather-balloon radiosonde can be used to determine dew point and the likelihood of clouds forming. Students will recognize that weather maps combine many kinds of atmospheric and surface data, including pressure, temperature, wind direction, wind speed, and precipitation. Students will identify that fronts are areas where large air masses collide.
Lesson Frame: Weather Balloons	I can describe what information is collected by weather balloons and its purpose.
Lesson Frame: Weather Maps	I can use weather maps to make predictions about the weather.
Performance Tasks: Science notebook entries Observations	Notes:
Topic 9: **The Water Planet**	**Length:** 5 sessions
Standard(s): MS.ESS2.4 MS.ESS2.6 MS.ESS3.4	**Academic Vocabulary:** El Niño, groundwater, gyre, ocean current, salinity, water cycle
Essential Questions: What is the water cycle? What affects the direction that ocean water flows? How does the ocean affect climate on land?	**Learning Targets:** Students will learn that most of Earth's water is saltwater in the ocean, and Earth's freshwater is found in many locations. Students will demonstrate that a water particle might follow many different paths as it travels in the water cycle. Students will understand that ocean currents are caused primarily by winds, convection of ocean water, and the Coriolis effect. Students will recognize that a location's proximity to a large body of water generally results in less temperature variation and more precipitation.

Lesson Frame: Water-Cycle Simulation	I can create a diagram of the water cycle. I can explain how the water cycle is a complex system.
Lesson Frame: Ocean Currents	I can use my knowledge of air currents and land masses to determine ocean currents.
Lesson Frame: Ocean Climates	I can describe how the ocean affects climate on land.
Performance Tasks: Science notebook entries Observations Investigation 8-9 I-Check	Notes:
Topic 10: **Climate over Time**	**Length:** 4 sessions
Standard(s): MS.ESS3.2 MS.ESS3.5	**Academic Vocabulary:** carbon dioxide, carbon sequestration, climate change, emission, global warming, greenhouse effect, greenhouse gas, ice core, infrared, paleoclimatology, pollutant
Essential Questions: How have climates changed over time? How do greenhouse gases in the atmosphere affect Earth's temperature? What are the effects of a slight rise in global temperatures? What is the difference between weather and climate?	**Learning Targets:** Students will understand that weather is the condition of the atmosphere at a specific time and location; climate is the average weather in a region over a long period of time. Students will identify that climate can change over time because of natural Earth cycles or human-induced changes. Students will recognize that when greenhouse-gas concentrations in the atmosphere increase, the global temperature rises. Students will verify that human activity can affect Earth's weather and climate.
Lesson Frame: Climate Change	I can explain how climate has changed over time.
Lesson Frame: The Role of Carbon Dioxide	I can identify the relationship between greenhouse gases and the increase of global temperatures.
Lesson Frame: Climate in the News	I can recognize how human activity affects Earth's weather and climate.
Lesson Frame: Identify Key Ideas	I can describe the differences between weather and climate.
Performance Tasks: Science notebook entries Observations Posttest	Notes:

Unit Name: **Diversity of Life**	**Length:** 60 sessions
Standards: MS.LS1.1 MS.LS1.2 MS.LS1.3 MS.LS1.4 MS.LS1.5 MS.LS1.6 MS.LS1.7 MS.LS3.2	**Outcomes:** All living things are made of cells. All organisms exhibit common characteristics and have certain requirements. Plants reproduce in a variety of ways. Genes are responsible for an organism's traits. Asexual reproduction results in offspring with identical genetic information. Sexual reproduction results in offspring with genetic variation, similar to parents but not identical. Organisms have structures and behaviors that enhance their chances of surviving and reproducing in their environment. Biodiversity is the wide range of existing life-forms that have adapted to the variety of conditions on Earth.
Topic 1: **What is Life?**	**Length:** 6 sessions
Standard(s): MS.LS1.1 MS.LS1.3	**Academic Vocabulary:** evidence, habitat, living, non living, organism, dead, dormant
Essential Questions: How do you know if something is living?	**Learning Targets:** Students will learn that any free-living thing is an organism. Students will recognize that all organisms exhibit common characteristics and have certain requirements. Students will understand that something can be dead only if it was once living. Students will learn that some organisms can become dormant to survive in an unsuitable environment.
Lesson Frame: Living or Nonliving	I can identify if something is living or nonliving.
Lesson Frame: Is Anything Alive in Here?	I can identify the common characteristics and requirements for all organisms.
Performance Tasks: Science notebook entries Observations	Notes:
Topic 2: **The Microscope**	**Length:** 6 sessions
Standard(s): MS.LS1.1 MS.LS1.2	**Academic Vocabulary:** compound microscope, field of view, magnification, magnify, power, scale

Essential Questions: How do objects appear when they are viewed through a microscope? How can we estimate the size of an object by looking at it through a microscope? What evidence can we find that brine shrimp are living organisms?	**Learning Targets:** Students will recognize the components of a compound optical microscope. Students will learn that a microscope's optical power is the product of the magnification of the eyepiece and the objective lens. Students will determine that the field of view is the diameter of the circle of light seen through the microscope which decreases and the power increases. Students will recognize that a microscope may reverse and invert images. Students will recognize the common characteristics of life within a microscopic organism contained on a wet mount slide.
Lesson Frame: Meet the Microscope	I can identify the different parts of a compound optical microscope.
Lesson Frame: Field of View	I can determine the size of the field of view based upon the optical power being used.
Lesson Frame: Microscopic LIfe	I can recognize that a microscopic organism can exhibit common characteristics of life.
Performance Tasks: Science notebook entries Observations	Notes:
Topic 3: **The Cell**	**Length:** 8 sessions
Standard(s): MS.LS1.1 MS.LS1.2 MS.LS3.2	**Academic Vocabulary:** Asexual reproduction, cell, cell membrane, cell structure, cell wall, chlorophyll, chloroplast, cytoplasm, dormancy, elodea, mitochondrion, multicellular organism, nucleus, organelle, paramecium, protist, single-celled organism
Essential Questions: What microscopic structures make up organisms such as elodea? How are elodea and the paramecium alike, and how are they different? Is there life in the mini habitats? If so, where did it come from? What microscopic structures make up organisms such as humans (you)?	**Learning Targets:** The cell is the basic unit of life. All living things are made up of one or more cells. Every cell has structures that enable it to carry out life's functions. Both single-celled and multicellular organisms exhibit all the characteristics of life. Some organisms can become dormant to survive in an unsuitable environment. Asexual reproduction is a method of reproduction that results in offspring with identical genetic information.
Lesson Frame: Discovering Cells	I can diagram and define plant cell structures and functions.
Lesson Frame: Paramecia	I can diagram and define protist cell structures and functions. I can explain the concept of asexual reproduction.
Lesson Frame: Microworlds	I can describe how and why some organisms become dormant.
Lesson Frame: Human Cheek Tissue	I can diagram and define animal cell structures and functions.

Performance Tasks: Science notebook entries Observations Investigation 1-3 I-Check	Notes:
Topic 4: **Domains**	**Length:** 9 sessions
Standard(s): MS.LS1.1 MS.LS1.2 MS.LS3.2	**Academic Vocabulary:** Archaea, atom, bacteria, classification, colony, control, culture, decomposer, domain, E. coli, eukaryote, fungus, microorganism, molecule, penicillium, plasmid, prokaryote, spore
Essential Questions: What are the building blocks of cell structures? What evidence is there that bacteria are living organisms? What evidence is there that fungi are living organisms? What are the characteristics of archaea?	**Learning Targets:** Cells are made of cell structures which are made of molecules, which are made of atoms. Bacteria, fungi, and archaea demonstrate all the characteristics of life. Life is classified into three domains (Archaea, Bacteria, Eukarya), depending upon cellular and molecular characteristics.
Lesson Frame: Comparing Living Things	I can explain that cells are made of molecules which are made of atoms.
Lesson Frame: Bacteria	I can describe how bacteria demonstrates all the characteristics of life.
Lesson Frame: Fungi	I can describe how fungi demonstrates all the characteristics of life.
Lesson Frame: Archaea: The Three Domains	I can identify the three domains of life based upon cellular and molecular characteristics.
Performance Tasks: Science notebook entries Observations Investigation 4 I-Check	Notes:
Topic 5: **The Vascular System**	**Length:** 8 sessions
Standard(s): MS.LS1.1 MS.LS1.3 MS.LS1.6 MS.LS1.7	**Academic Vocabulary:** absorb, climatologist, climatology, differential heating, evidence, heat, latitude, radiant energy, radiation, ray, solar angle, wave

Essential Questions: What happened to the water? How does water travel through a plant? How do plants use water?	**Learning Targets:** Transpiration is the process by which water is carried through vascular plants from the roots to stomata, ensuring that all the cells have access to water. The vascular system of plants consists of xylem and phloem. Plants use photosynthesis and aerobic cellular respiration to make usable energy from the Sun's energy. Cells are the building blocks of tissues, which are the building blocks of organs, which are the building blocks of organ systems, which are the building blocks of multicellular organisms.
Lesson Frame: What Happened to the Water?	I can explain the process of transpiration.
Lesson Frame: Looking at Plant Structures	I can demonstrate how the vascular system of plants works.
Lesson Frame: Transpiration and Photosynthesis	I can describe how transpiration and photosynthesis are necessary for cell life.
Performance Tasks: Science notebook entries Observations Investigation 5 I-Check	Notes:
Topic 6: **Plant Reproduction and Growth**	**Length:** 8 sessions
Standard(s): MS.LS1.4 MS.LS1.5 MS.LS3.2	**Academic Vocabulary:** adaptation, coevolve, egg, environmental factor, fertilize, flower, genetic factor, germination, pollination, pollination syndrome, pollinator, salinity, salt tolerance, seed, sexual reproduction, sperm
Essential Questions: How do the structural adaptations of seeds help them survive? How do environmental factors affect the germination and early growth of different food crops? What is the role of a flower? What adaptations do flowering plants have to accomplish pollination?	Learning Targets: Environmental and genetic factors affect the germination and growth of plants. Flowering plants reproduce sexually, producing seeds, which contain dormant new plants. Flowering plants have characteristics that attract pollinators to ensure successful pollination and reproduction. Pollinators are attracted to flowers that meet their needs.
Lesson Frame: Lima Bean Dissection	I can explain how flowering plants reproduce.
Lesson Frame: Environmental and Genetic Factors	I can describe how environmental and genetic factors affect plants.
Lesson Frame: Flowering-Plant Reproduction	I can create a diagram of the sequence for flowering plant reproduction.
Lesson Frame: Flowers and Pollinators	I can determine the characteristics of a flowering plant that attracts pollinators.
Performance Tasks: Science notebook entries Observations Investigation 6 I-Check	Notes:

Topic 7: **Variation of Traits**	**Length:** 4 sessions
Standard(s): MS.LS3.2	**Academic Vocabulary:** allele, characteristic, chromosome, cross, DNA, dominant, feature, filial, gene, generation, genotype, heredity, heterozygous, homozygous, inheritance, phenotype, population, punnett square, recessive, trait, variation
Essential Questions: How do traits pass from parents to offspring? how does sexual reproduction produce variation in offspring?	**Learning Targets:** During reproduction (both sexual and asexual), organisms transfer genetic information to offspring. Genes define an organism's genotype. Genes code for proteins, which determine an organism's phenotype. In sexually reproducing organisms, each parent contributes half the offspring's alleles, so that offspring have genotypes that are similar but not identical to either parent. Variation of traits in a population of plants or animals is established in part as a result of sexual reproduction.
Lesson Frame: Inheriting Traits	I can explain how parents transfer genetic information to their offspring.
Lesson Frame: Modeling Heredity	I can use a Punnett square to predict the ratio of genotypes in future generations of sexually reproducing organism.
Performance Tasks: Science notebook entries Observations Investigation 7 I-Check	Notes:
Topic 8: **Insects**	**Length:** 5 sessions
Standard(s): MS.LS1.3 MS.LS1.4	**Academic Vocabulary:** behavior, function, structure
Essential Questions: How do the structures and behaviors of the Madagascar hissing cockroach enable life's functions? How is the insect transport system like plant and human transport systems and how is it different?	**Learning Targets:** The structures and behaviors of an organism have functions that enhance the organism's chance to survive and reproduce in its habitat. Cells are the building blocks of tissues, which are the building blocks of organs, which are the building blocks of organ systems, which are the building blocks of multicellular organisms. Insects have open circulatory systems that transport substances to and away from their cells.
Lesson Frame: Structure, Function, and Behavior	I can recognize the structures and behaviors of an organism that enhances its chances to survive and reproduce.
Lesson Frame: Insect Systems	I can compare the insect circulatory system to the plant vascular system and the human cardiovascular system.

Performance Tasks: Science notebook entries Observations	Notes:
Topic 9: **Diversity of Life**	**Length:** 6 sessions
Standard(s): MS.LS1.1	**Academic Vocabulary:** biodiversity, virus
Essential Questions: What is the water cycle? What affects the direction that ocean water flows? How does the ocean affect climate on land?	**Learning Targets:** Biodiversity is the variety of life that exists in a particular habitat or ecosystem. Measuring biodiversity includes measuring both the variety of organisms and the number of organisms in a habitat or ecosystem. Scientific debate regarding whether viruses are living is ongoing.
Lesson Frame: Bioblitz	I can identify the biodiversity within a habitat or ecosystem.
Lesson Frame: What is Life?	I can use my knowledge of living characteristics to debate whether a virus is a living organism.
Performance Tasks: Science notebook entries Observations Posttest	Notes:

Unit Name: **Robotics**	**Length:** 24 sessions
Standards: MS.PS2.2 MS.PS2.3 MS.PS2.5 MS.PS3.2 MS.PS3.5 MS.ESS3.4 MS.ETS1.1 MS.ETS1.2 MS.ETS1.3 MS.ETS1.4	**Outcomes:** Force is a push or pull. Friction is a force that acts to oppose a force acting to put a mass in motion. Magnets have two poles; like poles repel and opposite poles attract. Magnets are surrounded by an invisible magnetic force field that acts through space and through all nonmagnetic materials. Energy cannot be created or destroyed, only transferred. Energy sources are either renewable or nonrenewable. Coding is used to allow robots to act without manual control. Technological advancements contribute to our society. Technological advancements are increasing at an alarming rate. Force and friction are both factors that affect robot coding.
Topic 1: **What is Force?**	**Length:** 3 sessions
Standard(s): MS.PS2.2	**Academic Vocabulary:** friction, force, kinetic energy
Essential Questions: What makes things move? How does friction affect the force needed to move an object? How do multiple forces affect motion?	**Learning Targets:** Students will learn that a force is a push or a pull. Students will understand that the metric unit for force is the newton (N). Students will recognize that friction is a force that acts to oppose a force acting to put a mass in motion. Students will learn that net force is the sum of the forces acting on a mass.
Lesson Frame: Push and Pull	I can identify that a force is a push or a pull.
Lesson Frame: Friction	I can demonstrate that friction is a force that acts to oppose a force acting to put a mass in motion.
Lesson Frame: Forces in Action	I can determine the net force of the forces acting upon a mass.
Performance Tasks: Science notebook entries Observations Investigation 1 I-Check	Notes:
Topic 2: **The Force of Magnetism**	**Length:** 3 sessions
Standard(s): MS.PS2.2 MS.PS2.3 MS.PS2.5 MS.PS3.2	**Academic Vocabulary:** attract, magnetic field, magnetic force, magnitude, pole, repel

Essential Questions: What happens when magnets interact? How can we detect a magnetic field? What factors affect the force of attraction between magnets?	**Learning Targets:** Students will recognize that magnets stick to (attract) objects that contain iron. Students will learn that all magnets have two poles; Like poles of magnets repel each other; opposite poles attract. Students will determine that magnets are surrounded by an invisible magnetic force field, which acts through space and through all nonmagnetic materials. Students will learn that magnetic materials may become magnets when they interact with magnetic fields. Students will recognize that the magnitude of the magnetic force between two interacting magnetic fields decreases as the distance between them increases.
Lesson Frame: Properties of Magnets	I can identify the poles of a magnet and what it will attract.
Lesson Frame: Magnetic Fields	I can demonstrate that a magnetic field surrounds a magnet and acts through nonmagnetic materials.
Lesson Frame: Force over Distance	I can recognize that the magnitude of the magnetic forces between to interacting fields decrease as they get closer together.
Performance Tasks: Science notebook entries Observations	Notes:
Topic 3: **Introduction to Robots**	Length: 6 sessions
Standard(s): MS.PS2.2 MS.PS2.3 MS.PS2.5 MS.LS3.2 MS.ETS1.1 MS.ETS1.2 MS.ETS1.3 MS.ETS1.4 MS.ESS3.3 MS.ESS3.4	**Academic Vocabulary:** circuit, code, electrical force, machine, magnetic force, programming, robot
Essential Questions: How does an electric motor work? How do robots work? What is the relationship between magnetic and electrical forces?	**Learning Targets:** Students will learn that energy transfers through an electric circuit from a source to components. Students will understand that energy cannot be created or destroyed, only transferred. Students will recognize the difference between a machine and a robot. Students will determine whether an energy source is renewable or nonrenewable. Students will recognize how technological advancements are contributing to society.
Lesson Frame: Electric Motors	I can explain how energy transfers through a motor to other components.
Lesson Frame: What is a Robot?	I can identify the difference between a machine and a robot and their benefits.
Lesson Frame: Force and Energy	I can determine if an energy source is renewable or nonrenewable.

Performance Tasks: Science notebook entries Observations Robot Presentation	Notes:
Topic 4: **Programming**	**Length:** 12 sessions
Standard(s): MS.PS2.2 MS.PS2.3 MS.PS2.5 MS.LS3.2 MS.ETS1.1 MS.ETS1.2 MS.ETS1.3 MS.ETS1.4 MS.ESS3.3 MS.ESS3.4	**Academic Vocabulary:** code, commands, eye, force, gyro, infrared, interactive, pressure
Essential Questions: What is coding? How does a blueprint help during construction? How does force and motion affect a turning car? How does friction and weight affect a moving vehicle?	**Learning Targets:** Students will learn the basic fundamentals of coding. Students will understand the importance of blueprints and how to interpret them. Students will recognize that force and motion affect the distance a vehicle moves. Students will plan and modify a design based upon the force and motion exerted upon the vehicle. Students will plan, build, and modify a robot for the sole intent of a specific purpose.
Lesson Frame: Coding	I can determine what commands to use to create an interactive computer game.
Lesson Frame: Basic Unit	I can construct a basic robot using a blueprint and building instructions.
Lesson Frame: 3 Point Turn	I can use my knowledge of coding and energy to program a robot to execute a 3 point turn.
Lesson Frame: Task Specific Programming	I can determine which coding principles to use to manipulate a basic unit and overcome the friction and other forces applied to complete a specific task.
Performance Tasks: Science notebook entries Observations Mechanical Designs Coding Project Completion Posttest	Notes:

Course Name:	7/8 Science Course A		
Credits:	n/a		
Prerequisites:	n/a		
Description:	Course covering aspects within Physical, Earth and Life Sciences.		
Academic Standards:	Next-Generation Science Standards		
Units:	**Unit Length:**	**Unit Standards:**	**Unit Outcomes:**
Chemical Interactions	approximately 63 days	MS-PS1-1, MS-PS1-2, MS-PS1-3, MS-PS1-4, MS-PS1-5, MS-PS1-6, MS-PS3-3, MS-PS3-4, MS-PS3-5, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4	Students observe a mystery-mixture reaction and begin to consider the definition of substance and chemical reaction. They identify the two substances in the mystery mixture by observing the characteristics of the reactions that occur when they mix pairs of known substances. Students learn about the periodic table of the elements. They use an online resource to consider properties and categories of elements, and to research individual elements. Students read consumer-product labels to think about the presence of elements in familiar substances. Students recreate the mystery-mixture reaction, using a setup that allows them to capture and study the resulting gas. They learn that the gas is carbon dioxide, which leads them to a study of air. They use syringes to discover that air can be compressed and expanded. Students start to develop a particulate model for matter. Students observe expansion and contraction of solids, liquids, and gases, and explain the phenomena in terms of kinetic theory—the constant motion of particles. Students learn one way that energy moves and how to conceptualize energy transfer as changes of the kinetic energy of particles resulting from particle collisions. Students mix equal volumes of hot and cold water and predict the final temperature. They use the result to determine an algorithm for calculating final temperature. Students are introduced to the calorie as a unit of energy transfer. Students use their understanding of energy transfer to face an engineering problem: how to build a container that keeps hot liquids hot and cold liquids cold. They test materials for their insulating properties in preparation for the design challenge. They determine criteria and constraints in the engineering design process and test their designs. Students explore the difference between melting and dissolving. They go on to study dissolving by comparing aqueous mixtures, one with a soluble solid and one with an insoluble solid. They compare the two mixtures and then attempt to separate them with filters and evaporation. Students experience three common phases (states) of matter—solid, liquid, and gas— and investigate the conditions that induce substances to change from one phase to another. Students engage in an engineering challenge to design a classroom “freezer” that will freeze water. Students blow bubbles into limewater, observe the precipitate, and move atom tiles (representations) to simulate the rearrangement of atoms to form new substances (particles). Students study another reaction involving hydrochloric acid and baking soda and learn to use models to balance chemical equations. Students conduct more chemical reactions, learning about limiting factors and reactants in excess.

Human Systems Interactions	approximately 28 days	MS-LS1-1, MS-LS1-3, MS-LS1-7, MS-LS1-8	Students solve a disease mystery. On the path to diagnosis, students discover the structural levels in human bodies: that cells form tissues, tissues form organs, organs form organ systems, and systems form a complex multicellular organism, the human. They look for evidence of how the organ systems interact, each dependent on all the others for its needs. Students fatigue their muscles and think about how their cells obtain the food and oxygen they need from the digestive, respiratory, and circulatory systems. They learn how aerobic cellular respiration works in cells. They find out that the cells eliminate wastes produced during aerobic cellular respiration via circulatory, respiratory, and excretory systems. Students explore the different senses to understand how humans acquire information from the environment. They engage in a “neuron relay” to model how sensory information travels to the brain for processing and how information returns to the body for action. Students turn their attention to their own learning and memory formation.
Heredity and Adaptations	approximately 31 days	MS-LS3-1, MS-LS3-2, MS-LS4-1, MS-LS4-2, MS-LS4-3, MS-LS4-4, MS-LS4-5, MS-LS4-6, MS-ESS1-4	Students are introduced to the big question that drives the course: How can we explain the diversity of life that exists on Earth? They take a tour of the fossil record, looking for evidence of the existence, diversity, and transitions in life-forms throughout Earth’s history. Students start this investigation with an exploration of evolutionary relationships. They examine a family tree and build a cladogram. Students build a model for how traits are inherited, starting with themselves and moving to a population of imaginary animals, larkeys. They learn about the basis of heredity, chromosomes and genes, and how genetic variation arises in populations. Students use Punnett squares to predict the probability of trait inheritance when the genotypes of the parents are known. Students consider how mutations lead to variation in a population. They see how positive mutations lead to adaptations and how natural selection works, leading to changes in populations over time. They consider the evidence for the theory of evolution. Finally, they research genetic technologies that humans use to influence inheritance and disease.

Planetary Science	approximately 52 days	MS-ESS1-1, MS-ESS1-2, MS-ESS1-3, MS-ESS1-4, MS-ESS2-2, MS-ESS2-4, MS-ESS3-1, MS-ESS3-2, MS-ESS3-3, MS-ESS3-4, MS-PS2-4, MS-PS4-2, MS-ETS1-1	Students develop a sense of planet Earth as a tiny base from which to launch an inquiry into the vast reaches of the solar system and beyond. They observe the Moon and start a log of its changes. Students become familiar with the celestial relationship of the Sun and Earth. They think not only about what they know (Earth is round) but how they know it. They simulate the basic geometry of Earth and the Sun to explain day, night, and year. Students apply what they know about Earth's tilt and the revolution of Earth around the Sun to explain daylight length and seasons. Students learn the factors resulting in seasons, including latitude, tilt of Earth's axis, revolution, and rotation. Students study the surface features of the Moon and the size and distance of our closest celestial neighbor. They read myths to experience how other cultures explain the features and behavior of the Moon. Students analyze Moon log data to identify the pattern of Moon phases, then develop a physical model that can explain Moon phases. They explain how the motions of Earth and the Moon in relation to the Sun result in the phases of the Moon we observe on Earth. Students conduct simple experiments to determine if the craters on the Moon's surface could be caused by impact events of various magnitudes. They use Moon data to determine the number and frequency of major impacts. Students learn the major classifications in which cosmic objects are distributed: solar system, galaxy, universe. They sequence the events that led to the formation of the solar system. Students explore four theories of Moon origin. Students explore the scale of the solar system by making physical and graphical models. They explore the relationship of atmosphere, planet temperature, and liquid water. They search images of planets and satellites for evidence of water. Students are introduced to a tool used to study distant objects in planetary systems, the spectroscope. They use a simple spectroscope to become aware of the spectral signature of elements. Students use telescope images of the moons of Jupiter to determine their orbital patterns and distances from the planet. They study techniques used to search for planets and planetary systems around other stars in the Milky Way galaxy.

Unit Name: **Chemical Interactions**	**Length:** approximately 63 days
Standards: MS-PS1-1, MS-PS1-2, MS-PS1-3, MS-PS1-4, MS-PS1-5, MS-PS1-6, MS-PS3-3, MS-PS3-4, MS-PS3-5, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4	**Outcomes:** Students observe a mystery-mixture reaction and begin to consider the definition of substance and chemical reaction. They identify the two substances in the mystery mixture by observing the characteristics of the reactions that occur when they mix pairs of known substances. Students learn about the periodic table of the elements. They use an online resource to consider properties and categories of elements, and to research individual elements. Students read consumer-product labels to think about the presence of elements in familiar substances. Students recreate the mystery-mixture reaction, using a setup that allows them to capture and study the resulting gas. They learn that the gas is carbon dioxide, which leads them to a study of air. They use syringes to discover that air can be compressed and expanded. Students start to develop a particulate model for matter. Students observe expansion and contraction of solids, liquids, and gases, and explain the phenomena in terms of kinetic theory—the constant motion of particles. Students learn one way that energy moves and how to conceptualize energy transfer as changes of the kinetic energy of particles resulting from particle collisions. Students mix equal volumes of hot and cold water and predict the final temperature. They use the result to determine an algorithm for calculating final temperature. Students are introduced to the calorie as a unit of energy transfer. Students use their understanding of energy transfer to face an engineering problem: how to build a container that keeps hot liquids hot and cold liquids cold. They test materials for their insulating properties in preparation for the design challenge. They determine criteria and constraints in the engineering design process and test their designs. Students explore the difference between melting and dissolving. They go on to study dissolving by comparing aqueous mixtures, one with a soluble solid and one with an insoluble solid. They compare the two mixtures and then attempt to separate them with filters and evaporation. Students experience three common phases (states) of matter—solid, liquid, and gas— and investigate the conditions that induce substances to change from one phase to another. Students engage in an engineering challenge to design a classroom “freezer” that will freeze water. Students blow bubbles into limewater, observe the precipitate, and move atom tiles (representations) to simulate the rearrangement of atoms to form new substances (particles). Students study another reaction involving hydrochloric acid and baking soda and learn to use models to balance chemical equations. Students conduct more chemical reactions, learning about limiting factors and reactants in excess.

Essential Questions:

How can we find out what two substances are in the mystery mixture?
What is the periodic table of elements?
What makes up all the substances of Earth?
How can the gas produced in a chemical reaction be studied?
Is air matter? Does air have mass and take up space?
What is the relationship between particles in matter?
What happens to particles in a sample of air when the air is heated and cooled?
What happens to particles in a sample of liquid when the liquid is heated and cooled?
What happens to particles in a sample of solid when the solid is heated and cooled?
If two equal volumes of hot and cold water are mixed, what will the final temperature be?
How does energy transfer from one substance to another?
How is heat measured?
How can you reduce energy transfer to or from a sample of water?
What is the best thermos design?
What is the difference between dissolving and melting?
Do all substances form solutions in water?
What happens at the particle level when a substance melts?
What is the relationship between melting and freezing?
How can you freeze water in the classroom?
What are all the ways that a substance can change state?
How do atoms combine to make new substances?
What happens at the particle level during a chemical reaction?
What is the chemical reaction between hydrochloric acid and sodium bicarbonate?
What is a limiting factor in a chemical reaction?
What have I learned about chemical interactions?

Learning Targets:

Students will learn that:
•a substance is a form of matter with a unique composition and distinct physical and chemical properties that can be used to identify it
•substances can be represented with common names, chemical names, and chemical formulas
•a chemical reaction occurs when substances interact to form new substances (products)
•an element is a basic substance that cannot be broken into simpler substances during chemical interactions
•there are 90 naturally occurring elements on Earth
•elements combine to make all the substances on Earth
•the relative abundance of elements varies with location in the universe
•matter is made of particles; every substance is defined by a unique particle
•gas is matter -- it has mass and occupies space; in a gas, particles are widely spaced and in constant motion
•gas compresses when force is applied; gas expands when force is withdrawn
•during compression and expansion, the number and character of particles in a sample of gas do not change; the space between the particles does change
•solids, liquids, and gases vary in how their particles are arranged in relationship to one another, but the particles are always in motion, kinetic energy is energy of motion
•the particles in substances gain kinetic energy as they warm, and los kinetic energy as they cool
•matter expands when the kinetic energy of its particles increases; matter contracts when the kinetic energy of its particles decreases
•energy transfers between particles when they collide. Energy transfer by contact is conduction.
•energy always transfers from particles with more kinetic energy to particles with less kinetic energy.
•energy is conserved. The amount of energy in a system does not change- no energy is ever created or destroyed.
•temperature is a measure of the average kinetic energy of the particles of a substance.
•insulating materials reduce energy transfer via conduction.
•materials with more widely spaced particles serve as better insulators.
•engineers try to solve problems that satisfy a set of criteria and that conform to constraints placed on a solution to the problem.
•dissolving occurs when one substance (solute) is reduced to particles and is distributed uniformly throughout the particles of the second substance (solvent).
•dissolving involves both kinetic interactions (collisions) and attractive forces (bonds).
•not all substances are soluble in water.
•solutions can be separated into their original components, which are not chemically changed during dissolution.
•matter exists on Earth in three common states -- solid, liquid, and gas.
•change of state is the result of change of energy and motion of the particles in a sample of matter.
•during phase change, particles do not change; relationships between particles do change.
•the temperatures at which phase changes occur are different for different substances.
•the processes of phase change are evaporation, condensation, melting, freezing, sublimation, and deposition.
•all substances are made from some 90 different types of atoms (elements), which combine in various ways.
•a compound is a substance composed of two or more different kinds of atoms.
•atoms combine to make particles of substances: molecules and ionic compounds held together by attractive forces called bonds.
•a chemical reaction is a process in which the atoms of substances rearrange to form new

Topic 1: **Substances**	**Length:** 6 sessions
Standard(s): MS-PS1-2	**Academic Vocabulary:** chemical formula, chemical name, chemical reaction, matter, substance
Lesson Frame: Mystery Mixture	We will:
	I will:
Lesson Frame: Mixing Substances	We will:
	I will:
Essential Questions: How can we find out what two substances are in the mystery mixture?	**Outcomes:** Students observe a mystery-mixture reaction and begin to consider the definition of substance and chemical reaction. They identify the two substances in the mystery mixture by observing the characteristics of the reactions that occur when they mix pairs of known substances.
Performance Tasks: •Mix substances with water in an effort to determine the identity of an unknown mixture of substances •Analyze and interpret data on the properties of substances before and after a chemical reaction •Explain that as a result of a reaction initial substances change into new, different substances. •Explain how to identify the two substances in a mystery mixture	**Learning Targets:** Students will learn that: •a substance is a form of matter with a unique composition and distinct physical and chemical properties that can be used to identify it •substances can be represented with common names, chemical names, and chemical formulas •a chemical reaction occurs when substances interact to form new substances (products)
Topic 2: **Elements**	**Length:** 5 sessions
Standard(s): MS-PS1-1, MS-PS1-3	**Academic Vocabulary:** element, periodic table of elements, symbol
Lesson Frame: Periodic Table	We will:
	I will:
Lesson Frame: Elements in the World	We will:
	I will:
Essential Questions: •What is the periodic table of elements? •What makes up all the substances of Earth?	**Outcomes:** Students learn about the periodic table of the elements. They use an online resource to consider properties and categories of elements, and to research individual elements. Students read consumer-product labels to think about the presence of elements in familiar substances.

Performance Tasks: •Use graphical displays of information in the periodic the to analyze substances in terms of their elemental composition •Explain that all common matter is made of elements •Consider the composition of natural resources and synthetic materials	**Learning Targets:** Students will learn that: •an element is a basic substance that cannot be broken into simpler substances during chemical interactions •there are 90 naturally occurring elements on Earth •elements combine to make all the substances on Earth •the relative abundance of elements varies with location in the universe •the periodic table of the elements displays all naturally occurring and synthesized elements
Topic 3: **Particles**	**Length:** 8 sessions
Standard(s): MS-PS1-2, MS-PS1-4	**Academic Vocabulary:** compress, compression, expand, expansion, gas, liquid, particle, solid
Lesson Frame: Capture the Gas	We will:
	I will:
Lesson Frame: Air is Matter	We will:
	I will:
Lesson Frame: Air as Particles	We will:
	I will:
Essential Questions: •How can the gas produced in a chemical reaction be studied? •Is air matter? Does air have mass and take up space? •What is the relationship between particles in matter?	**Outcomes:** Students recreate the mystery-mixture reaction, using a setup that allows them to capture and study the resulting gas. They learn that the gas is carbon dioxide, which leads them to a study of air. They use syringes to discover that air can be compressed and expanded. Students start to develop a particulate model for matter.
Performance Tasks: •Carry out an investigation to determine the volume of gas produced in a chemical reaction •Plan experimentation to observe the effects of pressure on gases •Develop a model of gas as individual particles in constant motion •Apply the gas model to explain compression and expansion	**Learning Targets:** Students will Learn that: •matter is made of particles; every substance is defined by a unique particle •gas is matter -- it has mass and occupies space; in a gas, particles are widely spaced and in constant motion •gas compresses when force is applied; gas expands when force is withdrawn •during compression and expansion, the number and character of particles in a sample of gas do not change; the space between the particles does change
Topic 4: **Kinetic Energy**	**Length:** 7 sessions
Standard(s): MS-PS1-4	**Academic Vocabulary:** contract, contraction, kinetic energy, temperature, thermometer
Lesson Frame: Gas Expansion/ Contraction	We will:
	I will:
Lesson Frame: Liquid Expansion/Contraction	We will:
	I will:

Lesson Frame: Solid Expansion/Contraction	We will:
	I will:
Essential Questions: •What happens to particles in a sample of air when the air is heated and cooled? •What happens to particles in a sample of liquid when the liquid is heated and cooled? •What happens to particles in a sample of solid when the solid is heated and cooled?	**Outcomes:** Students observe expansion and contraction of solids, liquids, and gases, and explain the phenomena in terms of kinetic theory—the constant motion of particles.
Performance Tasks: •Carry out an investigation heating and cooling gas, liquid, and solid matter to observe expansion and contraction •Develop a model of kinetic energy at the particle level •Construct an explanation of how a thermometer works	**Learning Targets:** Students will learn that: •solids, liquids, and gases vary in how their particles are arranged in relationship to one another, but the particles are always in motion •kinetic energy is energy of motion •the particles in substances gain kinetic energy as they warm, and los kinetic energy as they cool •matter expands when the kinetic energy of its particles increases; matter contracts when the kinetic energy of its particles decreases
Topic 5: **Energy Transfer**	**Length:** 8 sessions
Standard(s): MS-PS1-4, MS-PS3-3, MS-PS3-4, MS-PS3-5	**Academic Vocabulary:** calorie, conduction, conservation of energy, cooling, energy transfer, equilibrium, heating
Lesson Frame: Mixing Hot and Cold	We will:
	I will:
Lesson Frame: Particle Collision	We will:
	I will:
Lesson Frame: Heat	We will:
	I will:
Essential Questions: •If two equal volumes of hot and cold water are mixed, what will the final temperature be? •How does energy transfer from one substance to another? •How is heat measured?	**Outcomes:** Students learn one way that energy moves and how to conceptualize energy transfer as changes of the kinetic energy of particles resulting from particle collisions. Students mix equal volumes of hot and cold water and predict the final temperature. They use the result to determine an algorithm for calculating final temperature. Students are introduced to the calorie as a unit of energy transfer.
Performance Tasks: •Plan an investigation to mix hot and cold water to observe energy transfer •Explain energy transfer in terms of the change of particle kinetic energy resulting from conduction •Calculate and discuss energy transfer in calories. •Analyze data to develop ideas about conservation of energy.	**Learning Targets:** Students will Learn that: •energy transfers between particles when they collide. Energy transfer by contact is conduction. •energy always transfers from particles with more kinetic energy to particles with less kinetic energy. •energy is conserved. The amount of energy in a system does not change- no energy is ever created or destroyed. •temperature is a measure of the average kinetic energy of the particles of a substance.

Topic 6: **Thermos Engineering**	**Length:** 5 sessions
Standard(s): MS-PS3-3, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4	**Academic Vocabulary:** constraint, criterion, engineering problem, insulation
Lesson Frame: Insulation	We will:
	I will:
Lesson Frame: Thermos Design	We will:
	I will:
Essential Questions: •How can you reduce energy transfer to or from a sample of water? •What is the best thermos design?	**Outcomes:** Students use their understanding of energy transfer to face an engineering problem: how to build a container that keeps hot liquids hot and cold liquids cold. They test materials for their insulating properties in preparation for the design challenge. They determine criteria and constraints in the engineering design process and test their designs.
Performance Tasks: •Apply principles of energy transfer and conduction to design, construct, and test a device that minimizes thermal-energy transfer •Collect energy-transfer data over multiple trials and multiple design iterations •Analyze data from tests of design solutions to identify characteristics that can be combined to satisfy the criteria for success	**Learning Targets:** Students will learn that: •insulating materials reduce energy transfer via conduction. •materials with more widely spaced particles serve as better insulators. •engineers try to solve problems that satisfy a set of criteria and that conform to constraints placed on a solution to the problem.
Topic 7: **Solutions**	**Length:** 3 sessions
Standard(s): MS-PS1-1, MS-PS1-2, MS-PS1-4	**Academic Vocabulary:** dissolve, melt, mixture, solubility, solute, solution, solvent
Lesson Frame: Dissolve and Melt	We will:
	I will:
Lesson Frame: Solubility	We will:
	I will:
Essential Questions: •What is the difference between dissolving and melting? •Do all substances form solutions in water?	**Outcomes:** Students explore the difference between melting and dissolving. They go on to study dissolving by comparing aqueous mixtures, one with a soluble solid and one with an insoluble solid. They compare the two mixtures and then attempt to separate them with filters and evaporation.

Performance Tasks: •Carry out an investigation to determine that some solids dissolve and others don't •Develop a particle model to explain the process of dissolving •Design methods to separate aqueous solutions. •Engage in argumentation from evidence to distinguish between dissolving and melting	**Learning Targets:** Students will learn that: •dissolving occurs when one substance (solute) is reduced to particles and is distributed uniformly throughout the particles of the second substance (solvent). •dissolving involves both kinetic interactions (collisions) and attractive forces (bonds). •not all substances are soluble in water. •solutions can be separated into their original components, which are not chemically changed during dissolution.
Topic 8: **Phase Change**	**Length:** 8 sessions
Standard(s): MS-PS1-4, MS-PS1-6, MS-3-4, MS-ETS1-2, MS-ETS1-3	**Academic Vocabulary:** condensation, deposition, evaporation, freeze, freezing point, melting point, phase change, state of matter, sublimation
Lesson Frame: Melting Temperature	We will:
	I will:
Lesson Frame: Adding Thermal Energy	We will:
	I will:
Lesson Frame: Freezing Water	We will:
	I will:
Lesson Frame: Changing Phase	We will:
	I will:
Essential Questions: •What happens at the particle level when a substance melts? •What is the relationship between melting and freezing? •How can you freeze water in the classroom? •What are all the ways that a substance can change state?	**Outcomes:** Students experience three common phases (states) of matter—solid, liquid, and gas— and investigate the conditions that induce substances to change from one phase to another. Students engage in an engineering challenge to design a classroom “freezer” that will freeze water.
Performance Tasks: •Carry out investigations to transfer heat to and from substances to observe phase change •Develop a model of state in terms of the relationship of particles to one another in a substance •Communicate information about phase change in terms of kinetic energy and energy transfer •Undertake a design project to construct, test, and modify a device that absorbs thermal energy by chemical processes.	**Learning Targets:** Students will learn that: •matter exists on Earth in three common states -- solid, liquid, and gas. •change of state is the result of change of energy and motion of the particles in a sample of matter. •during phase change, particles do not change; relationships between particles do change. •the temperatures at which phase changes occur are different for different substances. •the processes of phase change are evaporation, condensation, melting, freezing, sublimation, and deposition.
Topic 9: **Reaction**	**Length:** 9 sessions
Standard(s): MS-PS1-1, MS-PS1-2, MS-PS1-5	**Academic Vocabulary:** atom, bond, burning, compound, conservation of matter, crystal, ionic compound, molecule, precipitate, product, reactant

Lesson Frame: Substance Models	We will:
	I will:
Lesson Frame: Lime Water Reaction	We will:
	I will:
Lesson Frame: Baking Soda and Acid	We will:
	I will:
Essential Questions: •How do atoms combine to make new substances? •What happens at the particle level during a chemical reaction? •What is the chemical reaction between hydrochloric acid and sodium bicarbonate?	**Outcomes:** Students blow bubbles into limewater, observe the precipitate, and move atom tiles (representations) to simulate the rearrangement of atoms to form new substances (particles). Students study another reaction involving hydrochloric acid and baking soda and learn to use models to balance chemical equations.
Performance Tasks: •Use chemical formulas and atom tiles to show that the total number of atoms does not change in a chemical reaction and thus that mass is conserved •Use limewater to collect evidence that carbon dioxide is produced when hydrochloric acid and sodium bicarbonate react •Develop an explanation of a chemical reaction as a process in which atoms rearrange to form new substances	**Learning Targets:** Students will learn that: •all substances are made from some 90 different types of atoms (elements), which combine in various ways. •a compound is a substance composed of two or more different kinds of atoms. •atoms combine to make particles of substances: molecules and ionic compounds held together by attractive forces called bonds. •a chemical reaction is a process in which the atoms of substances rearrange to form new substances. •atoms are neither created nor destroyed during chemical reactions, only rearranged.
Topic 10: **Limiting Factors**	**Length:** 4 sessions
Standard(s): MS-PS1-1, MS-PS1-2, MS-PS1-5	**Academic Vocabulary:** concentration, limiting factor
Lesson Frame: Citric Acid and Baking Soda	We will:
	I will:
Lesson Frame: Identify Key Ideas	We will:
	I will:
	We will:
	I will:
Essential Questions: •What is a limiting factor in a chemical reaction? •What have I learned about chemical interactions?	**Outcomes:** Students conduct more chemical reactions, learning about limiting factors and reactants in excess.

Performance Tasks: •Collect data by measuring the volume of gas produced in a reaction to develop explanations about the concentrations of reactants •Use a model of the concept of limiting factor in chemical reactions •Reflect on and communicate key points from the entire Chemical Interactions Unit	**Learning Targets:** Students will learn that: •the quantities of reactants available at the start of a reaction determine the quantities of products. •the limiting factor is the reactant present in the lowest amount. •reactants that remain in their original form after a reaction has run to completion were present in excess. •atoms are neither created nor destroyed during chemical reactions, only rearranged; matter is conserved.

Unit Name: **Human Systems Interactions**	**Length:** approximately 28 days
Standards: MS-LS1-1, MS-LS1-3, MS-LS1-7, MS-LS1-8	**Outcomes:** Students solve a disease mystery. On the path to diagnosis, students discover the structural levels in human bodies: that cells form tissues, tissues form organs, organs form organ systems, and systems form a complex multicellular organism, the human. They look for evidence of how the organ systems interact, each dependent on all the others for its needs. Students fatigue their muscles and think about how their cells obtain the food and oxygen they need from the digestive, respiratory, and circulatory systems. They learn how aerobic cellular respiration works in cells. They find out that the cells eliminate wastes produced during aerobic cellular respiration via circulatory, respiratory, and excretory systems. Students explore the different senses to understand how humans acquire information from the environment. They engage in a “neuron relay” to model how sensory information travels to the brain for processing and how information returns to the body for action. Students turn their attention to their own learning and memory formation.
Essential Questions: What is a human body made of? How do human organ systems interact? How do cells in the human body get the resources they need? How does the energy in food become energy that cells can use? How does the sense of touch work in humans? How do messages travel to and from the brain? How are the senses alike and how are they different? How do humans learn and form memories?	**Learning Targets:** Students will learn that: •multicellular organisms are complex systems composed of organ systems, which are made of organs, which are made of tissues, which are made of cells. •cells are made of cell structures, which are made of molecules, which are made of atoms. •the human body is a system of interacting subsystems (circulatory, digestive, endocrine, excretory, muscular, nervous, respiratory, skeletal, and others). •the human body is a system of interacting subsystems. •the respiratory system supplies oxygen and the digestive system supplies energy (food) to the cells in the body. •the circulatory system transports food and oxygen to the cells in the body and carries waste products to the excretory / respiratory systems for disposal. •aerobic cellular respiration is the process by which energy stored in food molecules is converted into energy for cells. •sensory receptors respond to an array of mechanical, chemical, and electromagnetic stimuli. •sensory information is transmitted electrically to the brain along neural pathways for processing and response. •neural pathways change and grow as information is acquired and stored as memories.
Topic 1: **Systems Connections**	**Length:** 6 sessions
Standard(s): MS-LS1-1, MS-LS1-3	**Academic Vocabulary:** Atom, cell, cell structure, circulatory system, diabetes, diagnosis, digestive system, endocrine system, hormone, molecule, muscular system, nervous system, organ, organ system, respiratory system, skeletal system, symptom, tissue
Lesson Frame: Human Body Structural Levels	We will:
	I will:
Lesson Frame: Systems Research	We will:

	I will:
Essential Questions: • What is a human body made of? •How do human organ systems interact?	**Outcomes:** Students solve a disease mystery. On the path to diagnosis, students discover the structural levels in human bodies: that cells form tissues, tissues form organs, organs form organ systems, and systems form a complex multicellular organism, the human. They look for evidence of how the organ systems interact, each dependent on all the others for its needs.
Performance Tasks: •Obtain, evaluate, and communicate information regarding a single human organ system •Diagnose a disease affecting a patient by evaluating research information and evidence •Engage in argument from evidence to defend conclusions	**Learning Targets:** Students will learn that: •multicellular organisms are complex systems composed of organ systems, which are made of organs, which are made of tissues, which are made of cells. •cells are made of cell structures, which are made of molecules, which are made of atoms. •the human body is a system of interacting subsystems (circulatory, digestive, endocrine, excretory, muscular, nervous, respiratory, skeletal, and others).
Topic 2: **Supporting Cells**	**Length:** 7 sessions
Standard(s): MS-LS1-3, MS-LS1-7	**Academic Vocabulary:** aerobic cellular respiration, alveolus, calorie, capillary, glucose
Lesson Frame: Food and Oxygen	We will:
	I will:
Lesson Frame: Aerobic Cellular Respiration	We will:
	I will:
Essential Questions: •How do cells in the human body get the resources they need? •How does the energy in food become energy that cells can use?	**Outcomes:** Students fatigue their muscles and think about how their cells obtain the food and oxygen they need from the digestive, respiratory, and circulatory systems. They learn how aerobic cellular respiration works in cells. They find out that the cells eliminate wastes produced during aerobic cellular respiration via circulatory, respiratory, and excretory systems.
Performance Tasks: •Develop models to describe how food molecules are rearranged by chemical reactions forming new molecules to provide usable energy for cells •Construct explanations about organ system interactions at different scales	**Learning Targets:** Students will learn that: •the human body is a system of interacting subsystems. •the respiratory system supplies oxygen and the digestive system supplies energy (food) to the cells in the body. •the circulatory system transports food and oxygen to the cells in the body and carries waste products to the excretory/respiratory systems for disposal. •aerobic cellular respiration is the process by which energy stored in food molecules is converted into energy for cells.
Topic 3: **The Nervous System**	**Length:** 15 sessions

Standard(s): MS-LS1-3, MS-LS1-8	**Academic Vocabulary:** cerebral cortex, chemoreceptor, learning, mechanoreceptor, memory, metacognition, nerve, neuron, neurotransmitter, photoreceptor, reaction time, receptive field, response, sensory receptor, smell, stimulus, synapse, touch, vision
Lesson Frame: The Sense of Touch	We will:
	I will:
Lesson Frame: Sending a Message	We will:
	I will:
Lesson Frame: Other Senses	We will:
	I will:
Lesson Frame: Learning and Memory	We will:
	I will:
Essential Questions: •How does the sense of touch work in humans? •How do messages travel to and from the brain? •How are the senses alike and how are they different? •How do humans learn and form memories?	**Outcomes:** Students explore the different senses to understand how humans acquire information from the environment. They engage in a “neuron relay” to model how sensory information travels to the brain for processing and how information returns to the body for action. Students turn their attention to their own learning and memory formation.
Performance Tasks: •Develop a model for the action of a neural pathway •Gather and interpret data on sensory stimuli and responses •Neural pathways change and grow as information is acquired and stored as memories	**Learning Targets:** Students will learn that: •sensory receptors respond to an array of mechanical, chemical, and electromagnetic stimuli. •sensory information is transmitted electrically to the brain along neural pathways for processing and response. •neural pathways change and grow as information is acquired and stored as memories.

Unit Name: **Heredity and Adaptation**	**Length:** approximately 31 days
Standards: MS-LS3-1, MS-LS3-2, MS-LS4-1, MS-LS4-2, MS-LS4-3, MS-LS4-4, MS-LS4-5, MS-LS4-6, MS-ESS1-4	**Outcomes:** Students are introduced to the big question that drives the course: How can we explain the diversity of life that exists on Earth? They take a tour of the fossil record, looking for evidence of the existence, diversity, and transitions in life-forms throughout Earth's history. Students start this investigation with an exploration of evolutionary relationships. They examine a family tree and build a cladogram. Students build a model for how traits are inherited, starting with themselves and moving to a population of imaginary animals, larkeys. They learn about the basis of heredity, chromosomes and genes, and how genetic variation arises in populations. Students use Punnett squares to predict the probability of trait inheritance when the genotypes of the parents are known. Students consider how mutations lead to variation in a population. They see how positive mutations lead to adaptations and how natural selection works, leading to changes in populations over time. They consider the evidence for the theory of evolution. Finally, they research genetic technologies that humans use to influence inheritance and disease.
Essential Questions: What does the fossil record tell us about the history of life on Earth? What does the fossil record tell us about how life has changed over time? How can a model help us understand the relationships among organisms? What leads to variation in population? How can we model how genetic information passes from generation to generation? How can we predict the distribution of traits in a future generation? How do genetic mutation lead to variation in a population? How do populations change over time? How are humans influencing inheritance?	**Learning Targets:** Students will learn that: •the chronological fossil record documents the existence, diversity, extinction, and change of life-forms throughout Earth's history. •the fossil record is incomplete because of the nature of fossilization. •structural similarities between ancient and modern organisms is one kind of evidence from which we can infer relatedness. •a cladogram is a model that demonstrates evolutionary relationships among organisms. •embryo development can be used to identify relationships not evident in adults of different species. •heredity explains why organisms are similar but not identical to their parents. •genes on DNA code for proteins that are responsible for an organism's traits. •variation of traits in a population is established in part as a result of sexual reproduction. •a punnett square is a model used to predict the probability of inheriting genotypes in individuals of a population. •variation in a population can occur due to random genetic mutations, which can have harmful, helpful, or no effects. •an adaptation is an inherited trait that increases an organism's chances of surviving in an environment long enough to pass on its genes. •natural selection is a process by which individuals in a population best adapted to their environment tend to survive and pass their traits to subsequent generations. •change in populations by means of natural selection is the basis for the theory of evolution, which best explains the biodiversity on Earth. •Humans use genetic technologies to influence inheritance.
Topic 1: **The History of Life**	**Length:** 9 sessions

Standard(s): MS-LS4-1, MS-LS4-2, MS-ESS1-4	**Academic Vocabulary:** biodiversity, extinct, fossil, fossil record, organism, paleontologist, paleontology, principle of superposition, sedimentary rock, sediments, tetrapod, transition
Lesson Frame: The Fossil Record	We will:
	I will:
Lesson Frame: Transitions	We will:
	I will:
	We will:
	I will:
Essential Questions: •What does the fossil record tell us about the history of life on Earth? •What does the fossil record tell us about how life has changed over time?	**Outcomes:** Students are introduced to the big question that drives the course: How can we explain the diversity of life that exists on Earth? They take a tour of the fossil record, looking for evidence of the existence, diversity, and transitions in life-forms throughout Earth's history.
Performance Tasks: •Analyze data and use models to predict the characteristics of organisms missing from the fossil record •Integrate information from a variety of media to develop evidence to explain a phenomenon	**Learning Targets:** Students will learn that: •the chronological fossil record documents the existence, diversity, extinction, and change of life-forms throughout Earth's history. •The fossil record is incomplete because of the nature of fossilization. •Structural similarities between ancient and modern organisms is one kind of evidence from which we can infer relatedness.
Topic 2: **Heredity**	**Length:** 11 sessions
Standard(s): MS-LS3-1, MS-L3-2, MS-LS4-2, MS-LS4-3	**Academic Vocabulary:** allele, characteristic, chromosome, cladogram, common ancestor, descendant, DNA, Dominant, feature, filial, gene, generation, genome, genotype, heredity, heterozygous, homozygous, inheritance, inherited characteristic, limitations, most recent common ancestor, phenotype, population, protein, punnett square, recessive, related, species, trait, variation
Lesson Frame: Lines of Descent	We will:
	I will:
Lesson Frame: Inheriting Traits	We will:
	I will:
Lesson Frame: Modeling Heredity	We will:
	I will:
Lesson Frame: Punnett Squares	We will:
	I will:

Essential Questions: •How can a model help us understand the relationships among organisms? •What leads to variation in population? •How can we model how genetic information passes from generation to generation? •How can we predict the distribution of traits in a future generation?	**Outcomes:** Students start this investigation with an exploration of evolutionary relationships. They examine a family tree and build a cladogram. Students build a model for how traits are inherited, starting with themselves and moving to a population of imaginary animals, larkeys. They learn about the basis of heredity, chromosomes and genes, and how genetic variation arises in populations. Students use Punnett squares to predict the probability of trait inheritance when the genotypes of the parents are known.
Performance Tasks: •Analyze and interpret data to construct explanations, using mathematical models involving probability	**Learning Targets:** Students will learn that: •a cladogram is a model that demonstrates evolutionary relationships among organisms. •embryo development can be used to identify relationships not evident in adults of different species. •heredity explains why organisms are similar but not identical to their parents. •genes on DNA code for proteins that are responsible for an organism's traits. •variation of traits in a population is established in part as a result of sexual reproduction. •a punnett square is a model used to predict the probability of inheriting genotypes in individuals of a population.
Topic 3: **Evolution**	**Length:** 11 sessions
Standard(s): MS-LS3-1, MS-LS4-4, MS-LS4-5, MS-LS4-6	**Academic Vocabulary:** adaptation, artificial selection, gene therapy, genetically modified organism, mutation, natural selection, speciation, theory, theory of evolution, transgenic organism
Lesson Frame: Adaptation	We will:
	I will:
Lesson Frame: Natural Selection	We will:
	I will:
Lesson Frame: Genetic Technology	We will:
	I will:
Essential Questions: •How do genetic mutation lead to variation in a population? •How do populations change over time? •How are humans influencing inheritance?	**Outcomes:** Students consider how mutations lead to variation in a population. They see how positive mutations lead to adaptations and how natural selection works, leading to changes in populations over time. They consider the evidence for the theory of evolution. Finally, they research genetic technologies that humans use to influence inheritance and disease.

Performance Tasks:	**Learning Targets:**
•Analyze and interpret data to construct explanations using mathematical models involving probability	Students will learn that: •variation in a population can occur due to random genetic mutations, which can have harmful, helpful, or no effects. •an adaptation is an inherited trait that increases an organism's chances of surviving in an environment long enough to pass on its genes. •natural selection is a process by which individuals in a population best adapted to their environment tend to survive and pass their traits to subsequent generations. •change in populations by means of natural selection is the basis for the theory of evolution, which best explains the biodiversity on Earth. •Humans use genetic technologies to influence inheritance.

Unit Name: **Planetary Science**	**Length:** approximately 53 sessions
Standards: MS-ESS1-1, MS-ESS1-2, MS-ESS1-3, MS-ESS1-4, MS-ESS2-2, MS-ESS2-4, MS-ESS3-1, MS-ESS3-2, MS-ESS3-3, MS-ESS3-4, MS-PS2-4, MS-PS4-2, MS-ETS1-1	**Outcomes:** Students develop a sense of planet Earth as a tiny base from which to launch an inquiry into the vast reaches of the solar system and beyond. They observe the Moon and start a log of its changes. Students become familiar with the celestial relationship of the Sun and Earth. They think not only about what they know (Earth is round) but how they know it. They simulate the basic geometry of Earth and the Sun to explain day, night, and year. Students apply what they know about Earth's tilt and the revolution of Earth around the Sun to explain daylight length and seasons. Students learn the factors resulting in seasons, including latitude, tilt of Earth's axis, revolution, and rotation. Students study the surface features of the Moon and the size and distance of our closest celestial neighbor. They read myths to experience how other cultures explain the features and behavior of the Moon. Students analyze Moon log data to identify the pattern of Moon phases, then develop a physical model that can explain Moon phases. They explain how the motions of Earth and the Moon in relation to the Sun result in the phases of the Moon we observe on Earth. Students conduct simple experiments to determine if the craters on the Moon's surface could be caused by impact events of various magnitudes. They use Moon data to determine the number and frequency of major impacts. Students learn the major classifications in which cosmic objects are distributed: solar system, galaxy, universe. They sequence the events that led to the formation of the solar system. Students explore four theories of Moon origin. Students explore the scale of the solar system by making physical and graphical models. They explore the relationship of atmosphere, planet temperature, and liquid water. They search images of planets and satellites for evidence of water. Students are introduced to a tool used to study distant objects in planetary systems, the spectroscope. They use a simple spectroscope to become aware of the spectral signature of elements. Students use telescope images of the moons of Jupiter to determine their orbital patterns and distances from the planet. They study techniques used to search for planets and planetary systems around other stars in the Milky Way galaxy.

Essential Questions:	**Learning Targets:**
Where are you when you are in science class? Why is Earth described as a system? How does the Moon change day by day? What causes day and night? Why is it hotter in the summer? Why are there more hours of sunlight in the summer? What is visible on the Moon? What does an Earth/Moon scale model? What Moon-phase patterns can be observed? What causes Moon phases? How do models help us understand phases of the Moon? Are Moon craters the result of volcanoes or impacts? Will Earth experience a major impact in the future? What is in the solar system? Where did the solar system come from? Where are the planets in the solar system? Which planet is most like Earth? Where is the water in the solar system? What impact do humans have on Earth's systems? Why is light important in astronomy? What are the big questions that guide space exploration? What can be learned by studying the moons of Jupiter? How are exoplanets found? Where are you when you are in science class?	Students will learn that: •location or position can be described in terms of a frame of reference (relationship to other objects). •point of view is a position from which a visual observation is made. •Earth is a system composed of subsystems. •the moon can be observed both day and night. •line of sight is the straight, unimpeded path taken by light from an object to an eye. •objects appear to sink when they move across the ocean and slip below the horizon on a curved surface. •at all times, half of Earth is illuminated and half is dark. •daytime and nighttime are the result of Earth's rotation on its axis. •Earth's axis tilts at an angle of 23.5 degrees and points toward the North Star. •the Moon has surface features that can be identified in telescope images; craters, maria, and mountains. •the Moon, Earth's satellite, is about one-fourth Earth's diameter and orbits at a distance of about 384,000 km. •scale is the size relationship between a representation of an object and the object. •scale can be expressed as a ratio when an object and its representation are measure in related units. •the moon goes through phases: "new" to "full" and back to "new" in a 4-week cycle. •the moon shines as a results of reflected light from the Sun. Half of the Moon is always illuminated (except during a lunar eclipse). •moon phase depends on how much of the Moon's illuminated surface is visible from Earth, which is determined by the relative positions of Earth and the Moon in their orbits around the Sun. •the Moon revolves around Earth once in 4 weeks, resulting in the Moon's rising about 50 minutes later each day. •the revolution of the Moon around Earth and the rotation of Earth on its axis account for the phases of the Moon and the time of day (or night) when the Moon is visible. •craters of various sizes and types result when meteoroids of various sizes impact the surface of planets and satellites. •craters can be categorized by size and physical characteristics: simple, complex, terraced, ringed (or basin), and flooded. •Earth and the Moon have been, and continue to be, subjected to the same rate of bombardment by meteoroids. •Earth's record of impacts has been erased by the actions of wind, water, and tectonic activity. •the solar system includes the Sun; eight planets and their satellites; and a host of smaller objects, including dwarf planets, asteroids, comets, Kuiper Belt objects, and Oort Cloud matter. •the solar system formed during a sequence of events that started with a nebula of dust and gas. •the Moon formed after a massive collision between the forming Earth and a planetesimal about the size of Mars. •the distance between solar system objects is enormous. •liquid water is essential for life as we know it. •the temperature on a planet depends on two major variables; distance from the Sun and the nature of the planet's atmosphere. •images can convey information about the presence and history of liquid water on planetary surfaces. •humans modify Earth's systems, creating observable effects. •a spectroscope analyzes the wavelengths of light (spectrum) coming from a light source. •scientists use spectral data from distant moons, planets, and stars to determine their temperature, composition, motion, and more. •scientific missions provide data about the composition and environmental conditions on the planets, moons, and other bodies in the solar system. •planetary-system objects move in measurable and predictable patterns. •a transit occurs when a planet passes between a star and an observer, causing a dip in the intensity of light from the star. •the magnitude and duration of the dip in light intensity during a transit reveals information about the planet. •location can be described in relation to a frame of reference.

Topic 1: **Earth as a System**	**Length: 4** sessions
Standard(s): MS-ESS1-1, MS-ESS3-4	**Academic Vocabulary:** altitude, atmosphere, biosphere, Bird's-eye view, elevation, frame of reference, Geosphere, Hydrosphere, location, point of view, Subsystem, System
Lesson Frame: School to Space	We will:
	I will:
Lesson Frame: Earth's Systems	We will:
	I will:
Lesson Frame: Moon Watch	We will:
	I will:
Essential Questions: •Where are you when you are in science class? •Why is Earth described as a system? •How does the Moon change day by day?	**Outcomes:** Earth as a System introduces students to the anchor phenomenon of Earth as an object in space. Students study images of Earth at different scales, then explore Earth's interacting subsystems. They develop a sense of planet Earth as a base from which to launch an inquiry into the vast reaches of the solar system and beyond.
Performance Tasks: •Use images to describe a location on Earth from ever-changing points of view •Explain interactions between Earth's systems •Observe the Moon and maintain a Moon log to record	**Learning Targets:** Students will learn that: •location or position can be described in terms of a frame of reference (relationship to other objects). •point of view is a position from which a visual observation is made. •Earth is a system composed of subsystems. •the moon can be observed both day and night.
Topic 2: **Earth/Sun Relationship**	**Length:** 8 sessions
Standard(s): MS-ESS1-1	**Academic Vocabulary:** axis, equator, equinox, latitude, longitude, north star, orbit, revolution, rotation, season, solar angle, solstice
Lesson Frame: Day and Night	We will:
	I will:
Lesson Frame: Summer Heat	We will:
	I will:
Lesson Frame: Day Length	We will:
	I will:
Essential Questions: •What causes day and night? •Why is it hotter in the summer? •Why are there more hours of sunlight in the summer?	**Outcomes:** In Earth/Sun Relationship, students explore the investigative phenomena of days and seasons on Earth. They develop a model incorporating the basic geometry of Earth and the Sun to explain day, night, and year.
Performance Tasks: •Use models and simulations to observe ships on round and flat Earth •Determine the direction of Earth's rotation •Use light sources and spheres to model day and night	**Learning Targets:** Students will learn that: •line of sight is the straight, unimpeded path taken by light from an object to an eye. •objects appear to sink when they move across the ocean and slip below the horizon on a curved surface. •at all times, half of Earth is illuminated and half is dark. •daytime and nighttime are the result of Earth's rotation on its axis. •Earth's axis tilts at an angle of 23.5 degrees and points toward the North Star

Topic 3: **Moon Study**	**Length:** 4 sessions
Standard(s): MS-ESS1-1, MS-ESS1-3	**Academic Vocabulary:** crater, highlands, mare, ray, rille, scaling factor
Lesson Frame: A Close Look at the Moon	We will:
	I will:
Lesson Frame: How Big/ How Far?	We will:
	I will:
Essential Questions: •What is visible on the Moon? •What does a scaled Earth/Moon scale model look like?	**Outcomes:** Moon Study introduces students to the phenomenon of surface feature of the Moon. Students explore the scale of the Earth/Moon relationship. Students also read myths to experience how other cultures explain the features and behaviors exhibited by the moon.
Performance Tasks: •Observe images of the Moon to identify and classify some major surface features •Generate a list of questions about the Moon that will guide further study •Construct a scale model of the Earth/Moon system.	**Learning Targets:** Students will learn that: •the Moon has surface features that can be identified in telescope images; craters, maria, and mountains. •the Moon, Earth's satellite, is about one-fourth Earth's diameter and orbits at a distance of about 384,000 km. •scale is the size relationship between a representation of an object and the object. •scale can be expressed as a ratio when an object and its representation are measure in related units.
Topic 4: **Phases of the Moon**	**Length:** 5 sessions
Standard(s): MS-ESS1-1, MS-ESS1-3	**Academic Vocabulary:** crescent, first quarter, full moon, gibbous, lunar eclipse, new moon, phase, solar eclipse, third quarter, waning, waxing
Lesson Frame: Observed Patterns	We will:
	I will:
Lesson Frame: Moon-Phase Models	We will:
	I will:
Lesson Frame: Moon-Phase Simulation	We will:
	I will:
Essential Questions: •What Moon-phase patterns can be observed? •What causes Moon phases?	**Outcomes:** Phases of the Moon helps students explore the phenomenon of Moon phases by gaining a better understanding of the motions of Earth and the Moon in relation to the Sun, which result in these phases.
Performance Tasks: •Observe, record, and analyze the Moon's appearance and position in relation to the Sun over a 4-week period •Use models of the Sun, Moon, and Earth to explain the mechanics of Moon phases and eclipses	**Learning Targets:** Students will learn that: •the moon goes through phases: "new" to "full" and back to "new" in a 4-week cycle. •the moon shines as a results of reflected light from the Sun. Half of the Moon is always illuminated (except during a lunar eclipse). •moon phase depends on how much of the Moon's illuminated surface is visible from Earth, which is determined by the relative positions of Earth and the Moon in their orbits around the Sun. •the Moon revolves around Earth once in 4 weeks, resulting in the Moon's rising about 50 minutes later each day. •the revolution of the Moon around Earth and the rotation of Earth on its axis account for the phases of the Moon and the time of day (or night) when the Moon is visible.

Topic 5: **Craters**	**Length:** 6 sessions
Standard(s): MS-ESS1-4, MS-ESS2-2, MS-ESS3-2, MS-ETS1-1	**Academic Vocabulary:** asteroid, comet, complex crater, ejecta, flooded crater, impact, meteoroid, regolith, simple crater
Lesson Frame: Moon Craters	We will:
	I will:
Lesson Frame: Target Earth	We will:
	I will:
Essential Questions: •Are Moon craters the results of volcanoes or impacts? •Will Earth experience a major impact in the future?	**Outcomes:** In Craters, students conduct experiments to determine if the craters on the Moon could be caused by impact events of various magnitudes. Students consider the possibility that Earth was also subjected to intense bombardment during its history and speculate on the destruction that would result from impacts on Earth comparable to those that have occurred on the Moon.
Performance Tasks: •Conduct experiments to determine the effect of meteoroid size and speed on crater characteristics •Use mathematical reasoning to determine the frequency of major impacts on Earth	**Learning Targets:** Students will learn that: •craters of various sizes and types result when meteoroids of various sizes impact the surface of planets and satellites. •craters can be categorized by size and physical characteristics: simple, complex, terraced, ringed (or basin), and flooded. •Earth and the Moon have been, and continue to be, subjected to the same rate of bombardment by meteoroids. •Earth's record of impacts has been erased by the actions of wind, water, and tectonic activity.

Topic 6: **Beyond the Moon**	**Length:** 6 sessions
Standard(s): MS-PS2-4, MS-ESS1-2	**Academic Vocabulary:** accretion, astronomical unit (AU), galaxy, gravity, light-year (ly), nebula, orbit radius, solar system, universe
Lesson Frame: What's Out There?	We will:
	I will:
Lesson Frame: Origins	We will:
	I will:
Essential Questions: •What is in the solar system? •Where did the solar system come from?	**Outcomes:** In Beyond the Moon, students explore the phenomenon of objects in outer space. They learn the major classifications into which cosmos objects are organized: solar system, galaxy, and universe, and create a sequence of events that resulted in the formation of the solar system. Finally, students weigh the evidence supporting four theories of the origin of the Moon.
Performance Tasks: •Carry out an investigation to organize objects in the cosmos into three nested systems: solar system, galaxy, universe •Analyze and interpret data to sequence the events and processes that resulted in the formation of the solar system •Present an argument citing evidence for the Moon's forming as a result of a big impact (or other theory).	**Learning Targets:** Students will learn that: •the solar system includes the Sun; eight planets and their satellites; and a host of smaller objects, including dwarf planets, asteroids, comets, Kuiper Belt objects, and Oort Cloud matter. •the solar system formed during a sequence of events that started with a nebula of dust and gas. •the Moon formed after a massive collision between the forming Earth and a planetesimal about the size of Mars.

Topic 7: **The Solar System**	**Length: 9** sessions
Standard(s): MS-ESS1-2, MS-ESS1-3, MS-ESS2-2, MS-ESS2-4, MS-ESS3-1, MS-ESS3-3, MS-ESS3-4	**Academic Vocabulary:** anthropocene, atmosphere, exoplanet

Lesson Frame: Where are the Planets?	We will:
	I will:
Lesson Frame: Comparing Temperatures and Atmospheres	We will:
	I will:
Lesson Frame: Where is the Water?	We will:
	I will:
Lesson Frame: Changing Systems	We will:
	I will:
Essential Questions: •Where are the planets in the solar system? •Which planet is most like Earth? •Where is there water in the solar system? •What impact do humans have on Earth's systems?	**Outcomes:** In The Solar System, students continue to explore the scale of the solar system by making physical and graphical models. Students explore the compositional and physical differences among the planets, the Moon, and other solar system objects. By focusing on the recent history of solar system exploration, students discover that only Earth possesses the fortuitous combination of factors that support life.
Performance Tasks: •Design and construct scale models of the solar system •Compare the temperatures and atmospheres of the planets •Analyze photographic images to search for evidence of the presence of water on planets and satellites	**Learning Targets:** Students will learn that: •the distance between solar system objects is enormous. •liquid water is essential for life as we know it. •the temperature on a planet depends on two major variables; distance from the Sun and the nature of the planet's atmosphere. •images can convey information about the presence and history of liquid water on planetary surfaces. •humans modify Earth's systems, creating observable effects.
Topic 8: **Space Exploration**	**Length: 4** sessions
Standard(s): MS-PS4-2, MS-ETS1-1	**Academic Vocabulary:** absorption line, emission line, light signature, spectroscope, spectrum, visible light
Lesson Frame: Light Spectra	We will:
	I will:
Lesson Frame: Exploration of the Solar System	We will:
	I will:
Essential Questions: •Why is light important in astronomy? •What are the big questions that guide space exploration?	**Outcomes:** In Space Exploration, students are introduced to one of the most important tools astronomers use to study distant objects in planetary systems, the spectroscope. Students use a simple spectroscope to explore the spectral signature of elements of the Sun and other light sources.
Performance Tasks: •Use a spectroscope a to analyze light coming from several light sources •Investigate the big questions scientists are asking in the exploration of the solar system and beyond	**Learning Targets:** Students will learn that: •a spectroscope analyzes the wavelengths of light (spectrum) coming from a light source. •scientists use spectral data from distant moons, planets, and stars to determine their temperature, composition, motion, and more. •scientific missions provide data about the composition and environmental conditions on the planets, moons, and other bodies in the solar system.

Topic 9: **Orbits and New Worlds**	**Length:** 7 sessions
Standard(s): MS-ESS1-1, MS-ESS1-2, MS-ESS1-3, MS-PS2-4	**Academic Vocabulary:** orbit radius, orbital period, transit, orrery
Lesson Frame: The Moons of Jupiter	We will:
	I will:
Lesson Frame: Looking for Planets	We will:
	I will:
Lesson Frame: What is Our Cosmic Address?	We will:
	I will:
Essential Questions: •What can be learned by studying the moons of Jupiter? •How are exoplanets found? •Where are you when you are in science class?	**Outcomes:** Orbits and New Worlds begins by having students use images of the moons of Jupiter to determine their orbital patterns and distances from the planet. They investigate the techniques that scientists use to search for planetary systems around other stars in our galaxy. Students redefine their place in the universe.
Performance Tasks: •Use data and images to determine the orbital period and orbit radii of the four Galilean moons of Jupiter. •Use an orrery and light sensor to model how to locate planetary systems in our galaxy.	**Learning Targets:** Students will learn that: •planetary-system objects move in measurable and predictable patterns. •a transit occurs when a planet passes between a star and an observer, causing a dip in the intensity of light from the star. •the magnitude and duration of the dip in light intensity during a transit reveals information about the planet. •location can be described in relation to a frame of reference.

Course Name:	7/8 Science Course B		
Credits:	n/a		
Prerequisites:	n/a		
Description:	Course covering aspects within Physical, Earth and Life Sciences.		
Academic Standards:	Next-Generation Science Standards		
Units:	**Unit Length:**	**Unit Standards:**	**Unit Outcomes:**
Population and Ecosystems	approximately 59	MS-LS1-6, MS-LS1-7, MS-LS2-1, MS-LS2-2, MS-LS2-3, MS-LS2-4, MS-LS2-5, MS-ESS3-3, MS-ESS3-4, MS-ETS1-1, MS-ETS1-2	In an 8-week investigation, students raise milkweed bugs in a supportive habitat to study the insect's reproductive biology. The information from this study is used to study milkweed-bug population dynamics. Students use ecosystem sorting cards to reflect on organizing concepts in ecology and develop the vocabulary associated with those concepts. Through a Jane Goodall video, students become familiar with a specific population study of chimpanzees. Students are introduced to one of ten ecoscenarios representing major biomes of Earth that will be studied throughout the course. Students use Mono Lake, an important alkaline lake, as a simple ecosystem case study. Students study the functional roles of populations to construct a food web. Students construct aquatic and terrestrial ecosystems in the classroom and observe them over time to understand ecosystem interactions. They use a scientific log to observe, describe, and monitor changes in biotic and abiotic factors. Students explore the effect of light on photosynthesis by studying wheat plants. Students learn that through photosynthesis, producers increase the biomass of an ecosystem. Students investigate the producers in specific ecosystems and identify their roles. Students model and measure the energy transferred from food. Students learn how energy provided by producers is used by all organisms. They explore how food energy moves from one trophic level to another through feeding relationships. Students simulate feeding relationships and determine what is needed to sustain a food chain. They investigate the role of decomposers in ecosystems. Students explore some of the variables in an ecosystem that limit population size. Based on their milkweed-bug study, they predict what the population would be in 12 months. Students use simulations to explore population interactions and outcomes. Students explore the importance of biodiversity on the health of the ecosystem. They investigate how humans have interacted with the ecosystem and put stresses on biodiversity. Students then learn how humans can reverse these stresses and help restore ecosystems. Students return to their ecoscenarios and use the knowledge developed in previous investigations to analyze the effects of human interactions in their ecosystem. They are given several engineering solutions and evaluate which they feel is the best solution to preserve or restore the ecosystem.

Waves	approximately 35	MS-PS4-1, MS-PS4-2, MS-PS4-3, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4	Students measure their pulse under different circumstances to think about frequency. They create waves using metal springs and use these simple waves to explore the fundamental properties of waves: wavelength, frequency, and amplitude. Students learn about wave energy and compare energy in waves with different properties. Students look at an engineering failure and consider the work engineers must do to achieve a successful design. They use these ideas to develop a chamber that can effectively block sound waves. Students explore properties of light waves. They start by using mirrors to explore reflection. Students use spectroscopes to analyze spectra of visible light and learn more about the electromagnetic spectrum. They use filters to change the spectrum of a light source and to learn about color. They determine how refraction changes the path of light rays as they travel between media. Students learn how information can be encoded and sent as digital waves to transfer large amounts of information efficiently over large distances. They test properties of fiber optic cables to develop an understanding of how total internal reflection allows data transfer by light. Students learn how data is encoded and sent as modulated waves to a recipient for demodulation. Students create digital waves and develop an understanding of how digital waves enable modern communications.
Gravity and Kinetic Energy	approximately 38	MS-PS2-1, MS-PS2-2, MS-PS2-4, MS-PS2-5, MS-PS3-1, MS-PS3-2, MS-PS3-5, MS-ESS1-2, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4	Students see an unprotected “bean brain” fall to the floor and start to think about speed, acceleration, energy transfer, and collisions. They walk along two interval tracks to collect data about speed. After graphing their results, they conclude that the slope of a graph of distance versus time is related to the speed. They then walk along a different interval track and discover that the speed required is not constant. They graph their results to learn about acceleration. Finally, students observe a ball dropping and complete a detailed analysis of its motion. They determine that the ball is not falling at a constant speed, but accelerating. They calculate the rate and compare it to the acceleration of gravity, to develop a working definition of gravity. Students use spring scales to learn about the difference between mass and weight. They compare mass and weight on different planets, then refine their definition of gravity. Students learn about Newton’s second law of motion, which describes the relationship between mass, force, and acceleration. Students roll marbles down a ramp system to collide with plastic cubes. They gather data about the cubes’ motion to make inferences about kinetic and potential energy. Students do an activity in which they review data from different collision scenarios. They analyze the data in two ways to draw conclusions about the effect of mass and speed on collisions. Finally, students experiment with horizontal collisions, learn more about Newton’s laws, and consider the implications in various situations. Students view a video that introduces the physics concept of impulse. They learn that increasing the time it takes for an object to change speed in a collision results in less force being applied to the object. Using this principle, students design a protective helmet for a model head. After several iterative designs, they share results as a class and discuss the engineering design process. To finish the course, students review big ideas and create a list of remaining physics questions. Students work together to answer questions and prepare for the Posttest.

Earth History	approximately 64	MS-ESS1-4, MS-ESS2-1, MS-ESS2-2, MS-ESS2-3, MS-ESS3-1, MS-ESS3-2, MS-ESS3-3, MS-ESS3-4, MS-ESS3-5, MS-LS4-1	Earth Is Rock uses the anchor phenomenon of the Grand Canyon to introduce students to the study of the landforms and rocks that make up Earth's crust. Through observations of aerial images of Earth's surface, sedimentary rock samples, and images from the Grand Canyon, students begin developing awareness about the complexity of Earth's crust and how geologists study it by trying to answer the question "What is the story of this place?" In Weathering and Erosion students explore the phenomena of earth material movement over the surface of Earth. Students observe a stream table to discover how water can erode sediments from one location and deposit the sorted sediments in a basin downstream. They model how rocks weather and what happens to sediments. Students also consider how soil forms. In Deposition, students investigate the phenomenon of the variety of sedimentary rocks on Earth. They look closely at the processes by which bedrock that is weathered and eroded ends up deposited in basins. There, favorable conditions can turn the sediments into sedimentary rock. Students consider how evidence in sedimentary rocks can lead to inferences about the ancient environments in which they formed. In Fossils and Past Environments, students experience the phenomenon of fossils. Students become familiar with the geologic time scale to understand how old fossils are and begin to comprehend the enormous spans of time that are described by geologic time. They use fossils to put the history of the Grand Canyon into the geologic time scale. Igneous Rocks presents students with new rock samples from a new location. It leads to an investigation of the relationship between crystal size and the formation of igneous rocks. The formation of igneous rocks is the phenomenon investigated by students. Volcanoes and Earthquakes provides engaging phenomena to investigate and gives students the opportunity to discover a pattern of geologic activity. Subduction, convection, and the theory of crustal plate tectonics are introduced to explain continental drift, plate boundary interactions, and the patterns of volcanoes and earthquakes. Mountains and Metamorphic Rocks builds on the phenomena of earthquakes and volcanoes by focusing on new landforms—mountains. Students investigate the interactions at plate boundaries that form mountains and metamorphic rocks, leading students to consider the rock cycle. In Geo Scenarios, students apply prior knowledge from the Earth History Course and new, site-specific information to develop a geologic story of a place or process. Students are introduced to four sites across the United States— four phenomena. Each team of students researches the story of one of those places, the processes that shaped it, and the implications of the story for human society. What Is Earth's Story? challenges students to put together what they have learned about Earth's geologic history and to use their knowledge to finish telling the story of the phenomenal Grand Canyon.

Unit Name: **Populations and Ecosystems**	**Length:** approximately 59
Standards: MS-LS1-6, MS-LS1-7, MS-LS2-1, MS-LS2-2, MS-LS2-3, MS-LS2-4, MS-LS2-5, MS-ESS3-3, MS-ESS3-4, MS-ETS1-1, MS-ETS1-2	**Outcomes:** In an 8-week investigation, students raise milkweed bugs in a supportive habitat to study the insect's reproductive biology. The information from this study is used to study milkweed-bug population dynamics in Investigation 7. Students use ecosystem sorting cards to reflect on organizing concepts in ecology and develop the vocabulary associated with those concepts. Through a Jane Goodall video, students become familiar with a specific population study of chimpanzees. Students are introduced to one of ten ecoscenarios representing major biomes of Earth that will be studied throughout the course. Students use Mono Lake, an important alkaline lake, as a simple ecosystem case study. Students study the functional roles of populations to construct a food web. Students construct a food web for their ecoscenario. Students construct aquatic and terrestrial ecosystems in the classroom and observe them over time to understand ecosystem interactions. They use a scientific log to observe, describe, and monitor changes in biotic and abiotic factors. Students explore the effect of light on photosynthesis by studying wheat plants. Students learn that through photosynthesis, producers increase the biomass of an ecosystem. Students investigate the producers in specific ecosystems and identify their roles. Students model and measure the energy transferred from food. Students learn how energy provided by producers is used by all organisms. They explore how food energy moves from one trophic level to another through feeding relationships. Students simulate feeding relationships and determine what is needed to sustain a food chain. They investigate the role of decomposers in ecosystems. Students explore some of the variables in an ecosystem that limit population size. Based on their milkweed-bug study, they predict what the population would be in 12 months. Students use simulations to explore population interactions and outcomes. Students explore the importance of biodiversity on the health of the ecosystem. They investigate how humans have interacted with the ecosystem and put stresses on biodiversity. Students then learn how humans can reverse these stresses and help restore ecosystems. Students return to their ecoscenarios and use the knowledge developed in previous investigations to analyze the effects of human interactions in their ecosystem. They are given several engineering solutions and evaluate which they feel is the best solution to preserve or restore the ecosystem.

Essential Questions:	**Learning Targets:**
What does a population of milkweed bugs need to survive in a classroom? What needs to be considered when building a habitat for milkweed bugs? How do milkweed bugs reproduce and grow? What is the relationship between individuals, populations, communities, and abiotic factors in an ecosystem? How is the milkweed-bug-habitat study similar to and different from Jane Goodall's population study? What are the defining characteristics of your ecosystem? What are the different biotic and abiotic components of the Mono Lake ecosystem? How do the organisms at Mono Lake interact? How do the organisms in your ecoscenario interact? What abiotic factors should be considered when setting up terrestrial and aquatic habitats? What interactions are likely for the organisms in the mini habitat? What changes have taken place in the terrariums and the class aquariums? What is the effect of light on producers? What do producers need to grow and increase biomass? What are the roles of specific producers in the ecosystem? How can we model and measure energy transfer from food? What are the kinds of work you do that require energy? What is needed to sustain a food chain? How does biomass and energy flow through an ecosystem? What happens to the energy stored in the biomass of an organism when it does? How many milkweed bugs could be in your habitat at the end of a year? What are the limiting factors that affect algae and brine shrimp populations at Mono Lake? How does predicted population growth compared to actual population growth? Why is biodiversity important in an ecosystem? What can happen when a species is introduced to an ecosystem? What impact have people had on Mono Lake? How have humans affected your ecoscenario, and what efforts have humans made to lessen this impact?	Students will learn that: •an organism is any living thing. •an organism's habitat is where it lives -- the place where it can meet all of its requirements for life. •a kind of organism that is different from all other kinds of organisms is called a species. •a population is all the individuals of a species in an area at a specified time. •an individual is one single organism; a community is all the interacting populations in a specified area. •an ecosystem is a system of interacting organisms and nonliving factors in a specified area. •biotic factors are living factors in an ecosystem; abiotic factors are nonliving factors. •ecosystems have different sets of biotic and abiotic factors. •biomes are large areas on Earth with similar abiotic factors. •the Mono Lake alkaline-lake ecosystem is defined by the interactions among the organisms and abiotic factors. •the path that food takes as one organism is eaten by another is a food chain. •the feeding relationships in an ecosystem can be represented as a food web. •all ecosystems are defined by the interactions among the organisms and abiotic factors that exist in the region. •an aquatic ecosystem functions in water. •a terrestrial ecosystem functions on land. •organisms depend on the abiotic elements in their ecosystem. •photosynthesis is the process by which energy-rich molecules are made from water, carbon dioxide, and light. •photosynthesis produces potential energy and aerobic cellular respiration transfers usable energy to organisms. •producers increase the biomass of an ecosystem through photosynthesis; ecosystems are defined by their producers. •food is energy-rich organic matter that organisms need to conduct their life processes. •every activity undertaken by living organisms involves expenditure of energy. •feeding relationships identify trophic roles. •biomass moves through an ecosystem from one trophic level to the next; only a small fraction of the biomass consumed at a level is used to produce growth (biomass) at that level; most of the biomass consumed is used for energy and much is lost to the environment. •decomposers recycle food molecules to basic particles for use by organisms in the ecosystem. •reproductive potential is the theoretical unlimited growth of a population over time. •a limiting factor is any biotic or abiotic component of the ecosystem that controls the size of a population. •biodiversity is the variety of organisms in an ecosystem. •a biodiversity index is one measure of the health of an ecosystem, and its ability to recover from stress. In a sustainable ecosystem, the system is resilient to change. •introduced species compete with native species in an ecosystem. •if an introduced species has no predators in the new ecosystem, it can thrive and become invasive. •humans affect ecosystems in both positive and negative ways. •humans rely on ecosystems for ecosystem services (provisioning, regulating, cultural, and supporting services). •ecosystems are dynamic systems of complex interactions. •disruptions to abiotic factors in ecosystems can cause shifts in populations and changes to ecosystem sustainability. •changes in ecosystems can affect services essential to humans. •solutions can be engineered to mitigate human impact.

Topic 1: **Milkweed Bugs**	**Length:** 4 sessions
Standard(s): MS-LS2-1	**Academic Vocabulary:** clutch, habitat, inference, instar, molt, nymph, observation, organism, population, species
Lesson Frame: Introducing Milkweed Bugs	We will:
	I will:
Lesson Frame: Milkweed-Bug Habitat	We will:
	I will:
Lesson Frame: Observing Milkweed-Bug Habitats	I will:
	We will:
Essential Questions: •What does a population of milkweed bugs need to survive in a classroom? •What needs to be considered when building a habitat for milkweed bugs? •How do milkweed bugs reproduce and grow?	**Outcomes:** In an 8-week investigation, students raise milkweed bugs in a supportive habitat to study the insect's reproductive biology. The information from this study is used to study milkweed-bug population dynamics in Investigation 7.
Performance Tasks: •Construct a suitable habitat for milkweed bugs and study their reproductive potential •Observe events and changes that yield information about the life cycle of an insect •Document the sequence of changes that constitute the milkweed bug's life cycle	**Learning Targets:** Students will learn that: •an organism is any living thing. •an organism's habitat is where it lives -- the place where it can meet all of its requirements for life. •a kind of organism that is different from all other kinds of organisms is called a species. •a population is all the individuals of a species in an area at a specified time.
Topic 2: **Sorting Out Life**	**Length:** 7 sessions
Standard(s): MS-LS2-1, MS-LS2-2	**Academic Vocabulary:** abiotic, biome, biotic, community, controlled experiment, ecosystem, ecosystem service, individual, observational study, population, population study
Lesson Frame: Ecosystem Card Sort	We will:
	I will:
Lesson Frame: Video Population Study	We will:
	I will:
Lesson Frame: Ecoscenarios	I will:
	We will:
Essential Questions: •What is the relationship between individuals, populations, communities, and abiotic factors in an ecosystem? •How is the milkweed-bug-habitat study similar to and different from Jane Goodall's population study? •What are the defining characteristics of your ecosystem?	**Outcomes:** Students use ecosystem sorting cards to reflect on organizing concepts in ecology and develop the vocabulary associated with those concepts. Through a Jane Goodall video, students become familiar with a specific population study of chimpanzees. Students are introduced to one of ten ecoscenarios representing major biomes of Earth that will be studied throughout the course.

Performance Tasks: •Analyze and categorize cards using evidence to determine which represent individuals, populations, communities, and ecosystems •Identify biotic and abiotic factors in an ecosystem	**Learning Targets:** Students will learn that: •an individual is one single organism; a community is all the interacting populations in a specified area. •an ecosystem is a system of interacting organisms and nonliving factors in a specified area. •biotic factors are living factors in an ecosystem; abiotic factors are nonliving factors. •ecosystems have different sets of biotic and abiotic factors. •biomes are large areas on Earth with similar abiotic factors.
Topic 3: **Mono Lake**	**Length:** 7 sessions
Standard(s): MS-LS2-2, LS-LS2-3	**Academic Vocabulary:** decomposer, detritivore, detritus, first-level consumer, food chain, food web, migratory, primary consumer, producer, secondary consumer, second-level consumer, tertiary consumer, third-level consumer
Lesson Frame: A Visit to Mono Lake	We will:
	I will:
Lesson Frame: Mono Lake Food Web	We will:
	I will:
Lesson Frame: Ecoscenario Food Webs	We will:
	I will:
Essential Questions: •What are the different biotic and abiotic components of the Mono Lake ecosystem? •How do the organisms at Mono Lake interact? •How do the organisms in your ecoscenario interact?	**Outcomes:** Students use Mono Lake, an important alkaline lake, as a simple ecosystem case study. Students study the functional roles of populations to construct a food web. Students construct a food web for their ecoscenario.
Performance Tasks: •Research the functional roles of organisms in the Mono Lake ecosystem in order to construct a food web •Develop a model known as a food web to represent feeding relationships between populations •Construct explanations about the interactions of an ecosystem in terms of functional roles	**Learning Targets:** Students will Learn that: •the Mono Lake alkaline-lake ecosystem is defined by the interactions among the organisms and abiotic factors. •the path that food takes as one organism is eaten by another is a food chain. •the feeding relationships in an ecosystem can be represented as a food web. •all ecosystems are defined by the interactions among the organisms and abiotic factors that exist in the region.
Topic 4: **Mini Habitats**	**Length:** 4 sessions
Standard(s): MS-LS2-1, MS-LS2-4	**Academic Vocabulary:** aquatic, predator, prey, terrestrial
Lesson Frame: The Physical Environment	We will:
	I will:
Lesson Frame: Introducing Life	We will:
	I will:
Lesson Frame: Observing Mini Habitats	We will:
	I will:

Essential Questions: •What abiotic factors should be considered when setting up terrestrial and aquatic habitats? • What interactions are likely for the organisms in the mini habitat? •What changes have taken place in the terrariums and the class aquariums?	**Outcomes:** Students construct aquatic and terrestrial ecosystems in the classroom and observe them over time to understand ecosystem interactions. They use a scientific log to observe, describe, and monitor changes in biotic and abiotic factors.
Performance Tasks: •Assemble the abiotic elements of an aquatic and a terrestrial mini habitat as models of natural habitats •Introduce organisms into aquatic and terrestrial mini habitats •Collect and analyze data over time, using a scientific log and observational drawings to record interactions and changes in mini habitats •Develop a model in the form of a food web for each mini habitat	**Learning Targets:** Students will Learn that: •an aquatic ecosystem functions in water. •a terrestrial ecosystem functions on land. •organisms depend on the abiotic elements in their ecosystem.
Topic 5: **Producers**	**Length:** 8 sessions
Standard(s): MS-LS1-6, MS-LS1-7, MS-LS2-3	**Academic Vocabulary:** aerobic cellular respiration, autotroph, biomass, calorie, carbohydrate, control, energy, food, heterotroph, kilocalorie, photosynthesis
Lesson Frame: Growing Producers	We will:
	I will:
Lesson Frame: Biomass and Producers	We will:
	I will:
Lesson Frame: Ecoscenario Producers	We will:
	I will:
Lesson Frame: Energy Transfer from Food	I will:
	We will:
Essential Questions: •What is the effect of light on producers? •What do producers need to grow and increase biomass? •What are the roles of specific producers in the ecosystem? •How can we model and measure energy transfer from food?	**Outcomes:** Students explore the effect of light on photosynthesis by studying wheat plants. Students learn that through photosynthesis, producers increase the biomass of an ecosystem. Students investigate the producers in specific ecosystems and identify their roles. Students model and measure the energy transferred from food.
Performance Tasks: •Grow plants to determine the role light energy plays in growth of producers in ecosystems. •Analyze experimental data to determine that plants require water, carbon dioxide, and light to produce biomass •Burn food to model and measure the energy transferred from food	**Learning Targets:** Students will Learn that: •photosynthesis is the process by which energy-rich molecules are made from water, carbon dioxide, and light. •photosynthesis produces potential energy and aerobic cellular respiration transfers usable energy to organisms. •producers increase the biomass of an ecosystem through photosynthesis; ecosystems are defined by their producers. •food is energy-rich organic matter that organisms need to conduct their life processes.

Topic 6: **Following the Energy**	**Length:** 7 sessions
Standard(s): MS-LS1-6, MS-LS2-1, MS-LS2-2, MS-LS2-3	**Academic Vocabulary:** bioaccumulation, carnivore, herbivore, omnivore, sustainable, trophic level
Lesson Frame: Using Energy	We will:
	I will:
Lesson Frame: Food-Chain Game	We will:
	I will:
Lesson Frame: Trophic Levels	I will:
	We will:
Lesson Frame: Decomposers	I will:
	We will:
Essential Questions: •What are the kinds of work you do that require energy? •What is needed to sustain a food chain? •How does biomass and energy flow through an ecosystem? •What happens to the energy stored in the biomass of an organism when it does?	**Outcomes:** Students learn how energy provided by producers is used by all organisms. They explore how food energy moves from one trophic level to another through feeding relationships. Students simulate feeding relationships and determine what is needed to sustain a food chain. They investigate the role of decomposers in ecosystems.
Performance Tasks: •Construct an explanation for how organisms get the energy they need for life •Develop and use a model to explain how matter and energy transfer across trophic levels in an ecosystem.	**Learning Targets:** Students will learn that: •every activity undertaken by living organisms involves expenditure of energy. •feeding relationships identify trophic roles. •biomass moves through an ecosystem from one trophic level to the next; only a small fraction of the biomass consumed at a level is used to produce growth (biomass) at that level; most of the biomass consumed is used for energy and much is lost to the environment. •decomposers recycle food molecules to basic particles for use by organisms in the ecosystem.
Topic 7: **Population Size**	**Length:** 8 sessions
Standard(s): MS-LS2-1, MS-LS2-2, MS-LS2-4	**Academic Vocabulary:** interdependent, limiting factor, migrate, reproductive potential
Lesson Frame: Reproductive Potential	We will:
	I will:
Lesson Frame: Limiting Factors	We will:
	I will:
Lesson Frame: Population Dynamic	I will:
	We will:
Essential Questions: •How many milkweed bugs could be in your habitat at the end of a year? •What are the limiting factors that affect algae and brine shrimp populations at Mono Lake? •How does predicted population growth compared to actual population growth?	**Outcomes:** Students explore some of the variables in an ecosystem that limit population size. Based on their milkweed-bug study, they predict what the population would be in 12 months. Students use simulations to explore population interactions and outcomes.

Performance Tasks: •Calculate the theoretical growth of a population of milkweed bugs, assuming there are no limiting factors •Use computer simulations to model how reproductive strategies and limiting factors affect population growth •Analyze field observations to determine the effects of biotic factors on population size •Describe the population fluctuations in Mono Lake in terms of limiting factors and feeding relationships and support conclusions with evidence	**Learning Targets:** Students will learn that: •reproductive potential is the theoretical unlimited growth of a population over time. •a limiting factor is any biotic or abiotic component of the ecosystem that controls the size of a population.
Topic 8: **Human Impact**	**Length:** 7 sessions
Standard(s): MS-LS2-4, MS-ESS3-3, MS-ESS3-4	**Academic Vocabulary:** biodiversity, biodiversity index, introduced species, invasive species, native species, sampling, unbiased
Lesson Frame: Biodiversity	We will:
	I will:
Lesson Frame: Invasive Species	We will:
	I will:
Lesson Frame: Mono Lake Revisited	We will:
	I will:
Essential Questions: •Why is biodiversity important in an ecosystem? •What can happen when a species is introduced to an ecosystem? •What impact have people had on Mono Lake?	**Outcomes:** Students explore the importance of biodiversity on the health of the ecosystem. They investigate how humans have interacted with the ecosystem and put stresses on biodiversity. Students then learn how humans can reverse these stresses and help restore ecosystems.
Performance Tasks: •Conduct a field survey of the biodiversity of an ecosystem •Calculate the biodiversity index for a sample of the schoolyard •Explore the impact of humans on an ecosystem	**Learning Targets:** Students will learn that: •biodiversity is the variety of organisms in an ecosystem. •a biodiversity index is one measure of the health of an ecosystem, and its ability to recover from stress. In a sustainable ecosystem, the system is resilient to change. •introduced species compete with native species in an ecosystem. •if an introduced species has no predators in the new ecosystem, it can thrive and become invasive. •humans affect ecosystems in both positive and negative ways.
Topic 9: **Ecoscenarios**	**Length:** 7 sessions
Standard(s): MS-LS2-4, MS-LS2-5, MS-ESS3-3, MS-ESS3-4, MS-ETS1-1, MS-ETS1-2	**Academic Vocabulary:** cultural service, provisioning service, regulating service, supporting service
Lesson Frame: Human Involvement	We will:
	I will:
Lesson Frame: Evaluating Solutions	We will:
	I will:
Lesson Frame: Presentations	We will:

	I will:
Essential Questions: •How have humans affected your ecoscenario, and what efforts have humans made to lessen this impact?	**Outcomes:** Students return to their ecoscenarios and use the knowledge developed in previous investigations to analyze the effects of human interactions in their ecosystem. They are given several engineering solutions and evaluate which they feel is the best solution to preserve or restore the ecosystem.
Performance Tasks: •Discuss ways that human activities affect natural ecosystems •Evaluate possible solutions for preserving and restoring natural ecosystems using evidence to support a case •Recommend natural solutions to balance the sustainability of an ecosystem with human needs for ecosystem services	**Learning Targets:** Students will learn that: •humans rely on ecosystems for ecosystem services (provisioning, regulating, cultural, and supporting services). •ecosystems are dynamic systems of complex interactions. •disruptions to abiotic factors in ecosystems can cause shifts in populations and changes to ecosystem sustainability. •changes in ecosystems can affect services essential to humans. •solutions can be engineered to mitigate human impact.

Unit Name: **Waves**	**Length:** approximately 35
Standards: MS-PS4-1, MS-PS4-2, MS-PS4-3, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4	**Outcomes:** Students measure their pulse under different circumstances to think about frequency. They create waves using metal springs. They use these simple waves to explore the fundamental properties of waves: wavelength, frequency, and amplitude. Students learn about wave energy and compare energy in waves with different properties. Students look at an engineering failure and consider the work engineers must do to achieve a successful design. They use these ideas to develop a chamber that can effectively block sound waves. Students explore properties of light waves. They start by using mirrors to explore reflection. Students use spectroscopes to analyze spectra of visible light and learn more about the electromagnetic spectrum. They use filters to change the spectrum of a light source and to learn about color. Finally, they determine how refraction changes the path of light rays as they travel between media. Students learn how information can be encoded and sent as digital waves to transfer large amounts of information efficiently over large distances. They test properties of fiber optic cables to develop an understanding of how total internal reflection allows data transfer by light. Students learn how data is encoded and sent as modulated waves to a recipient for demodulation. Students create digital waves and develop an understanding of how digital waves enable modern communications.

Essential Questions: What is frequency? What defines a wave? What is the relationship between waves properties and wave energy? How are engineering challenges solved? What is the best way to insulate a recording studio from outside sounds? What happens when light waves interact with matter? What do spectra reveal about light? What makes objects appear as different colors? What happens to light waves at the interface between different media? What are some design constraints in fiber optic communication? How is sound sent through radio waves? How are images sent through radio waves?	**Learning Targets:** Students will learn that: •a wave is a back-and-forth pattern of motion that transfers energy. •key features of waves are crests, troughs, and nodes. •waves can be described in terms of wavelength, frequency, and amplitude. •if you know the frequency and wavelength, you can calculate the velocity of a wave. •a mechanical wave travels through a medium. •the amplitude, frequency, and wavelength of a wave are related to the energy transferred by the wave. •the frequency and wavelength of a wave are related. •planning, researching, modeling, and testing can help engineers develop successful designs. •a sound wave is a mechanical wave, so it requires a medium to travel. •waves interacting with media can be absorbed or reflected. •a wave model can be used to explain the properties of light. •light travels in straight lines, except at the interface between transparent media where refraction occurs. •the angle of incidence equals the angle of reflection. •the electromagnetic spectrum extends beyond visible light. •different wavelengths of visible light are perceived as different colors. •when light shines on an object, the light is reflected, absorbed, or transmitted through the object. •light can be transmitted long distances through optical fibers. •complex information like words, sounds, and images must be encoded to be sent as light. •digital waves can have the same information as analog waves; digital waves can be improved by smaller increments. •many modern communication devices use digitized signals (sent as waves) as a reliable way to encode and transmit information. •modern technology encodes information to improve transmission quality, reliability, and speed.
Topic 1: **Make Waves**	**Length:** 6 sessions
Standard(s): MS-PS4-1	**Academic Vocabulary:** amplitude, compression wave, crest, frequency, kinetic energy, longitudinal wave, node, pulse, reflection, transverse wave, trough, velocity, wave, wavelength
Lesson Frame: Pulse Rate	We will: explore compressions waves using springs
	I will: create a sheet of observations and drawings of compression waves
Lesson Frame: Spring Waves	We will: demonstrate wave pulses and frequency using our pulse as an example
	I will: complete an exit ticket explaining how our pulse is an example of wave frequency

Essential Questions: •What is frequency? •What defines a wave?	**Outcomes:** Students measure their pulse under different circumstances to think about frequency. They create waves using metal springs. They use these simple waves to explore the fundamental properties of waves: wavelength, frequency, and amplitude.
Performance Tasks: •Collect frequency data from multiple sources •Create and describe longitudinal and transverse waves •Apply computational thinking when diagramming a wave, measuring its properties, and calculating velocity	**Learning Targets:** Students will learn that: •a wave is a back-and-forth pattern of motion that transfers energy. •key features of waves are crests, troughs, and nodes. •waves can be described in terms of wavelength, frequency, and amplitude. •if you know the frequency and wavelength, you can calculate the velocity of a wave.
Topic 2: **Wave Energy**	**Length:** 10 sessions
Standard(s): MS-PS4-1, MS-PS4-2, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4	**Academic Vocabulary:** absorb, brainstorm, constraint, criterion, decibel, energy, inverse relationship, mechanical wave, medium, prototype, research, variable
Lesson Frame: Energy in Waves	We will: examine the energy in waves looking at ocean waves as an example
	I will: complete a sheet analyzing aspects of a mechanical wave
Lesson Frame: Bridge Collapse	We will: test waves to measure the energy present in the wave
	I will: analyze and discuss as groups the finding from the activity focusing on energy in the waves
Lesson Frame: Energy in Sound Waves	We will: watch videos and discuss engineering disasters and asses solutions to avoid further disasters
	I will: analyze how we used the engineering process to address the engineering disasters
Essential Questions: •What is the relationship between waves properties and wave energy? •How are engineering challenges solved? •What is the best way to insulate a recording studio from outside sounds?	**Outcomes:** Students learn about wave energy and compare energy in waves with different properties. Students look at an engineering failure and consider the work engineers must do to achieve a successful design. They use these ideas to develop a chamber that can effectively block sound waves.
Performance Tasks: •Modify a model to see what happens when a property of a wave is changed •Evaluate information about a historical engineering failure •Design a sound studio that meets specified criteria and constraints	**Learning Targets:** Students will learn that: •a mechanical wave travels through a medium. •the amplitude, frequency, and wavelength of a wave are related to the energy transferred by the wave. •the frequency and wavelength of a wave are related. •planning, researching, modeling, and testing can help engineers develop successful designs. •a sound wave is a mechanical wave, so it requires a medium to travel. •waves interacting with media can be absorbed or reflected.

Topic 3: **Light Waves**	**Length:** 10 sessions
Standard(s): MS-PS4-3	**Academic Vocabulary:** angle of incidence, angle of reflection, color, electromagnetic spectrum, electromagnetic wave, filter, incident beam, interface, laser, normal line, ray, reflected beam, refraction, spectroscope, spectrum, total internal reflection
Lesson Frame: Mirrors	We will: use mirrors and lasers in an activity that introduces light wave properties
	I will: complete a challenge using knowledge gained on light waves and then comparing lasers and light bulbs
Lesson Frame: Spectra	We will: discuss reflection and angles of reflections from the activity and reading
	I will: gather data from activity then answer the questions on the activity found on your sheet
Lesson Frame:Color	we will: learn about the electromagnetic spectrum by looking at light through various colored filters
	I will:
Lesson Frame: Refraction	We will:
	I will:
Essential Questions: •What happens when light waves interact with matter? •What do spectra reveal about light? •What makes objects appear as different colors? •What happens to light waves at the interface between different media?	**Outcomes:** Students explore properties of light waves. They start by using mirrors to explore reflection. Students use spectroscopes to analyze spectra of visible light and learn more about the electromagnetic spectrum. They use filters to change the spectrum of a light source and to learn about color. Finally, they determine how refraction changes the path of light rays as they travel between media.
Performance Tasks: •Use lasers to carry out investigations of optical properties of different media •Use light spectra to identify light sources, and collect evidence to support light-wave explanations about color	**Learning Targets:** Students will learn that: •a wave model can be used to explain the properties of light. •light travels in straight lines, except at the interface between transparent media where refraction occurs. •the angle of incidence equals the angle of reflection. •the electromagnetic spectrum extends beyond visible light. •different wavelengths of visible light are perceived as different colors. •when light shines on an object, the light is reflected, absorbed, or transmitted through the object.
Topic 4: **Communication Waves**	**Length:** 9 sessions
Standard(s): MS-PS4-3	**Academic Vocabulary:** amplitude modulation (AM), analog, binary, carrier wave, demodulation, digital, fiber optics, frequency modulation (FM), modulation, optical fiber, pixel, resolution

Lesson Frame: Optical Fibers	We will:
	I will:
Lesson Frame: Sending Sound	We will:
	I will:
Lesson Frame: Sending Images	We will:
	I will:
Essential Questions: •What are some design constraints in fiber optic communication? •How is sound sent through radio waves? •How are images sent through radio waves?	**Outcomes:** Students learn how information can be encoded and sent as digital waves to transfer large amounts of information efficiently over large distances. They test properties of fiber optic cables to develop an understanding of how total internal reflection allows data transfer by light. Students learn how data is encoded and sent as modulated waves to a recipient for demodulation. Students create digital waves and develop an understanding of how digital waves enable modern communications.
Performance Tasks: •Transmit data through optical fibers to test design constraints •Analyze graphical displays of carrier waves, sound waves, and modulated waves to understand their relationships and describe their properties.	**Learning Targets:** Students will learn that: •light can be transmitted long distances through optical fibers. •complex information like words, sounds, and images must be encoded to be sent as light. •digital waves can have the same information as analog waves; digital waves can be improved by smaller increments. •many modern communication devices use digitized signals (sent as waves) as a reliable way to encode and transmit information. •modern technology encodes information to improve transmission quality, reliability, and speed.

Unit Name: Gravity and Kinetic Energy	**Length:** approximately 38
Standards: MS-PS2-1, MS-PS2-2, MS-PS2-4, MS-PS2-5, MS-PS3-1, MS-PS3-2, MS-PS3-5, MS-ESS1-2, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4	**Outcomes:** Students see an unprotected “bean brain” fall to the floor and start to think about speed, acceleration, energy transfer, and collisions. They walk along two interval tracks to collect data about speed. After graphing their results, they conclude that the slope of a graph of distance versus time is related to the speed. They then walk along a different interval track and discover that the speed required is not constant. They graph their results to learn about acceleration. Finally, students observe a ball dropping and complete a detailed analysis of its motion. They determine that the ball is not falling at a constant speed, but accelerating. They calculate the rate and compare it to the acceleration of gravity, to develop a working definition of gravity. Students use spring scales to learn about the difference between mass and weight. They compare mass and weight on different planets, then refine their definition of gravity. Students learn about Newton’s second law of motion, which describes the relationship between mass, force, and acceleration. Students roll marbles down a ramp system to collide with plastic cubes. They gather data about the cubes’ motion to make inferences about kinetic and potential energy. Students do an activity in which they review data from different collision scenarios. They analyze the data in two ways to draw conclusions about the effect of mass and speed on collisions. Finally, students experiment with horizontal collisions, learn more about Newton’s laws, and consider the implications in various situations. Students view a video that introduces the physics concept of impulse. They learn that increasing the time it takes for an object to change speed in a collision results in less force being applied to the object. Using this principle, students design a protective helmet for a model head. After several iterative designs, they share results as a class and discuss the engineering design process. To finish the course, students review big ideas and create a list of remaining physics questions. Students work together to answer questions and prepare for the Posttest.

Essential Questions: What is speed? What is acceleration? What is gravity? What is the relationship between mass and weight? What is gravity like on other planets compared to Earth? How is potential energy related to kinetic energy? How does the kinetic energy of an object change when its speed or mass changes? How do Newton's laws help us explain marble billiards? Which properties of physics can help us design protection from a collision? What are the big ideas that explain gravity, accelerations, kinetic energy, and collisions?	**Learning Targets:** Students will learn that: •the average speed of an object is the distance it travels in a unit of time. •the slope of the line on a graph of distance versus time represents the speed; steeper slopes represent faster speeds. •an object that does not move at a constant speed has acceleration, change of speed per unit time. •a falling object increases speed with a constant acceleration, regardless of the object's mass. •gravity is an attractive force between two objects with a rate of acceleration of 9.8 m/s2 on Earth. • gravity is an attractive force between two objects. • mass is the amount of matter in an object. •weight is the force of gravity on an object. •the acceleration of an object increases if the force acting upon it increases (F = ma). • if identical force is applied to two objects with different masses, the more massive object will accelerate less than the less massive object (F = ma). •kinetic energy is energy of moving things; potential energy is energy dependent on the position of an object. •a collision transfers kinetic energy. •increasing the mass of an object by some factor increases its kinetic energy by the same factor; increasing the speed of an object by some factor increase its kinetic energy by the same factor squared. •an object in motion will stay in motion with the same speed unless acted on by an external force. •for every action, there is an equal and opposite reaction. •impulse is force applied over a period of time. •extending the time of a collision, by slowing an object's deceleration, results in less force on the object. •safety feature to protect humans in collisions use properties of physics to slow deceleration. •engineers use an iterative process to solve problems.
Topic 1: **Acceleration**	**Length:** 13 sessions
Standard(s): MS-PS2-2, MS- PS2-4	**Academic Vocabulary:** acceleration, air resistance, average speed, constant speed, distance, force, gravity, position, slope, speed
Lesson Frame: Speed Track	We will: analyze the data found on speed and graph our findings
	I will: compare the data found in my experiment with classmates and share results on a ticket to leave
Lesson Frame: Acceleration Track	We will: use our knowledge from learning about speed and learn how the speed equation applies to acceleration
	I will: use the speed equation and apply it to answer the questions on the half sheet about acceleration
Lesson Frame: Acceleration of Gravity	We will: walk tracks at different speeds with set distances to learn about acceleration
	I will: enter data from lab on my report and calculate acceleration
Essential Questions: • What is speed? • What is acceleration? • What is gravity?	**Outcomes:** Students see an unprotected “bean brain” fall to the floor and start to think about speed, acceleration, energy transfer, and collisions. They walk along two interval tracks to collect data about speed. After graphing their results, they conclude that the slope of a graph of distance versus time is related to the speed. They then walk along a different interval track and discover that the speed required is not constant. They graph their results to learn about acceleration. Finally, students observe a ball dropping and complete a detailed analysis of its motion. They determine that the ball is not falling at a constant speed, but accelerating. They calculate the rate and compare it to the acceleration of gravity, to develop a working definition of gravity.

Performance Tasks: •Analyze line slope to make claims about an object's speed •Construct and analyze data sets to identify patterns and distinguish between speed and acceleration •Use digital tools to analyze motion video data and determine the force of gravity on Earth	**Learning Targets:** Students will learn that: •the average speed of an object is the distance it travels in a unit of time. •the slope of the line on a graph of distance versus time represents the speed; steeper slopes represent faster speeds. •an object that does not move at a constant speed has acceleration, change of speed per unit time. •a falling object increases speed with a constant acceleration, regardless of the object's mass. •gravity is an attractive force between two objects with a rate of acceleration of 9.8 m/s2 on Earth.
Topic 2: **Force of Gravity**	**Length:** 8 sessions
Standard(s): MS-PS2-2, MS-PS2-4, MS-PS2-5, MS-ESS1-2	**Academic Vocabulary:** gram, mass, Newton, weight
Lesson Frame:Mass and Weight	We will: analyze a ball drop video to assess acceleration due to gravity
	I will: complete a sheet to demonstrate my knowledge of acceleration
Lesson Frame: How Heavy?	We will: perform an activity highlighting why objects are heavy and then read about the Law of Gravity
	I will: complete the questions from the reading with my partner demonstrating my understanding of the law of gravity
Essential Questions: •What is the relationship between mass and weight? •What is gravity like on other planets compared to Earth?	**Outcomes:** Students use spring scales to learn about the difference between mass and weight. They compare mass and weight on different planets, then refine their definition of gravity. Students learn about Newton's second law of motion, which describes the relationship between mass, force, and acceleration.
Performance Tasks: • Calculate weight at locations with different gravitational forces •Analyze data to construct explanations about proportional relationships between mass, force, and acceleration	**Learning Targets:** Students will learn that: • gravity is an attractive force between two objects. • mass is the amount of matter in an object. •weight is the force of gravity on an object. •the acceleration of an object increases if the force acting upon it increases (F = ma). • if identical force is applied to two objects with different masses, the more massive object will accelerate less than the less massive object (F = ma).
Topic 3: **Energy and Collisions**	**Length:** 10 sessions
Standard(s): MS-PS2-1, MS-PS2-2, MS-PS3-1, MS-PS3-2, MS-PS3-5	**Academic Vocabulary:** collision, energy, friction, joule, kinetic energy, potential energy, variable
Lesson Frame: Potential and Kinetic Energy	We will: observe collisions to learn about the connections between potential and kinetic energy
	I will: complete and exit ticket explaining the transfer of energy in collisions from potential to kinetic
Lesson Frame: Stop or Crash	We will: design and perform and experiment with a ramp and a marble to measure the energy transferred
	I will: write an explanation detailing why the marble's speed at the bottom of the ramp was the greatest
Lesson Frame: Marble Collisions	We will: conduct a stop or crash activity to assess the change of an object's kinetic energy
	I will: analyze the data from the activity to quantify the energy change

Essential Questions: •How is potential energy related to kinetic energy? •How does the kinetic energy of an object change when its speed or mass changes? •How do Newton's laws help us explain marble billiards?	**Outcomes:** Students roll marbles down a ramp system to collide with plastic cubes. They gather data about the cubes' motion to make inferences about kinetic and potential energy. Students do an activity in which they review data from different collision scenarios. They analyze the data in two ways to draw conclusions about the effect of mass and speed on collisions. Finally, students experiment with horizontal collisions, learn more about Newton's laws, and consider the implications in various situations.
Performance Tasks: •Collect and analyze data from collisions to determine the relationships between speed, mass, and kinetic energy	**Learning Targets:** Students will learn that: •kinetic energy is energy of moving things; potential energy is energy dependent on the position of an object. •a collision transfers kinetic energy. •increasing the mass of an object by some factor increases its kinetic energy by the same factor; increasing the speed of an object by some factor increase its kinetic energy by the same factor squared. •an object in motion will stay in motion with the same speed unless acted on by an external force. •for every action, there is an equal and opposite reaction.
Topic 4: **Engineering**	**Length**: 7 sessions
Standard(s): MS-PS2-1, MS-S3-5, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4	**Academic Vocabulary:** constraint, criterion, impulse
Lesson Frame: Helmet Design Challenge	We will: use or knowledge about physics to design a helmet to protect a "bean brain"
	I will: analyze and compare successful designs as a group using our physics terms to explain success or failure
Lesson Frame: Big Ideas	We will: discuss the results of the activity and what this means to people and the importance of helmets and how they protect against concussions
	I will: answer questions from the article on concussions to solidify our learning to real world problems
Essential Questions: •Which properties of physics can help us design protection from a collision? •What are the big ideas that explain gravity, accelerations, kinetic energy, and collisions?	**Outcomes:** Students view a video that introduces the physics concept of impulse. They learn that increasing the time it takes for an object to change speed in a collision results in less force being applied to the object. Using this principle, students design a protective helmet for a model head. After several iterative designs, they share results as a class and discuss the engineering design process. To finish the course, students review big ideas and create a list of remaining physics questions. Students work together to answer questions and prepare for the Posttest.
Performance Tasks: •Define an engineering problem and design solutions through an iterative process •Engage in argument from evidence to evaluate solutions to a design challenge •Develop and use a model to describe the iterative process of engineering design •Construct explanations and ask questions about physics concepts related to kinetic energy, gravity, and collisions	**Learning Targets:** Students will learn that: •impulse is force applied over a period of time. •extending the time of a collision, by slowing an object's deceleration, results in less force on the object. •safety feature to protect humans in collisions use properties of physics to slow deceleration. •engineers use an iterative process to solve problems.

Unit Name: **Earth History**	**Length:** approximately 64
Standards: MS-ESS1-4, MS-ESS2-1, MS-ESS2-2, MS-ESS2-3, MS-ESS3-1, MS-ESS3-2, MS-ESS3-3, MS-ESS3-4, MS-ESS3-5, MS-LS4-1	**Outcomes:** Earth Is Rock uses the anchor phenomenon of the Grand Canyon to introduce students to the study of the landforms and rocks that make up Earth's crust. Through observations of aerial images of Earth's surface, sedimentary rock samples, and images from the Grand Canyon, students begin developing awareness about the complexity of Earth's crust and how geologists study it by trying to answer the question "What is the story of this place?" In Weathering and Erosion students explore the phenomena of earth material movement over the surface of Earth. Students observe a stream table to discover how water can erode sediments from one location and deposit the sorted sediments in a basin downstream. They model how rocks weather and what happens to sediments. Students also consider how soil forms. In Deposition, students investigate the phenomenon of the variety of sedimentary rocks on Earth. They look closely at the processes by which bedrock that is weathered and eroded ends up deposited in basins. There, favorable conditions can turn the sediments into sedimentary rock. Students consider how evidence in sedimentary rocks can lead to inferences about the ancient environments in which they formed. In Fossils and Past Environments, students experience the phenomenon of fossils. Students become familiar with the geologic time scale to understand how old fossils are and begin to comprehend the enormous spans of time that are described by geologic time. They use fossils to put the history of the Grand Canyon into the geologic time scale. Igneous Rocks presents students with new rock samples from a new location. It leads to an investigation of the relationship between crystal size and the formation of igneous rocks. The formation of igneous rocks is the phenomenon investigated by students. Volcanoes and Earthquakes provides engaging phenomena to investigate and gives students the opportunity to discover a pattern of geologic activity. Subduction, convection, and the theory of crustal plate tectonics are introduced to explain continental drift, plate boundary interactions, and the patterns of volcanoes and earthquakes. Mountains and Metamorphic Rocks builds on the phenomena of earthquakes and volcanoes by focusing on new landforms— mountains. Students investigate the interactions at plate boundaries that form mountains and metamorphic rocks, leading students to consider the rock cycle. In Geo Scenarios, students apply prior knowledge from the Earth History Course and new, site-specific information to develop a geologic story of a place or process. Students are introduced to four sites across the United States— four phenomena. Each team of students researches the story of one of those places, the processes that shaped it, and the implications of the story for human society. What Is Earth's Story? challenges students to put together what they have learned about Earth's geologic history and to use their knowledge to finish telling the story of the phenomenal Grand Canyon.

Essential Questions:	**Learning Targets:**
Which landforms occur at different locations on Earth? Why do there appear to be stripes on the walls of the Grand Canyon? Why do there appear to be stripes on the walls of the Grand Canyon? What happens to earth materials when water flows over landforms? How did weathering and erosion contribute to the formation of the Grand Canyon? How is soil related to rocks? What happens to sediments that get deposited in basins? How does limestone form? What do sedimentary rock layers reveal about ancient environments? How do fossils get in rocks? How old are fossils? When did the Grand Canyon rocks form? How do igneous rocks form? What affects crystal formation in igneous rocks? What can crystal size tell us about where an igneous rock formed? Where do volcanoes occur on Earth and where do earthquakes occur on Earth? Why do volcanoes and earthquakes occur where they do? What causes plates to move? What happens to Earth's crust during plate interactions? How do metamorphic rocks form? What do we need to know to tell the geologic story of a place? What is the geologic story of the Grand Canyon? How do earth materials recycle through constructive and destructive processes?	Students will learn that: •Earth's surface has a variety of different landforms and water features. •every place on Earth's surface has a unique geologic story. •rocks hold the clues to the story of a place. •limestone, sandstone, and shale are rocks found in the Grand Canyon that can be identified by their characteristics. •most landforms are shaped by slow, persistent processes that proceed over the course of millions of year: weathering, erosion, and deposition. •rock can be weathered into sediments by a number of processes, including frost wedging, abrasion, chemical dissolution, and root wedging. •particles of earth material can be categorized and sorted by size: clay, silt, sand, gravel, pebble, cobble, and boulder. •most sediments move downhill until they are deposited in a basin. Sediments that do not form rock can become widely distributed over Earth's surface as soil. •sediments deposited by water usually form flat, horizontal layers. •sediments turn into solid rock (such as sandstone, shale, and limestone) through the process of lithification, which involves compaction, cementation, and dissolution. •the relative ages of sedimentary rock can be determined by the sequence of layers. Lower layers are older than higher layers. •the processes we observe today, such as weathering, erosion, and deposition, probably acted in the same way millions of year ago, producing sedimentary rocks. •a fossil is any remains, trace, or imprint of a plant or animal that was preserved in Earth's crust during ancient times. •the fossil record represents what we know about ancient life and is constantly refined as new fossil evidence is discovered. •geologic time extends from Earth's origin to the present. •Earth's history is measured in millions and billions of years. •Index fossils allow rock layers to be correlated by age over vast distances. •Earth is composed of layers of earth materials, from its hard crust of rock all the way down to its hot core. •heat inside Earth melts rock; melted rock can cool and form igneous rocks. •molten rock cools quickly on the surface of Earth and can be identified by small mineral crystals. Molten rock that cools more slowly inside Earth forms larger mineral crystals. •volcanoes and earthquakes occur along plate boundaries. •Earth's crust and solid upper mantle make up Earth's plates. Plates can be the size of continents or larger or smaller. •Earth's plates "float" on top of the layer of viscous, semi solid earth material below-- the asthenosphere. •The asthenosphere is a heated, semisolid, semifluid material that flows due to convection currents. •Plate movements result in plate-boundary interactions that produce volcanoes, earthquakes, and continental drift. •interactions between tectonic plates at their boundaries deform the plates, producing landforms on Earth's surface. •mountains form as a results of plate interactions. •when plates interact, high heat and immense pressure can change rock into new forms of rock (metamorphic rock). •the rock cycle describes how rock is constantly being recycled and how each type of rock can be transformed into other rock types.

Topic 1:**Earth is a Rock**	**Length:** 8 sessions
Standard(s): MS-ESS1-4, MS-ESS2-1, MS-ESS2-2	**Academic Vocabulary:** calcite, correlation, elevation, geologist, landform, layer, limestone, sandstone, shale
Lesson Frame: What's the Story of This Place?	We will:
	I will:
Lesson Frame: Grand Canyon Rocks	We will:
	I will:
Lesson Frame: Correlating Grand Canyon Rocks	We will:
	I will:
Essential Questions: •Which landforms occur at different locations on Earth? •Why do there appear to be stripes on the walls of the Grand Canyon?	**Outcomes:** Earth Is Rock uses the anchor phenomenon of the Grand Canyon to introduce students to the study of the landforms and rocks that make up Earth's crust. Through observations of aerial images of Earth's surface, sedimentary rock samples, and images from the Grand Canyon, students begin developing awareness about the complexity of Earth's crust and how geologists study it by trying to answer the question "What is the story of this place?"
Performance Tasks: •Make and record observations of landforms on Earth's surface and some of the rocks that compose them •Analyze rock samples from different sites to construct rock correlation	**Learning Targets:** Students will learn that: •Earth's surface has a variety of different landforms and water features. •every place on Earth's surface has a unique geologic story. •rocks hold the clues to the story of a place. •limestone, sandstone, and shale are rocks found in the Grand Canyon that can be identified by their characteristics.
Topic 2: **Weather and Erosion**	**Length:** 9 sessions
Standard(s): MS-ESS2-1, MS-ESS2-2	**Academic Vocabulary:** abrasion, basin, bedrock, chemical reaction, chemical weathering, clay, deposition, differential erosion, erosion, frost wedging, humus, mineral, model, physical weathering, rock, rock fall, root wedging, sand, sediment, silt, soil, soil profile, sorting, weathering
Lesson Frame: Stream Table	We will:
	I will:
Lesson Frame: Weathering	We will:
	I will:
Lesson Frame: Soils	We will:
	I will:

Essential Questions: •What happens to earth materials when water flows over landforms? •How did weathering and erosion contribute to the formation of the Grand Canyon? •How is soil related to rocks?	**Outcomes:** In Weathering and Erosion students explore the phenomena of earth material movement over the surface of Earth. Students observe a stream table to discover how water can erode sediments from one location and deposit the sorted sediments in a basin downstream. They model how rocks weather and what happens to sediments. Students also consider how soil forms.
Performance Tasks: •Sort earth materials by size, using water •Use models to represent, study, and manipulate Earth processes	**Learning Targets:** Students will learn that: •most landforms are shaped by slow, persistent processes that proceed over the course of millions of year: weathering, erosion, and deposition. •rock can be weathered into sediments by a number of processes, including frost wedging, abrasion, chemical dissolution, and root wedging. •particles of earth material can be categorized and sorted by size: clay, silt, sand, gravel, pebble, cobble, and boulder. •most sediments move downhill until they are deposited in a basin. Sediments that do not form rock can become widely distributed over Earth's surface as soil.
Topic 3: **Deposition**	**Length:** 6 sessions
Standard(s): MS-ESS1-4, MS-ESS2-1, MS-ESS2-2	**Academic Vocabulary:** cement, cementation, compaction, groundwater, horizontal, ooze, precipitate, principle of original horizontality, principle of superposition, sedimentary rock, uniformitarianism
Lesson Frame: Sandstone and Shale	We will:
	I will:
Lesson Frame: Limestone	We will:
	I will:
Lesson Frame: Interpreting Sedimentary Layers	We will:
	I will:
Essential Questions: •What happens to sediments that get deposited in basins? •How does limestone form? •What do sedimentary rock layers reveal about ancient environments?	**Outcomes:** In Deposition, students investigate the phenomenon of the variety of sedimentary rocks on Earth. They look closely at the processes by which bedrock that is weathered and eroded ends up deposited in basins. There, favorable conditions can turn the sediments into sedimentary rock. Students consider how evidence in sedimentary rocks can lead to inferences about the ancient environments in which they formed.

Performance Tasks: •Identify components of sandstone, shale, and limestone •Infer change in environments through the interpretation of a sequence of sedimentary rock layers	**Learning Targets:** Students will learn that: •sediments deposited by water usually form flat, horizontal layers. •sediments turn into solid rock (such as sandstone, shale, and limestone) through the process of lithification, which involves compaction, cementation, and dissolution. •the relative ages of sedimentary rock can be determined by the sequence of layers. Lower layers are older than higher layers. •the processes we observe today, such as weathering, erosion, and deposition, probably acted in the same way millions of year ago, producing sedimentary rocks.
Topic 4: **Fossils and Past Environments**	**Length:** 10 sessions
Standard(s): MS-ESS1-4, MS-LS4-1	**Academic Vocabulary:** Cenozoic, crossbreeding, cross section, epoch, era, formation, fossil, fossil record, geologic time, index fossil, law of fossil succession, mesozoic, paleontology, paleozoic, period, Precambrian, relative time scale, stratigraphy, unconformity
Lesson Frame: Fossils	We will:
	I will:
Lesson Frame: A Long Time Ago	We will:
	I will:
Lesson Frame: Index Fossils	We will:
	I will:
Essential Questions: •How do fossils get in rocks? •How old are fossils? •When did the Grand Canyon rocks form?	**Outcomes:** In Fossils and Past Environments, students experience the phenomenon of fossils. Students become familiar with the geologic time scale to understand how old fossils are and begin to comprehend the enormous spans of time that are described by geologic time. They use fossils to put the history of the Grand Canyon into the geologic time scale.
Performance Tasks: •Construct a timeline of geologic events and ancient life •Infer ancient environments, based on rock and fossil evidence •Describe how rocks can be given a relative age, based on their relationship to other rocks	**Learning Targets:** Students will learn that: •a fossil is any remains, trace, or imprint of a plant or animal that was preserved in Earth's crust during ancient times. •the fossil record represents what we know about ancient life and is constantly refined as new fossil evidence is discovered. •geologic time extends from Earth's origin to the present. •Earth's history is measured in millions and billions of years. •Index fossils allow rock layers to be correlated by age over vast distances.
Topic 5: **Igneous Rocks**	**Length:** 6 sessions

Standard(s): MS-ESS2-1, MS-ESS2-2	**Academic Vocabulary:** asthenosphere, crust, crystal, crystallize, extrusive, igneous rock, inner core, intrusive, lava, lithosphere, magma, mantle, outer core
Lesson Frame: Earth's Layers	We will:
	I will:
Lesson Frame: Salol Crystals	We will:
	I will:
Lesson Frame: Types of Igneous Rocks	We will:
	I will:
Essential Questions: •How do igneous rocks form? •What affects crystal formation in igneous rocks? •What can crystal size tell us about where an igneous rock formed?	**Outcomes:** Igneous Rocks presents students with new rock samples from a new location. It leads to an investigation of the relationship between crystal size and the formation of igneous rocks. The formation of igneous rocks is the phenomenon investigated by students.
Performance Tasks: •Identify properties of a new set of rock samples, differentiating them from sedimentary rocks •Design an experiment to test how cooling rate affects crystal size •Confirm a relationship between cooling rate and crystal size that can be applied to igneous rock formation	**Learning Targets:** Students will learn that: •Earth is composed of layers of earth materials, from its hard crust of rock all the way down to its hot core. •heat inside Earth melts rock; melted rock can cool and form igneous rocks. •molten rock cools quickly on the surface of Earth and can be identified by small mineral crystals. Molten rock that cools more slowly inside Earth forms larger mineral crystals.
Topic 6: **Volcanoes and Earthquakes**	**Length:** 7 sessions
Standard(s): MS-ESS2-2, MS-ESS2-3, MS-ESS3-1, MS-ESS3-2	**Academic Vocabulary:** active, continental drift, continental shelf, convection, convergent boundary, divergent boundary, dormant, earthquake, extinct, latitude, longitude, plate, plate boundary, ring of fire, seismology, spreading ridge, subduction zone, tectonic, theory of plate tectonics, transform, boundary, volcano, volcanology
Lesson Frame: Mapping Volcanoes and Earthquakes	We will:
	I will:
Lesson Frame: Moving Continents	We will:
	I will:
Lesson Frame: Plate Tectonics	We will:
	I will:

Essential Questions: •Where do volcanoes occur on Earth and where do earthquakes occur on Earth? •Why do volcanoes and earthquakes occur where they do? •What causes plates to move?	**Outcomes:** Volcanoes and Earthquakes provides engaging phenomena to investigate and gives students the opportunity to discover a pattern of geologic activity. Subduction, convection, and the theory of crustal plate tectonics are introduced to explain continental drift, plate boundary interactions, and the patterns of volcanoes and earthquakes.
Performance Tasks: •Analyze volcano and earthquake data for patterns •Model continental drift that has occurred on Earth •Describe how convection and plate tectonics drive continental drift •model plate-=boundary interactions	**Learning Targets:** Students will learn that: •volcanoes and earthquakes occur along plate boundaries. •Earth's crust and solid upper mantle make up Earth's plates. Plates can be the size of continents or larger or smaller. •Earth's plates "float" on top of the layer of viscous, semi solid earth material below-- the asthenosphere. •The asthenosphere is a heated, semisolid, semifluid material that flows due to convection currents. •Plate movements result in plate-boundary interactions that produce volcanoes, earthquakes, and continental drift.
Topic 7: **Mountains and Metamorphic Rocks**	**Length:** 9 sessions
Standard(s): MS-ESS2-1, MS-ESS2-2, MS-ESS2-3	**Academic Vocabulary:** dome, fault, fault block, fold, foliation, gneiss, marble, metamorphic rock, plateau, quartzite, rock cycle, schist, slate, subduction, trench, uplift
Lesson Frame: Plate Models	We will:
	I will:
Lesson Frame: Metamorphic Rocks	We will:
	I will:
Essential Questions: •What happens to Earth's crust during plate interactions? •How do metamorphic rocks form?	**Outcomes:** Mountains and Metamorphic Rocks builds on the phenomena of earthquakes and volcanoes by focusing on new landforms— mountains. Students investigate the interactions at plate boundaries that form mountains and metamorphic rocks, leading students to consider the rock cycle.
Performance Tasks: •Simulate plate interactions to produce various landforms •Model the metamorphic rock process •Apply understanding of geologic processes (plate tectonics and the rock cycle) to interpret rock evidence	**Learning Targets:** Students will learn that: •interactions between tectonic plates at their boundaries deform the plates, producing landforms on Earth's surface. •mountains form as a results of plate interactions. •when plates interact, high heat and immense pressure can change rock into new forms of rock (metamorphic rock). •the rock cycle describes how rock is constantly being recycled and how each type of rock can be transformed into other rock types.
Topic 8: **Geoscenarios**	**Length:** 5 sessions

Standard(s): MS-ESS3-1, MS-ESS3-2, MS-ESS3-3, MS-ESS3-4, MS-ESS3-5	**Academic Vocabulary:** (none)
Lesson Frame: Introduction to the Project	We will:
	I will:
Lesson Frame: Research and Writing	We will:
	I will:
Lesson Frame: Presentations	We will:
	I will:
Essential Questions: •What do we need to know to tell the geologic story of a place?	**Outcomes:** In Geoscenarios, students apply prior knowledge from the Earth History Course and new, site-specific information to develop a geologic story of a place or process. Students are introduced to four sites across the United States— four phenomena. Each team of students researches the story of one of those places, the processes that shaped it, and the implications of the story for human society.
Performance Tasks: •Interpret various data resources to learn about a geologic site or process •Collaborate as a team to bring together data and develop an evidence-based story of a place or process •Describe how human activities and values interact with geologic processes in societal decision making •Present and communicate findings to the rest of the class	**Learning Targets:** Students will learn that: •geologic processes help tell the story of a physical place. •evidence and observations of a site's geology provide clues to tell the geologic story. •knowledge of uplift, plate tectonics, volcanism, weathering, erosion, and fossil evidence plus the principles of uniformitarianism, superposition, and original horizontality can help tell the story of a place.
Topic 9: **What is Earth's Story?**	**Length:** 4 sessions
Standard(s): MS-ESS1-4, MS-ESS2-1, MS-ESS2-2, MS-ESS2-3	**Academic Vocabulary:** (none)
Lesson Frame: Revisit the Grand Canyon	We will:
	I will:
Lesson Frame: Review the Evidence	We will:
	I will:
Essential Questions: •What is the geologic story of the Grand Canyon? •How do earth materials recycle through constructive and destructive processes?	**Outcomes**: What Is Earth’s Story? challenges students to put together what they have learned about Earth’s geologic history and to use their knowledge to finish telling the story of the phenomenal Grand Canyon.

Performance Tasks:	**Learning Targets:**
•Analyze evidence from rocks, landforms, and other resources to put together Earth's geologic story	Students will learn that: •evidence that provides clues about Earth's geologic history comes from observing rocks, landforms, and other earth materials. •scientists specialize in many different disciplines to collect and analyze evidence to help put together Earth's geologic history. •scientists use a number of different tools and techniques to analyze and synthesize evidence obtained from Earth to tell its story.

Course Name:	Financial Literacy		
Credits:	0.5		
Prerequisites:	Junior or Senior Status		
Description:	This course will help prepare students for planning and managing their personal finances. Through instruction and activities students will be introduced to the workings of budgeting, saving, paying for college, the dangers of credit and debt, taxes, insurances and the effects of career choices.		
Academic Standards:	This course follows the Next Gen Personal Finance standards adapted by Jump$tart National Standards. https://www.ngpf.org		
Units:	**Unit Length:**	**Unit Standards:**	**Unit Outcomes:**
Taxes	1.5 weeks	3c: Differentiate between gross, net and taxable income 3b: List circumstances that make it prudent to adjust the income tax withholding allowance 3b: List circumstances that make it prudent to adjust the income tax withholding allowance 3c: Differentiate between gross, net and taxable income 3d: Complete IRS Form 1040EZ, Form 1040, and applicable state income tax forms	Students will exam how a career impacts their taxes, how to file taxes and employment forms.

Banking	4.5 weeks	1a: Use a plan to manage spending and and achieve financial goals 1d: Investigate changes in personal spending behavior that contribute to wealth building Investing 1d: Illustrate how the concept of the time value of money applies to retirement planning 1e: Compare consequences of delaying investment for retirement and benefits of investing early 2a: Investigate account management services that financial institutions provide 2d: Compare the costs of cashing a check with various third parties, such as a bank or credit union, check-cashing services and retail outlets 2e: Demonstrate how to schedule and manage bill payments 2f: Write a check 2a: Investigate account management services that financial institutions provide 3a: Summarize the risks and protections of checks, stored value cards, debit cards, and online and mobile payment systems 3b: Compare the features and costs of personal checking accounts offered by different financial institutions Financial Decision Making 4d: Develop a contingency plan to deal with events, such as a car breakdown or a phone loss that might affect personal finances on short notice 8c: Develop a personal financial plan, including goals, spending-and-saving plan, investing plan, insurance plan, a net worth statement and an estate plan	An investigation into banking will be done by students, who will research about checking accounts and the banking industry. Saving is not one of the tasks Americans do well. This unit will help students to understand how vital it is to our economy to save and how they can start saving.

Credit and Loans	5 weeks	Spending & Saving 4c: Research the average costs of all expenses associated with a four-year college education Employment & Income 1a: Analyze how economic and other conditions affect income and career opportunities and the need for lifelong training and education Financial Decision Making 2a: Evaluate whether financial information is objective, accurate and current Credit & Debt 1b: Explain how credit card grace periods, methods of interest calculation and fees affect borrowing costs 1c: Categorize the types of information needed when applying for credit 1d: Compare the total cost of reducing a credit card balance to zero with minimum versus above-minimum payments, all other terms being equal and no further purchases being made. 1e: Decide the most cost-effective option for paying for a car 1f: Differentiate among various types of student loans and alternatives as a means of paying for post-secondary education 1h: Differentiate between adjustable- and fixed-rate mortgage 2a: Summarize online information about the Fair Credit Reporting Act 2b: Explain the value of credit reports to borrowers and to lenders 2c: Give examples of permissible uses of a credit report other than granting credit 2d: Identify the primary organizations that maintain and provide consumer credit reports 2e: Categorize the information in a credit report and how long it is retained 2f: Explain the rights that people have to examine their credit reports 2g: Investigate ways that a negative credit report can affect a consumer's financial options 2i: Summarize factors that affect a particular credit scoring system 2j: Analyze how a credit score affects creditworthiness and the cost of credit 3b: Examine the types of services that consumer credit counseling agencies offer 3c: Investigate the purpose of bankruptcy and its possible negative effects on assets, employability and credit cost and availability 3d: Investigate how student loan obligations differ from other kinds of debt 3e: Research a financial institution’s debt reduction services 4f: Give examples of legal and illegal debt collection practices covered by the Fair Debt Collection Practices Act 4a: Summarize online information about the Equal Credit Opportunity Act 6b: Summarize the terms of a credit card or other loan agreement Financial Decision Making 1c: Consider how personal finance decisions might affect others 1g: Predict the potential consequences of deferred payment of student loans 2a: Evaluate whether financial information is objective, accurate and current 3d: Investigate how student loan obligations differ from other kinds of debt 8b: Create a cash flow statement to illustrate cash inflows and outflows for a specific period Risk Management & Insurance 7a: Outline steps to resolve identity theft problems as recommended by the Federal Trade Commission and relevant financial institutions 7c: Investigate consumer safeguards for mobile and online banking	This part of this course will take a more indepth look into college costs, savings and spending. Student loans will be a focus and hot topics of today regarding student loans will be looked at. Focus of this unit will be on borrowing money and how to pay it back. Students will be looking at how they can also raise their credit score. This unit will discuss many aspects of our economy and how we interact with our credit. Determining where credit comes from and how to avoid debt will be the focus.

Insurance	1.5 weeks	Risk Management & Insurance 3a: Analyze the conditions under which it is appropriate for young adults to have life, health, and disability insurance 1c: Recommend insurance for the types of risks that young adults may face 3b: Investigate the requirements for health insurance coverage 3e: Explain the purposes long-term care insurance 2a: Differentiate among the main types of auto insurance coverage 2b: List factors that determine auto insurance premiums and the factors that cause them to change 2c: Determine the legal minimum amounts of auto insurance coverage required in one's state of residence and the recommended optimal amounts 2d: Calculate payment expected on an auto insurance claim after applying exclusions and deductibles Financial Decision Making 6c: Summarize the terms of a homeowners' or renters' insurance policy 6d: Summarize the terms of a health insurance plan	Students will understand the importance of having the law required insurance to protect themselves monetarily.
Budgeting	2 weeks	Spending & Saving 1a: Use a plan to manage spending and achieve financial goals 1d: Investigate changes in personal spending behavior that contribute to wealth building 1b: Specify how monetary and non-monetary assets can contribute to net worth Employment & Income 3c: Differentiate between gross, net and taxable income Financial Decision Making 8b: Create a cash flow statement to illustrate cash inflows and outflows for a specific period 6c: Summarize the terms of a homeowners' or renters' insurance policy 6f: Summarize tenant and landlord rights and responsibilities that are covered in the terms of a standard apartment lease agreement 5a: Assess the value of discussing individual and shared financial responsibilities with a roommate before moving in 8a: Create a cash flow statement to illustrate cash inflows and outflows for a specific period Risk Management & Insurance 1c: Recommend insurance for the types of risks that young adults may face. 2b: List factors that determine auto insurance premiums and the factors that cause them to change	Preparing a budget for students needs is becoming more of a priority in our economy. This unit provides the basic knowledge and skill for students to continue their lives after high school and become independent adults. This unit focuses on the basic budgeting and how to manage expenses.
Final Project	1.5 weeks	Math: 1: Make sense of problems and persevere in solving them. 3: Construct viable arguments and critique the reasoning 5: Use appropriate tools. Writing: 6: Use technology to produce and publish writing. 8: Gather relevant information and integrate the information.	Combine knowledge learned throughout the semester into one project that shows they are able to process information and relay information into one completed project.

Unit Name: **Taxes**	**Length:** 1.5 weeks
Standards: 3c, 3b, 3b, 3c, 3d	**Outcomes:** Students will exam how a career impacts their taxes, how to file taxes and employment forms.
Essential Questions: What do you think are the top three categories the government spends our tax dollars on? Do you (or another teenager you know) file taxes? Why or why not? Why do you think that teenagers make up such a small percentage of taxpayers overall? In your opinion, what could help motivate more teenagers to file taxes? Why would this help? When do people file their tax returns? What method do you think most millennials (ages 18-24) prefer to use when filing their taxes? Why?	**Learning Targets:** Students will be able to: Explain where income taxes are collected from and how they provide revenue for public expenses. Read a pay stub and describe the different deductions. Explain why so few teenagers file taxes. Identify common misconceptions about taxes and state the correct facts. Determine whether they need to file taxes based on a variety of scenarios. Identify what types of income are taxed. Understand what a W-4 form is used for and how it impacts the taxes withheld from their paycheck. Explain why making contributions to a Roth IRA with their earnings and/or tax refunds can be a good saving strategy. Identify important dates of the tax cycle. Understand the difference between common tax forms. Explain the purpose of a W-4 and what withholdings mean for their paycheck. Complete a W-4 Identify items they need to prepare their tax return. Explain the different ways they can file their taxes. Understand the purpose of a W-2 form and how to use it to file their taxes. Explain how to make a tax payment if taxes are owed.
Topic: **Taxes**	**Length:** 1.5 weeks
Standards: 3c, 3b, 3b, 3c, 3d	**Academic Vocabulary:** income tax, social security, medicare, 401K, W-4, W-2, dependents, I-9, 1040EZ, tax cycle, 1099, pay stub
Lesson Frame: Taxes and Your Pay Stub	We will: differentiate between gross, net and taxable income.
	I will: read a pay stub.
Lesson Frame: Teens and Taxes	We will: explain where income taxes are collected.
	I will: understand what a W-4 form is used for.
Lesson Frame: The Tax Cycle & Job Paperwork	We will: determine the optimal amount to withhold for personal income tax.
	I will: explain the different ways to file taxes.
Lesson Frame: How to File Your Taxes	We will: complete a 1040EZ and complete all forms associated with filling my taxes next year.
	I will: use a simulation to prepare a tax form.
Performance Tasks: Diagnostic exams, midterm and final exam, unit tests, projects, exit tickets and final project.	Notes: use exit ticket on Taxes and Your Pay Stub

Unit Name: **Banking**	**Length:** 3 weeks
Standards: 2a, 2d, 2e, 2f, 2a, 3a, 3b; Spending & Saving:1a,1d; Investing: 1d, 1e; Financial Decision Making: 4d, 8c	**Outcomes:** An investigation into banking will be done by students, who will research about checking accounts and the banking industry. Saving is not one of the tasks Americans do well. This unit will help students to understand how vital it is to our economy to save and how they can start saving.
Essential Questions: What are some of the advantages and disadvantages of having a checking account? What are the reasons to use mobile banking? What are some of the risks are for using online and mobile banking? The average U.S. household spends $290 a year on bank fees according to MarketWatch. What fees do banks charge on checking accounts? What are the advantages and disadvantages of buying now using credit/taking out a loan and buying it later by saving up and paying cash? What should you look for when selecting an account?	**Learning Targets:** Students will be able to: Explain what a checking account is used for. Understand the variety of ways they can deposit and withdraw funds from their checking account. Conduct various banking activities, such as write a check, use an ATM, and more. Describe the consequences of not being in the banking system Read a bank statement. Understand what the various components of a bank statement mean to interpret where their money goes. Explain the advantages and disadvantages of using online and mobile banking. Identify ways they can protect their checking account. Understand what direct deposit is and how they can use it. Explain what person-to-person payment methods are. Determine which payment method they would use in different scenarios. Identify common checking account fees and how to avoid them. Explain how overdraft protection works and the impact of overdraft fees. Read a Checking Account Summary. Compare overdraft policies at major US banks. Describe how saving and investing are different. Understand fundamentals of saving such as reasons for saving, how much to save, and strategies to enable saving. Explain why it is important to start investing for retirement when you are still young. Identify everyday obstacles Americans experience when trying to save money. Recognize the impact of inflation on savings. Experience simulated challenges of living paycheck to paycheck Understand why it is important to maintain an emergency fund. Identify various rules of thumb and strategies to save money. Determine whether a direct deposit or manually saving is the better strategy for them. Understand how compound interest works to increase savings. Explain the difference between a checking and savings account. Compare different savings vehicles such as a savings account, CD, and money market account. Identify important criteria to consider when selecting a savings account.
Topic: **Checking**	**Length:** 1.5 weeks
Standards: 2a, 2d, 2e, 2f, 2a, 3a, 3b	**Academic Vocabulary:** bank statement, ATM, mobile banking, direct deposit, reconcile, fees, overdraft, reorder, agreement
Lesson Frame: How Checking Works	We will: Understand the variety of ways they can deposit and withdraw
	I will: Discuss mobile banking
Lesson Frame: Online & Mobile Banking	We will: read a bank statement
	I will: explain the difference between a debit card and credit card
Lesson Frame: Beware of Banking Fees	We will: explain how overdraft protection works
	I will: complete an overdraft fee analysis
Performance Tasks: Diagnostic exams, midterm and final exam, unit tests, projects, exit tickets and final project.	Notes: Reconcile a bank statement on the board
Topic: **Saving**	**Length:** 1.5 weeks
Standards: Spending & Saving:1a,1d; Investing: 1d, 1e; Financial Decision Making: 4d, 8c	**Academic Vocabulary:** investing, retirement, inflation, emergency fund, unemployment, compound interest
Lesson Frame: Save Early & Often	We will: illustrate how the concept of the time value of money applies to retirement planning.
	I will: read a graph to compare saving over time.
Lesson Frame: Saving Only Seems Hard	We will: plan to manage spending and look at financial goals.

	I will: identify rules and strategies to save money.
Lesson Frame: Saving is Easy!	We will: compare consequences of delaying investment for retirement.
	I will: determine how much I need to save right now.
Lesson Frame: Where to Save	We will: investigate financial institutions that provide the best services for me.
	I will: understand compound interest.
Performance Tasks: Diagnostic exams, midterm and final exam, unit tests, projects, exit tickets and final project.	Notes:

Unit Name: **Credit and Loans**	**Length:** 5 weeks
Standards: Spending & Saving: 4c, 1a; Financial Decision Making: 2a; Credit & Debt: 1f; Financial Decision Making: 2a, 1c, 8b, 1g, 3d; Credit & Debt: 1c, 1d, 1b, 6b, 1e, 1h; Credit and Debt: 2a, 2b, 2c, 2d, 2e, 2f, 2g, 2i, 2j, 3b, 3c, 3d, 3e, 4f, 4a; Risk Management & Insurance: 7a, 7c	**Outcomes:** This part of the course will take a more indepth look into college costs, savings and spending. Student loans will be a focus and hot topics of today regarding student loans will be looked at. This unit will also cover borrowing money and how to pay it back. Students will be looking at how they can also raise their credit score. This unit will also discuss many aspects of our economy and how we interact with our credit. Determining where credit comes from and how to avoid debt will be the focus.
Essential Questions: Why do you think savings, scholarships, and state aid are good “preparation” steps to take before applying for federal financial aid? Your friend asks you, “How early do you think I should start saving and searching for scholarships and state aid?” What do you recommend? Why? What is a financial aid award letter? How are credit cards similar or different than debit cards? What do you think are some of the advantages and disadvantages to having and using a credit card? What are the different fees that credit card companies charge borrowers? How do you avoid paying these fees? What do people use loans for? When is it good to use a loan? What do you know about how loans work? Why do most people need a mortgage to buy a home? What is one argument for why college students should be using credit cards? If someone you did NOT know wanted to borrow money, what would you want to learn about them before deciding? Why? If someone were to grade you on your financial habits, what grade would you get? Assume you graduate high school with an outstanding GPA. What are the short- and long-term benefits? Assume you graduate high school with a subpar GPA. What are the short- and long-term consequences? Why do you think identity theft is so common and so profitable for thieves?	**Learning Targets:** Students will be able to: Identify the quantitative and qualitative benefits of going to college. Explain the importance of researching expected starting salaries when choosing a college and major. Understand common costs associated with college. Explain the difference between sticker price and net price. Explain the role the FAFSA plays in the financial aid process. Read a Student Aid Report (SAR) and understand the role of their Expected Family Contribution (EFC)ns about paying for college. Understand the different loan repayment options available. Identify the major types of credit and their characteristics. Understand and correctly use the three basic components of lines of credit: principal, interest rate, and term. Understand how the use of a credit card can impact the total cost of purchasing goods and services. Review the Schumer Box and credit card agreement to understand key terms before signing up for a credit card. Explain what a mortgage is and why most Americans require one to finance a home. Understand how down payment, term, and principal influence the overall cost of a mortgage and the size of monthly payments. Explain how amortization impacts loan structure and monthly payments. Provide three common examples of loans. Understand why it can be difficult to qualify for a loan. Explain the importance of establishing credit as a method of opening financial opportunity. List ways that teens can begin establishing credit. Enumerate the components of a credit report and how long each data type is retained. Understand which people or organizations may review your credit report and why. Explain key components of the Fair Credit Reporting Act and how it impacts lenders and borrowers. Understand the importance of reviewing one’s credit report and the steps to take to find and dispute errors. Describe how credit score impacts the ability to borrow money and at what rate. Understand the implications of a thin file and how they can build credit and improve their score. Summarize the rules contained in the Equal Credit Opportunity Act. Understand the consequences for not paying one’s debts. Generate a list of responsible strategies that can be used by an individual to pay down and eliminate their debts. Explain the difference between High Rate and Debt Snowball repayment methods. Decide whether credit counseling could help them manage debt. Understand the consequences for not paying one’s debts and the choices of last resort for out-of-control debt. Describe the basics of how payday and auto title loans work and what role they play in the financial landscape. Recognize their rights under the Fair Debt Collection Act.
Topic: **Paying for College**	**Length:** 1.5 weeks
Standards: Spending & Saving: 4c, 1a; Financial Decision Making: 2a; Credit & Debt: 1f; Financial Decision Making: 2a, 1c, 8b, 1g, 3d	**Academic Vocabulary:** financial aid, FAFSA, SAR, EFC, scholarship, grants, federal stafford loans
Lesson Frame: Paying for College	We will: identify benefits of going to college.
	I will: understand the costs associated with college.
Lesson Frame: Applying for the FAFSA	We will: understand what the FAFSA is for.
	I will: understand the importance of submitting the FAFSA.
Lesson Frame: Scholarships & Grants	We will: understand the national trends in student debt .
	I will: find scholarships.
Lesson Frame: Student Loans	We will: differentiate between the various types of loans.
	I will: explain the differences between federal and private loans.
Lesson Frame: Financial Aid Packages	We will: consider how personal finance decisions might affect others.

	I will: read a SAR.
Lesson Frame: Budgeting During College	We will: start a monthly college budget.
	I will: envision their college career and make choices that impact their college budget.
Lesson Frame: Student Loan Repayment	We will: use a plan to manage spending.
	I will: identify steps to prepare for student loan repayment.
Performance Tasks: Diagnostic exams, midterm and final exam, unit tests, projects, exit tickets and final project. Analyze three student profiles and choose a repayment option that works best for them.	Notes: elevate the work for those going for a 2, 4, 6 & 8 degree
Topic: **Types of Credit**	**Length:** 2 weeks
Standards: Credit & Debt: 1c, 1d, 1b, 6b, 1e, 1h	**Academic Vocabulary:** credit, principal, interest rate, term, statement, debit card, Schumer Box, agreement, amortization, financing
Lesson Frame: Introduction to Credit	We will: explain why a person needs or wants credit.
	I will: identify the major types of credit.
Lesson Frame: Credit Cards as a Young Adult	We will: compare the total cost of credit card debt.
	I will: understand cc debt as good or bad and the responsibility with using them.
Lesson Frame: How Credit Cards Work	We will: explain how credit card grace periods and interest work for billing purposes.
	I will: how to make cc billing payments and how to avoid interest.
Lesson Frame: Credit Card Fine Print	We will: summarize terms of a cc or loan agreement.
	I will: review the Schumer Box.
Lesson Frame: Select a Credit Card	We will: find information needed when applying for credit.
	I will: avoid marketing schemes that might lead to bad credit decisions.
Lesson Frame: Loan Fundamentals	We will: question why people need loans.
	I will: understand why it can be difficult to qualify for a loan.
Lesson Frame: Understanding Auto Loans	We will: decide the most cost-effective option for paying for a car.
	I will: analyze different auto loan offers to determine the best financing terms.
Lesson Frame: Understanding Mortgages	We will: differentiate between adjustable and fixed-rate mortgages.
	I will: explain what a mortgage is and why most people need one to finance a home.
Performance Tasks: Diagnostic exams, midterm and final exam, unit tests, projects, exit tickets and final project.	Notes: Use end of unit test.
Topic: **Managing Credit**	**Length:** 1.5 weeks
Standards: Credit and Debt: 2a, 2b, 2c, 2d, 2e, 2f, 2g, 2i, 2j, 3b, 3c, 3d, 3e, 4f, 4a; Risk Management & Insurance: 7a, 7c	**Academic Vocabulary:** credit, credit report, credit score, identity theft
Lesson Frame: Why You Need Credit	We will: explain the value of a credit report.
	I will: list ways teens can begin establishing credit.
Lesson Frame: Your Credit History	We will: summarize online information about the Fair Credit Reporting Act.
	I will: understand which people or orgs. may review your credit report and why.

Lesson Frame: Read a Credit Report	We will: outline the process of disputing inaccurate credit report data.
	I will: read a credit report.
Lesson Frame: Intro to Credit Scores	We will: summarize factors that affect a particular credit scoring system.
	I will: identify ways of finding out one's credit score.
Lesson Frame: Why Credit Scores Matter	We will: summarize online information about the Equal Credit Opportunity Act.
	I will: describe how your credit score impacts the ability to borrow money.
Lesson Frame: Identity Theft	We will: outline steps to resolve identity theft problems.
	I will: explain actions to take if they become a victim of identity theft.
Lesson Frame: Debt Management	We will: develop a personal financial plan to manage debt.
	I will: generate a list of responsible strategies that can be used by someone to pay down debt.
Lesson Frame: Avoiding Credit Trouble	We will: give examples of legal and illegal debt collection.
	I will: understand the consequences of not paying one's debts.
Performance Tasks: Diagnostic exams, midterm and final exam, unit tests, projects, exit tickets and final project.	Notes: May look at types of bankruptcy.

Unit: **Insurance**	**Length:** 1.5 weeks
Standards: Risk Management & Insurance; 3a, 1c, 3b, 3e, 2a, 2b, 2c, 2d; Financial Decision Making: 6c, 6d	**Outcomes:** Students will understand the importance of having the law required insurance to protect themselves monetarily.
Essential Questions: What risks do you take in an average day? (Pick 3) What are the potential consequences? What (if anything) do you do to protect yourself against those risks? Do you already have any types of insurance? If so, which one(s)? Who pays for it(them)? If not, what type of insurance do you anticipate needing first in life? Why? Consider your life and identify other things (aside from your health and car) that you might want to receive insurance for. List as many as you can and explain why it may be important to get insurance for them.Every budget has a finite amount of money to allocate. Assume you have a full-time job. Would you devote “extra” money in your budget to paying down student loans, saving in an emergency fund, or buying better insurance coverage? How would you make your decision?	**Learning Targets:** Students will be able to: Identify risks and protection strategies. Illustrate how everyone risks financial loss and how insurance shares that risk. Discuss factors that impact insurance premiums and the relationship between premiums and out-of-pocket expenses. Explain the basics of how insurance companies operate. Conduct online research to understand basic information about distinct insurance policy types. Discern commonalities between different types of insurance to reinforce the concepts of how risk pooling, financial protection, and filing a claim work. List factors that determine auto insurance premiums. Describe the main types of auto insurance policies and compare state requirements. Explain a deductible, out-of-pocket expenses, and what insurance will pay for in different situations. Choose an appropriate level of car insurance coverage. Understand the financial tradeoff between premiums and deductibles/out-of-pocket costs under various insurance plans. Appreciate the “randomness” of accidents and illnesses and how insurance protects against financial ruin.
Topic: **Insurance**	**Length:** 1.5 weeks
Standards: Risk Management & Insurance; 3a, 1c, 3b, 3e, 2a, 2b, 2c, 2d; Financial Decision Making: 6c, 6d	**Academic Vocabulary:** insurance premiums, policy, risk, deductible, coverage, accident
Lesson Frame: Insurances a Vital Risk Management	We will: find conditions where it is appropriate for you to have various insurance coverage.
	I will: identify risk strategies.
Lesson Frame: Fundamentals of Insurance	We will: investigate the requirements for health insurance.
	I will: conduct online research to understand basic policy types.
Lesson Frame: Types of Insurance	We will: explain the purpose of long-term care.
	I will: find differences between different types of insurance.
Lesson Frame: Auto Insurance	We will: list factors that determine auto insurance premiums.
	I will: describe the main types of auto insurance policies and compare state requirements.
Lesson Frame: Health Insurance	We will: investigate the requirements for health insurance coverage.
	I will: understand the benefits of employer-sponsored health insurance.
Lesson Frame: Financial Impact of Insurance	We will: analyze the factors that influence the cost of renters insurance.
	I will: understand the financial trade off between premiums and deductibles.
Performance Tasks: Diagnostic exams, midterm and final exam, unit tests, projects, exit tickets and final project.	Notes: Fill out an auto accident report and diagram.

Unit: **Budgeting**	**Length:** 2 weeks
Standards: Spending & Saving: 1a, 1d, 1b; Employment & Income: 3c; Financial Decision Making: 8b, 6c, 6f, 5a, 8a; Risk Management & Insurance: 1c, 2b	**Outcomes:** Preparing a budget for students needs is becoming more of a priority in our economy. This unit provides the basic knowledge and skill for students to continue their lives after high school and become independent adults. This unit focuses on the basic budgeting and how to manage expenses.
Essential Questions: Imagine yourself as a recent college graduate who has just secured a full time job. How do you think your spending as a college grad will compare with your current spending as a teen? What are the first three steps you would take to create a budget for yourself? What top three criteria would you use to evaluate if the apartment is/is not a good fit for you? How can Facebook make you poorer?	**Learning Targets:** Students will be able to: Track and evaluate a sample student's current spending habits and expenses. Determine what the student's priorities and financial goals are. Explain how a budget can help the student achieve their financial goals. Create a plan that outlines next steps for the student to take. Explain the difference between gross income and net income. Understand the importance of using net income when budgeting. Discuss the 50-20-30 rule and other budgeting strategies to use when creating a budget and to save money. Create a salary-based budget. Explain what "cost of living" means and why it changes depending on location. Identify important factors to consider when deciding where to live. Select a city to live in based on their financial situation, values, and other personal preferences. Understand the initial, recurring, and potential other costs that come with owning a car. Identify alternatives to car ownership and the costs associated with these options. Determine whether they need a car based on their transportation needs and wants. Describe common budgetary mistakes to avoid. Explain the difference between budgetary needs and wants and how these change from person to person. Describe strategies to use when trying to determine a need from a want. Assess their own values in order to create a monthly budget for their discretionary spending.
Topic: **Budgeting**	**Length:** 2 weeks
Standards: Spending & Saving: 1a, 1d, 1b; Employment & Income: 3c; Financial Decision Making: 8b, 6c, 6f, 5a, 8a; Risk Management & Insurance: 1c, 2b	**Academic Vocabulary:** budget, net worth, net income, cost of living, rental agreement
Lesson Frame: Case Study: How Do I Budget	We will: use a plan to manage spending and achieve financial goals.
	I will: track current spending habits and expenses.
Lesson Frame: Budgeting 101	We will: investigate changes in personal spending behavior that contribute to wealth building.
	I will: create a plan that outlines next steps for the student to take.
Lesson Frame: How to Create a Budget	We will: create a cash flow statement to illustrate cash inflows and outflows.
	I will: explain the difference between gross income and net income.
Lesson Frame: The Cost of Living	We will: investigate the cost of living.
	I will: select a city to live based on their financial situation.
Lesson Frame: Renting an Apartment	We will: summarize terms of a renters policy.
	I will: identify what steps they need to take to find and rent an apartment.
Lesson Frame: Budgeting with Roommates	We will: assess the value of shared financial responsibilities with a roommate.
	I will: create a budget that is tailored to different roommates needs and preferences.

Lesson Frame: Budgeting for Transportation	We will: list factors that determine auto insurance premiums and the factors that cause them to change.
	I will: identify alternatives to car ownership and the costs associated with these options.
Lesson Frame: Budgeting for Food	We will: plan to manage spending.
	I will: plan a food budget that takes both groceries and dining out into consideration.
Lesson Frame: Needs vs. Wants	We will: describe common budgetary mistakes to avoid.
	I will: explain the difference between wants and needs.
Performance Tasks: Diagnostic exams, midterm and final exam, unit tests, projects, exit tickets and final project.	Notes: use Budgeting Cashcabulary Quizlet

Course Name:	**Business and Personal Law**		
Credits:	0.5		
Prerequisites:	NA		
Description:	Students study the underlying legal concepts that personal and business law are based on to understand the importance of the law in general.		
Academic Standards:	Business Law and Ethics (BLE 1-6.c) WI Business & IT standards book; https://dpi.wi.gov/bit/standards		
Units:	**Unit Length:**	**Unit Standards:**	**Unit Outcomes:**
What is Law	4 weeks	Social Responsibility	Students will learn about morals and ethics and how are they applied to our legal system. Students will identify different kinds of laws and crimes. About the relationship between ethics and the law, and the structure of the court system in the United States. Ethics are the rules we use to distinguish right from wrong and guide our behavior.
Consumer Contracts	2 weeks	Sales & Consumer Law	This unit gives students the basic elements found in an offer and acceptance. Given a case study the students will analyze the case to determine if an acceptance occurred and explain why the contract is legal or not. General agreements will be examined and how they apply to real life. Elements of contracts are identified and who becomes a party. How contracts come to an end or are ended are also determined.
Consumer Law	3 weeks	Legal Process	Students will consider what an offer and acceptance are and what they are not. Students will research on how we are protected under our consumer laws. Contracts can be voided or voidable, students will examine the details in the difference and when it can happen.
Mock Trial	2-3 weeks	Legal Process	Students will practice trial proceedings in a classroom set up court. The mission of the Wisconsin High School Mock Trial Program is to foster understanding and respect for the legal system and the rule of law.
Forms of Business organizations	1 week	Types of Ownership	How businesses form and start are the focus of this unit. Students will examine how a sole proprietorship and a corporation are different. Students will define different forms of business that can be created in our economic system.
Employment Laws	1 week	Employment	Students will understand what laws protect our employment. A general understanding of employment laws and how they affect their positions.

Unit Name: **What is Law?**	**Length:** 4 weeks
Standards: Social Responsibility: BLE5.a & b & c & e & BLE 1.a	**Outcomes:** Students will learn about morals and ethics and how are they applied to our legal system. Students will identify different kinds of laws and crimes. About the relationship between ethics and the law, and the structure of the court system in the United States. Ethics are the rules we use to distinguish right from wrong and guide our behavior.
Essential Questions: What protection does the Constitution provide to US citizens? Why are ethics important in business decisions and law? What is strict liability? What are the elements of negligence? What is negligence?	**Learning Targets** Explain how ethical decisions are made. Identify the different ethical character traits. Describe how the law relates to ethics. Explain the importance of the law. Identify the parts of the Constitution. Explain the components of common law. Explain the purposes of statutory law. Identify the ways that the courts make law. Explain the differences between categories of crime. Distinguish federal from state criminal law. Describe the elements of a crime. Determine several defenses to criminal acts. Explain the differences between penalties for committing felonies and misdemeanors. Explain the differences between categories of crime. Distinguish federal from state criminal law. Describe the elements of a crime. Determine several defenses to criminal acts. Explain the differences between penalties for committing felonies and misdemeanors. Describe the different categories of crime. Identify several special crimes that involve the use of motor vehicles. Define different types of business crimes, such as arson, forgery, and embezzlement. Define negligence. Explain the concepts of the reasonable person test and proximate cause. Explain the concept of strict liability. Compare and contrast negligence, strict liability, and proximate cause. Distinguish between a tort and a crime. Differentiate between and give examples of negligence and intentional torts. Explain a person's rights and duties in relation to tort law. Describe remedies available in tort law. List the main intentional torts against people and property.
Topic 1: **Foundations of Law**	**Length:** 1 week
Standard(s): BLE5.a & b & c & e	**Academic Vocabulary:** empathy, prevalent, mediator, jeopardy
Lesson Frame: What are ethical decisions	We will: analyze what is a law.
	I will: understand the four ethical character traits.
Lesson Frame: What is common law	We will: explain why laws are necessary.
	I will: understand my legal rights and responsibilities.
Performance Tasks: Case study, discussion, articles, writing activity, self-check, chapter questions	Notes:
Topic 2: **The Court System and Procedures**	**Length:** 1/2 week
Standard(s): BLE 1.a	**Academic Vocabulary:** appellate court, common law, statute, arraignment, jeopardy.
Lesson Frame: Crimes and Criminal Justice	We will: investigate what kind of court that a teenager might have to appear in if they commit an offense.
	I will: identify alternative dispute resolution techniques.
Lesson Frame: Types of Crimes	We Will: differentiate between civil and criminal cases.
	I will: list the steps in a criminal prosecution.
Performance Tasks: Case study, discussion, articles, writing activity, self-check, chapter questions	Notes:

Topic 3: **Crimes and Criminal Justice**	**Length:** 1/2 week
Standard(s): BLE 5. a & b & c & e	**Academic Vocabulary:** intent, motive, impulse, larceny, robbery, murder
Lesson Frame: Crimes and Criminal Justice	We will: define entrapment.
	I will: determine several defenses to criminal acts.
Lesson Frame: Types of Crimes	We will: examine how the federal government keeps up with changing American society.
	I will: examine changes in society that law should keep up with.
Performance Tasks: Case study, discussion, articles, writing activity, self-check, chapter questions	Notes:
Topic 4: **Types of Crimes**	**Length:** 1 week
Standard(s): BLE5.a & b & c & e	**Academic Vocabulary:** defendant, plaintiff, prosecutor, infarction
Lesson Frame: Crimes and Criminal Justice	We will: examine property crimes.
	I will: define different types of business crimes.
Lesson Frame: Types of Crimes	We will: look at the differences between assault and battery.
	I will: look at hot issues in our current society that affect crime.
Performance Tasks: Case study, discussion, articles, writing activity, self-check, chapter questions	Notes:
Topic 5: **Definition of a Tort**	**Length:** 1 week
Standard(s): BLE5.a & b & c & e	**Academic Vocabulary:** negligence, assumption of risk, compensate, distress, foreseeable
Lesson Frame: Torts and Crimes	We will: identify elements of a tort.
	I will: understand the history and necessity of tort law.
Lesson Frame: Negligence and Intentional Torts	We will: be able to prove negligence.
	I will: define a misdemeanor and a felony.
Lesson Frame: Legal Options	We will: list the main intentional torts against people and property.
	I will: discuss a case study involving an intentional tort.
Performance Tasks: Case study, discussion, articles, writing activity, self-check, chapter questions	Notes:
Topic 6: **Negligence and Liability**	**Length:** 1 week
Standard(s): BLE5.a & b & c & e	**Academic Vocabulary:** vandalism, burglary, larceny, robbery, intent, motive

Lesson Frame: Rationality and Fairness	We will: differentiate between negligence and strict liability.
	I will: give examples of strict liability.
Lesson Frame: Realistic and Impartial	We will: explain the concepts of reasonable person test and proximate cause.
	I will: compare negligence with strict liability.
Lesson Frame: Reasonably Anticipated	We will: discuss if the injured party is required to prove negligence.
	I will: discuss a case study involving a negligence.
Performance Tasks: Case study, discussion, articles, writing activity, self-check, chapter questions	Notes:

Unit Name: **Consumer Contracts**	**Length:** 2 weeks
Standards: Sales and consumer law	**Outcomes:** This unit gives students the basic elements found in an offer and acceptance. Given a case study the students will analyze the case to determine if an acceptance occurred and explain why the contract is legal or not. General agreements will be examined and how they apply to real life. Elements of contracts are identified and who becomes a party. How contracts come to an end or are ended are also determined.
Essential Questions: What are the differences among valid, void, and voidable contracts? What are the differences between express and implied contracts? What is a unilateral contract? What are the requirements of an offer? What are the requirements of an acceptance? When is an offer terminated? How are most contracts discharged? What is substantial performance? What is breach of contract?	**Learning Targets:** Explain the nature and importance of contracts. Identify the elements of a valid contract. Analyze the different classes of contract. Differentiate between express and implied contracts, unilateral and bilateral contracts, and oral and written contracts. Explain the requirements of a valid offer. Recognize the requirements of an acceptance. Distinguish between an offer, an invitation to negotiate, an acceptance, and a counteroffer. Explain how offers are terminated. Assess contractual capacity. Explain the Statute of Frauds and the parol evidence rule. List minors' contractual rights and responsibilities. Define legality and illegality. Explain how and when contracts can be discharged. Analyze the concept of performance. Describe the rules that apply to transfer of rights and duties. Understand the difference between delegation and assignment.
Topic 1:**What is a contract?**	**Length:** 1 week
Standard(s): BLE5.a & b & c & e	**Academic Vocabulary:** Capacity, Consideration, Legality, Offer, Acceptance, Genuine agreement
Lesson Frame: Identify Federal statutes and objectives	We will: Identify unfair trade practices.
	I will: explain the importance of contracts.
Lesson Frame: Identify Federal Agencies and areas of protection	We will: Distinguish between an offer, an invitation to negotiate, acceptance and a counteroffer.
	I will: Identify mislabeling goods.
Lesson Frame: How government promotes consumer protection	We will: Explain the requirements of a valid contract.
	I will: discuss remedies for injured consumers.
Performance Tasks: Case study, discussion, articles, writing activity, self-check, chapter questions	Notes:
Topic 2: **Elements of a Contract**	**Length:** 1 week
Standard(s): BLE5.a & b & c & e	**Academic Vocabulary:** assumption, usury, dispensing, capacity, minor, majority, emancipated

Lesson Frame: Define When an Offer Has Been Made	We will: define offer.
	I will: assess contractual capacity.
Lesson Frame: Classify contracts	We will: identify parties to a contract.
	I will: list minor's contractual rights and responsibilities.
Lesson Frame: Consideration	We will: give examples to mutual consideration.
	I will: list exceptions to consideration.
Performance Tasks: Case study, discussion, articles, writing activity, self-check, chapter questions	Notes:
Topic 3: **How Contracts Come to an End**	**Length:** 1 week
Standard(s): BLE5.a & b & c & e	**Academic Vocabulary:** substituted, expire, affected, tender, delegation, breach, discharge
Lesson Frame: Transferring and Ending Contracts	We will: explain how contracts can be discharged.
	I will: analyze the concept of performance.
Lesson Frame: Voidable Contracts and Remedies	We will: describe the rules that apply to transfers of rights and duties.
	I will: define breach of contract.
	We will: understand the difference between delegation and assignment.
	I will: differentiate among the ways contracts can be undermined.
Performance Tasks: Case study, discussion, articles, writing activity, self-check, chapter questions	Notes:

Unit Name: **Consumer Law**	**Length:** 2 weeks
Standards: UCC Consumer Protection (BLE3.a & b)	**Outcomes:** Students will consider what an offer and acceptance are and what they are not. Students will research on how we are protected under our consumer laws. Contracts can be voided or voidable, students will examine the details in the difference and when it can happen.
Essential Questions: To what kinds of transactions does the law of sales apply? When must sales contracts be in writing? What are the exceptions? When do title and risk of loss pass from the seller to the buyer in a delivery contract? What is the warranty of title? What are the three ways an express warranty can be made? What is the cooling-off rule?	**Learning Targets:** Students will be able to: Explain the Uniform Commercial Code. Compare and contrast service contracts and contracts for the sale of goods. Explain when title and risk of loss pass in a sale of goods. List the remedies of the buyer and seller when a sales contract is breached. Distinguish different types of consumer fraud. Describe laws and agencies that protect consumers. Identify various types of warranties. Describe how warranties may be excluded or modified. Determine where to get consumer protection assistance.
Topic 1: **Consumer Law and Contracts**	**Length:** 1 week
Standard(s): BLE3.a & b	**Academic Vocabulary:** uniform, dominant, revoke, UCC, firm offer, title, bill of sale, risk of loss
Lesson Frame: Sales contracts	We will: discuss receiving damaged goods on how to remedy the situation.
	I will: list remedies of the buyer and seller when a sales contract is breached.
Lesson Frame: Consumer Protection	We will: discuss the "buyer beware" quote and how it applies to our purchases.
	I will: identify various types of warranties.
Performance Tasks: Case study, discussion, articles, writing activity, self-check, chapter questions	Notes:
Topic 2: **Personal Property**	**Length:** 1 week
Standard(s): BLE3.a & b	**Academic Vocabulary:** disclose, option, exclude, warranty, express warranty, implied warranty
Lesson Frame: Types of Property	We will: discuss the rules that apply to a sale made at another location other than the main business.
	I will: explain the concept of intellectual property.
Lesson Frame: Bailments	We will: define bailment.
	I will: discuss the standard care of bailees must use.
	We will: define a hotel keepers liability

	I will: identify a common carrier's liability of loss or damaged goods.
Performance Tasks: Case study, discussion, articles, writing activity, self-check, chapter questions	Notes:

Unit Name: **Mock Trial**	**Length:** 2-3 weeks
Standards: Legal Process: BLE1.b & c We will be following the State Bar of Wisconsin's mock trial competition set up on: https://www.wisbar.org/mock_trial/Pages/Teams.aspx	**Outcomes:** Students will practice trial proceedings in a classroom set up court. The mission of the Wisconsin High School Mock Trial Program is to foster understanding and respect for the legal system and the rule of law.
Essential Questions: Who controls our local courts? How do our local courts run? Who do I contact if I have a legal issue? What can I expect when I attend a courtroom proceeding?	**Learning Targets:** Goals of mock trial (a) To promote greater understanding and appreciation for the law, court procedures, and the American judicial system; (b) To improve basic life skills, such as critical thinking, communication, and advocacy skills; (c) To improve communication and cooperation among community members, including students, teachers, government leaders, law professionals and citizens; (d) To heighten appreciation for the principle of equal justice for all; (e) To promote an awareness of current legal issues; (f) To promote the exchange of ideas among students from throughout Wisconsin while providing a fun, rewarding and memorable experience of interaction; (g) To foster teamwork, collaboration, and cooperation among young people of diverse interests and abilities.
Topic 1: **Preparing for Trial**	**Length:** 1 week
Standard(s): Legal Process: BLE1.b & c	**Academic Vocabulary:** evidence, witness, attorney, judge, bailiff, court reporter
Lesson Frame: Analyze and Prepare for Case	We will: be courteous to witnesses, attorneys and judges.
	I will: rise when addressing the judge.
Lesson Frame: Analyze and Prepare for Case	We will: direct all remarks to the judge or witness.
	I will: limit the amount of objections.
Performance Tasks: Prepare witnesses, write out case points for presentation, dress appropriately, prepare short questions	Notes: Make posters for rules of the court for ease of following
Topic 2: **Trial**	**Length:** 1-2 weeks
Standard(s): Legal Process: BLE1.b & c	**Academic Vocabulary:** plaintiff, defense, cross-examination, closing arguments, proof, affidavit, presumption of innocence
Lesson Frame: Opening and Closing of Trial	We will: prepare judge for the case.
	I will: present an opening statement.

Lesson Frame: Opening and Closing of Trial	We will: examine all witnesses.
	I will: correctly question the witness.
Lesson Frame: Opening and Closing of Trial	We will: prepare a timekeeper so the daily trial does not go over the time limit.
	I will: use a stopwatch and notify both sides everyday when starting and stopping.
Performance Tasks: Writing case notes, preparing closing arguments, write out cross-examinations, prepare visual aids	Notes: We will also follow the mock trial competition in Madison that involves this case.

Unit Name: **Forms of Business Organizations**	**Length:** 1 week
Standards: Types of Ownership (BLE2.a & b)	**Outcomes:** How businesses form and start are the focus of this unit. Students will examine how a sole proprietorship and a corporation are different. Students will define different forms of business that can be created in our economic system.
Essential Questions: What are the three advantages of a sole proprietorship? What are the two essential elements of a partnership? How is a limited partner different from all the other types of partners? What does “perpetual existence” refer to? What is the difference between a C corporation and an S corporation?	**Learning Targets:** Describe how to form and run a sole proprietorship. List the advantages and disadvantages of a sole proprietorship. Explain the rights and responsibilities of partners. Identify the different types of partners. Explain how a partnership can be terminated. Characterize corporations. Explain the different types of corporations. Discuss the steps involved in forming a corporation. Explain what a limited liability company is. List the steps in forming a limited liability company.
Topic 1: **Sole Proprietorships and Partnerships**	**Length:** 1 week
Standard(s): BLE2.a & b	**Academic Vocabulary:** perpetual, dormant, incompetence, partnership, joint liability, dissociation
Lesson Frame: Sole Proprietorships and Partnerships	We will: discuss the basic attributes of the sole proprietorship and partnership.
	I will: explain the rights and responsibilities of partners.
Lesson Frame: Corporations and LLC's	We will: determine which one form of organization may be best in a particular situation.
	I will: characterize corporations.
	We will: explain the risks of utilizing each form of business organization.
	I will: list the steps in forming a limited liability company.
Performance Tasks: Case study, discussion, articles, writing activity, self-check, chapter questions	Notes:

Unit Name: **Employment Law**	**Length:** 1 week
Standards: Employment (BLE 2.c, BLE 6.c)	**Outcomes:** Students will understand what laws protect our employment. A general understanding of employment laws and how they affect their positions.
Essential Questions: What is the general rule of employment that guides hiring and firing in the U.S.? What is the equal pay rule? What law bans discrimination based on age?	**Learning Targets:** Discuss the employer-employee relationship. Define employment-at-will. Name the exceptions to employment-at-will. Explain the collective bargaining process. Describe the laws that regulate labor unions. Explain how the law protects employee health and safety. Describe the laws that guarantee fair wages and benefits. Identify the laws that prohibit different forms of discrimination. Define disparate treatment and disparate impact.
Topic 1: **Employment Law**	**Length:** 1 week
Standard(s): BLE2.c & BLE6.c	**Academic Vocabulary:** employment at-will, disparate treatment, disparate impact, union, collective bargaining
Lesson Frame: Employment Agreements	We will: identify an employment agreement.
	I will: describe how terms in employment contracts are created.
Lesson Frame: Employee Rights	We will: recognize when an employer is responsible for acts of an employee.
	I will: describe the laws that guarantee fair wages and benefits.
	We will: discuss what an implied contract means.
	I will: explain situations where an implied contract might exist.
Performance Tasks: Case study, discussion, articles, writing activity, self-check, chapter questions	Notes: We will debate employment policies.