Mystery Science Alignment with Massachusetts Science Standards

Mystery Science - Massachusetts Alignment
Mystery Science aligns to the Massachusetts Science and Technology/ Engineering Framework (2016). Each lesson (exploration & hands-on activity) is designed to take one hour. Extensions are available for each lesson and offer an opportunity for students to continue their science content learning. They include assessments and a curated collection of additional activity suggestions, online resources, project ideas, & readings.

Anchor Layer
If you are interested in anchoring phenomena or unit level projects, we suggest exploring our **Anchor Layer** feature.

mystery science

Last updated August 24, 2022

You may click unit names to navigate directly to each unit's webpage, or click page numbers to jump to the corresponding page in this standards alignment document.

Kindergarten

1st Grade

2nd Grade

3rd Grade

4th Grade

5th Grade

Animal Needs Unit (Animal Secrets)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Animal Needs: Food** Why do woodpeckers peck wood?	Students obtain information through virtual observations of different animal behaviors. They use this evidence to explain that one of the basic needs of animals is food.	**K-LS1-1** Observe and communicate that animals (including humans) and plants need food, water, and air to survive. Animals get food from plants and other animals. Plants make their food and need light to live and grow.
Lesson 2 	**Animal Needs: Shelter Read-Along** Where do animals live?	Students obtain information through media about how different animal homes are built. They use this evidence to explain that animals need shelter.	**K-ESS2-2** Construct an argument supported by evidence for how plants and animals (including humans) can change the environment.
Lesson 3 	**Animal Needs: Safety** How can you find animals in the woods?	Students obtain information through virtual observations of different animal behaviors. They use this evidence to explain that one of the basic needs of animals is shelter.	**K-LS1-1** Observe and communicate that animals (including humans) and plants need food, water, and air to survive. Animals get food from plants and other animals. Plants make their food and need light to live and grow.
Lesson 4 	**Animals & Changing the Environment Read-Along** How do animals make their homes in the forest?	Students take a nature walk to look for evidence of animal homes.	**K-ESS2-2** Construct an argument supported by evidence for how plants and animals (including humans) can change the environment.

Plant Needs Unit (Plant Secrets)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1	**Coming Soon!**	A new lesson is in the works!	**K-LS1-1** Observe and communicate that animals (including humans) and plants need food, water, and air to survive. Animals get food from plants and other animals. Plants make their food and need light to live and grow.
Lesson 2 	**Plant Needs: Water & Light** How do plants and trees grow?	Students investigate to determine the basic needs of plants. They observe to identify ways young plants resemble the parent plant and how the plant changes as it proceeds through its life cycle.	**K-LS1-1** Observe and communicate that animals (including humans) and plants need food, water, and air to survive. Animals get food from plants and other animals. Plants make their food and need light to live and grow. **K-LS1-2(MA)** Recognize that all plants and animals grow and change over time.
Lesson 3 	**Animal Needs & Changing the Environment** **Read-Along** Why would you want an old log in your backyard?	Students obtain evidence of living organisms by virtually keeping watch of a log and the living things that visit it.	**K-ESS3-3** Communicate solutions to reduce the amount of natural resources an individual uses.

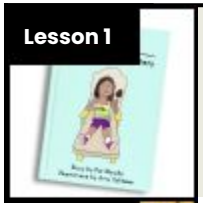
Severe Weather Unit (Wild Weather)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Severe Weather & Preparation Read-Along** How can you get ready for a big storm?	Students obtain information of different types of severe weather to observe and describe how the weather changes during these events and what students can do to prepare and stay safe.	**K-ESS3-2** Obtain and use information about weather forecasting to prepare for, and respond to, different types of local weather.
Lesson 2 	**Wind & Storms** Have you ever watched a storm?	Students create a simple tool that allows them to observe how hard the wind is blowing. They use this tool to observe weather changes and describe the pattern of faster wind speeds right before a storm.	**K-ESS3-2** Obtain and use information about weather forecasting to prepare for, and respond to, different types of local weather.
Lesson 3 	**Weather Conditions** How many different kinds of weather are there?	Students obtain information through observations of the weather. They communicate the information by acting as weather watchers and creating drawings of the weather conditions.	**K-ESS3-2** Obtain and use information about weather forecasting to prepare for, and respond to, different types of local weather.

Weather Patterns Unit (Circle of Seasons)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Local Weather & Daily Patterns Read-Along** How do you know what to wear for the weather?	Students track the weather daily and analyze the data by collecting, recording, and sharing their observations to observe patterns of weather changing throughout the day and from day-to-day.	**K-ESS2-1** Use and share quantitative observations of local weather conditions to describe patterns over time.
Lesson 2 	**Seasonal Patterns** What will the weather be like on your birthday?	Students evaluate information in a series of unnamed drawings of each season. They use these clues to identify characteristics of each season and describe the yearly cyclical pattern.	**K-ESS2-1** Use and share quantitative observations of local weather conditions to describe patterns over time.
Lesson 3 	**Animals Changing Their Environment** Why do birds lay eggs in the spring?	Students identify the reasons why birds lay eggs in the spring. Then, they develop a bird nest model and use this model as evidence for how animals can change the environment to meet their needs.	**K-ESS2-1** Use and share quantitative observations of local weather conditions to describe patterns over time. **K-ESS2-2** Construct an argument supported by evidence for how plants and animals (including humans) can change the environment.

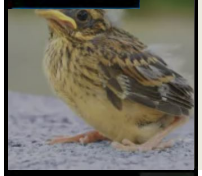
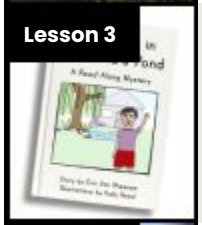
Sunlight & Warmth Unit (Sunny Skies)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Sunlight, Heat, & Earth's Surface Read-Along** How could you walk barefoot across hot pavement without burning your feet?	Students make observations of the pavement heating up after being warmed by the Sun. Then, they design a solution to build a shade structure that can reduce the warming effect of sunlight.	**K-PS3-1** Make observations to determine that sunlight warms materials on Earth's surface. **K-PS3-2** Use tools and materials to design and build a model of a structure that will reduce the warming effect of sunlight on an area.
Lesson 2 	**Sunlight, Warming, & Engineering** How could you warm up a frozen playground?	Students carry out an investigation to test which materials can redirect the light and heat of sunlight. (*This lesson has students increase the warming effect of sunlight on an area.)	**K-PS3-1** Make observations to determine that sunlight warms materials on Earth's surface. **K-PS3-2** Use tools and materials to design and build a model of a structure that will reduce the warming effect of sunlight on an area.
Lesson 3 	**Sunlight & Warmth** Why does it get cold in winter?	Students construct an explanation for why marshmallows melt in one car and not in another car. Then, they conduct a virtual investigation to determine that the warmth of the Sun is the cause of the melted marshmallows.	**K-PS3-1** Make observations to determine that sunlight warms materials on Earth's surface. **K-PS1-1(MA)** Investigate and communicate the idea that different kinds of materials can be solid or liquid depending on temperature.

Pushes & Pulls Unit (Force Olympics)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Pushes & Pulls** What's the biggest excavator?	Students observe different machines and use those observations as evidence for why machines make work easier.	**Foundational for K-PS2-1** Compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
Lesson 2 	**Pushes, Pulls, & "Work Words" Read-Along** Why do builders need so many big machines?	Students observe construction equipment being used in different ways to move objects.	**Foundational for K-PS2-1** Compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
Lesson 3 	**Motion, Speed, & Strength** How can you knock down a wall made of concrete?	Students carry out an investigation to determine how far back they should pull a model wrecking ball to knock down a wall, but not the houses behind it.	**K-PS2-1** Compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
Lesson 4 	**Speed & Direction of Force Read-Along** How can you knock down the most bowling pins?	Students play a game of bumper bowling to observe the way that objects can move in straight lines, zigzags, and back and forth.	**K-PS2-1** Compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
Lesson 5 	**Direction of Motion & Engineering** How can we protect a mountain town from falling rocks?	Students conduct an investigation of how to protect a town from a falling boulder. They design a solution to safely guide the direction of the boulder away from the town.	**K-PS2-1** Compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.
Lesson 6 	**Forces & Engineering Read-Along** How could you invent a trap?	Students define a problem they would like to solve and then design a solution using what they know about the locations of objects and how they can move.	**K-PS2-1** Compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

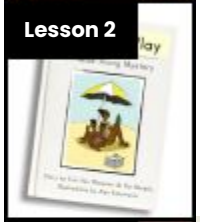
Animal Traits & Survival Unit (Animal Superpowers)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	✨New!✨ **Parent & Offspring Traits** How can you help a lost baby animal find its parents?	Students observe the traits of adult and baby animals in order to construct an explanation that most young animals are like, but not exactly like, their parents.	**1-LS3-1** Use information from observations (first-hand and from media) to identify similarities and differences among individual plants or animals of the same kind.
Lesson 2 	**Animal Structures & Survival** Why do birds have beaks?	Students investigate how different bird beaks are well suited for eating different kinds of food. They explain which beak would help a particular bird survive in a particular environment.	**1-LS1-1** Use evidence to explain that (a) different animals use their body parts and senses in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air, and (b) plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and produce food for the plant.
Lesson 3 	**Animal Behavior & Offspring Survival Read-Along** Why do baby ducks follow their mother?	Students obtain information about the behaviors of animal parents that help their offspring survive.	**1-LS1-2** Obtain information to compare ways in which the behavior of different animal parents and their offspring help the offspring to survive.
Lesson 4 	**Camouflage & Animal Survival** Why are polar bears white?	Students use observations of animal parents and their offspring to construct an explanation about young plants and animals being similar, but not identical, to their parents.	**1-LS1-1** Use evidence to explain that (a) different animals use their body parts and senses in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air, and (b) plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and produce food for the plant.
Lesson 5 	**Inheritance & Variation of Traits Read-Along** Why do family members look alike?	Students identify parts of plants such as roots, branches, and leaves. They evaluate these plant parts and apply that information to design an umbrella that won't blow down in the wind.	**1-LS3-1** Use information from observations (first-hand and from media) to identify similarities and differences among individual plants or animals of the same kind.

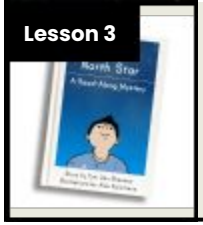
Plant Traits & Survival Unit (Plant Superpowers)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1	**Coming Soon!**	A new lesson is in the works!	**1-LS3-1** Use information from observations (first-hand and from media) to identify similarities and differences among individual plants or animals of the same kind.
Lesson 2 	**Plant Survival & Engineering** Why don't trees blow down in the wind?	Students learn how plants respond to light. They conduct an investigation to compare how the parts of a plant respond to light.	**1-LS1-1** Use evidence to explain that (a) different animals use their body parts and senses in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air, and (b) plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and produce food for the plant. **1.K-2-ETS1-1 & 1.K-2.ETS1-2**
Lesson 3 	**Plant Movement & Survival Read-Along** What do sunflowers do when you're not looking?	Students learn how plants respond to light. They conduct an investigation to compare how the parts of a plant respond to light.	**1-LS1-1** Use evidence to explain that (a) different animals use their body parts and senses in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air, and (b) plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and produce food for the plant.

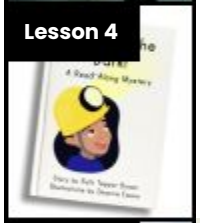
Day Patterns Unit (Sun & Shadows)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Sun, Shadows, & Daily Patterns** Could a statue's shadow move?	Students observe how shadows change as time passes, or as the Sun moves across the sky. They analyze how to move a light source to change the shape and direction of shadows, constructing an explanation of what causes a shadow to move.	**1-ESS1-1** Use observations of the Sun, Moon, and stars to describe that each appears to rise in one part of the sky, appears to move across the sky, and appears to set.
Lesson 2 	**Sun, Shadows, & Daily Patterns Read-Along** What does your shadow do when you're not looking?	Students conduct an investigation to gather information about how their shadow changes throughout the day.	**1-ESS1-1** Use observations of the Sun, Moon, and stars to describe that each appears to rise in one part of the sky, appears to move across the sky, and appears to set.
Lesson 3 	**Sun & Daily Patterns** How can the Sun help you if you're lost?	Students develop a Sun Finder, a model of the Sun's movement across the sky. They use this model to reason about how the Sun can help guide them during the day.	**1-ESS1-1** Use observations of the Sun, Moon, and stars to describe that each appears to rise in one part of the sky, appears to move across the sky, and appears to set.
Lesson 4 	**Daylight & Seasonal Patterns Read-Along** Why do you have to go to bed early in the summer?	Students obtain information about the seasonal patterns of sunrise and sunset.	**1-ESS1-2** Analyze provided data to identify relationships among seasonal patterns of change, including relative sunrise and sunset time changes, seasonal temperature, and rainfall or snowfall patterns, and seasonal changes to the environment.

Night Patterns Unit (Moon & Stars)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
	✨New!✨ **Moon Phases & Patterns** When can you see the full moon?	Students record observations of the Moon's shape using a series of photos collected over the course of four weeks. Using this information, students discover that the Moon follows a cyclical pattern, which they can use to predict when a full moon will appear.	**1-ESS1-1** Use observations of the Sun, Moon, and stars to describe that each appears to rise in one part of the sky, appears to move across the sky, and appears to set.
	**Stars & Daily Patterns** Why do stars come out at night?	Students develop and use a model of the Big Dipper in the night sky. After conducting a simple investigation, students construct an explanation for why stars are only visible in the night sky.	**1-ESS1-1** Use observations of the Sun, Moon, and stars to describe that each appears to rise in one part of the sky, appears to move across the sky, and appears to set.
	**Stars & Seasonal Patterns Read-Along** How can stars help you if you get lost?	Students observe that groups of stars in the sky form a pattern: constellations. Even though the Big Dipper changes its spot in the sky in different seasons, it always points to the North Star.	**1-ESS1-1** Use observations of the Sun, Moon, and stars to describe that each appears to rise in one part of the sky, appears to move across the sky, and appears to set.

Light, Sound, & Communication Unit (Lights & Sounds)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Sounds & Vibrations** How do they make silly sounds in cartoons?	Students explore how to make different sounds with everyday objects. They construct an explanation that objects vibrate when they make a sound, and if the vibration stops, the sound stops.	**1-PS4-1** Demonstrate that vibrating materials that make sound and that sound can make materials vibrate.
Lesson 2 	**Sounds & Vibrations Read-Along** Where do sounds come from?	Students create three different sound makers and construct an explanation about where the vibrations are happening in each sound experiment.	**1-PS4-1** Demonstrate that vibrating materials that make sound and that sound can make materials vibrate.
Lesson 3 	**Light, Materials, Transparent & Opaque** What if there were no windows?	Students investigate the properties of different materials that they can and cannot see through. Then they create a stained glass window using tissue paper to explore how materials interact with light.	**1-PS4-3** Conduct an investigation to determine the effect of placing materials that allow light to pass through them, allow only some light through them, block all the light, or redirect light when put in the path of a beam of light.
Lesson 4 	**Light & Illumination Read-Along** Can you see in the dark?	Students look inside a completely dark box to determine if they can see the shape of the object inside. They allow more light into the box to illuminate the object and allow them to see it. Students use their observations explain that objects need light to be seen.	**1-PS4-3** Conduct an investigation to determine the effect of placing materials that allow light to pass through them, allow only some light through them, block all the light, or redirect light when put in the path of a beam of light.
Lesson 5 	**Light, Communication, & Engineering** How could you send a secret message to someone far away?	Students are presented with the problem that they need to send a message at night, without using noise. They design a solution to create a color-coded message system and communicate with light signals.	**1-PS4-4** Use tools and materials to design and build a device that uses light or sound to send a signal over a distance. **1.K-2-ETS1-1 & 1.K-2.ETS1-2**
Lesson 6 	**Lights, Sounds, & Communication Read-Along** How do boats find their way in the fog?	Students obtain information about light and sound signals. They analyze different sounds with eyes closed to determine which type of sound they hear.	**1-PS4-4** Use tools and materials to design and build a device that uses light or sound to send a signal over a distance.

Animal Biodiversity Unit (Animal Adventures)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Biodiversity & Classification** How many different kinds of animals are there?	Students observe the traits of different animals and use that information to organize them into groups based on their characteristics.	**Foundational for 2-LS4-1** Use texts, media, or local environments to observe and compare (a) different kinds of living things in an area, and (b) differences in the kinds of living things living in different types of areas.
Lesson 2 	✨New!✨ **Habitat Diversity** Why would a wild animal visit a playground?	Students observe animals, plants, and the physical characteristics of two different habitats. They collect and analyze data to compare the biodiversity between the two habitats.	**2-LS4-1** Use texts, media, or local environments to observe and compare (a) different kinds of living things in an area, and (b) differences in the kinds of living things living in different types of areas.
Lesson 3 	**Biodiversity, Habitats, & Species** Why do frogs say “ribbit”?	Students identify frogs based on their unique calls and use that information to determine the level of frog species diversity within multiple habitats.	**2-LS4-1** Use texts, media, or local environments to observe and compare (a) different kinds of living things in an area, and (b) differences in the kinds of living things living in different types of areas.
Lesson 4 	**Biodiversity & Engineering** How could you get more birds to visit a bird feeder?	Students investigate which kinds of birds are likely to visit a bird feeder based on what they eat and design and build a prototype bird feeder that attracts a specific type of bird.	**2-LS4-1** Use texts, media, or local environments to observe and compare (a) different kinds of living things in an area, and (b) differences in the kinds of living things living in different types of areas. **1.K-2.ETS1-3** Analyze data from tests of two objects designed to solve the same design problem to compare the strengths and weaknesses of how each object performs.

Plant Adaptations Unit (Plant Adventures)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Seed Dispersal** How did a tree travel halfway around the world?	Students observe how different types of plants produce different types of seeds in the process of reproduction.	**2-LS2-3(MA)** Develop and use models to compare how plants and animals depend on their surroundings and other living things to meet their needs in the places they live.
Lesson 2 	**Water, Sunlight, & Plant Growth** Could a plant survive without light?	Students conduct an investigation to determine that plants need water and light to grow.	**2-LS2-3(MA)** Develop and use models to compare how plants and animals depend on their surroundings and other living things to meet their needs in the places they live.
Lesson 3 	**Light, Leaves, & Competition** Why do trees grow so tall?	Students observe that plants require light in order to fully grow and be healthy.	**2-LS2-3(MA)** Develop and use models to compare how plants and animals depend on their surroundings and other living things to meet their needs in the places they live.
Lesson 4 	**Adaptations & Habitat** Should you water a cactus?	Students observe that different plants require different amounts of light and water.	**2-LS2-3(MA)** Develop and use models to compare how plants and animals depend on their surroundings and other living things to meet their needs in the places they live.
Lesson 5 	**Adaptations & Habitat** Where do plants grow best?	Students practice thinking like gardeners, considering what plants need and how a simple habitat can change over time.	**2-LS2-3(MA)** Develop and use models to compare how plants and animals depend on their surroundings and other living things to meet their needs in the places they live.

Erosion & Earth's Surface Unit (Work of Water)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Mapping & Earth's Surface Features** If you floated down a river, where would you end up?	Students develop a model of the Earth's surface and use it to discover an important principle about how rivers work: rivers flow downhill, from high places to low places.	**2-ESS2-2** Map the shapes and types of landforms and bodies of water in an area. **2-ESS2-3** Use examples obtained from informational sources to explain that water is found in the ocean, rivers and streams, lakes and ponds, and may be solid or liquid.
Lesson 2 	**Rocks, Sand, & Erosion** Why is there sand at the beach?	Students investigate the effects of rocks tumbling in a river. Based on their observations, they construct an explanation for why rocks on the top of mountains are much bigger than the sand at the beach.	**2-ESS2-2** Map the shapes and types of landforms and bodies of water in an area. **2-ESS2-4(MA)** Observe how blowing and flowing water can move Earth materials from one place to another and change the shape of a landform.
Lesson 3 	✨New!✨ **Mapping & Severe Weather** Where do flash floods happen?	Students use a model (i.e. a map) to examine the different factors, including the shapes and kinds of land, that contribute to flash floods. They use this to predict where flash floods are most likely to happen.	**2-ESS2-2** Map the shapes and types of landforms and bodies of water in an area.
Lesson 4 	**Erosion, Earth's Surface, & Landforms** What's strong enough to make a canyon?	Students create a model landform and investigate how some Earth events can occur quickly, while others occur slowly.	**2-ESS2-4(MA)** Observe how blowing and flowing water can move Earth materials from one place to another and change the shape of a landform.
Lesson 5 	**Erosion & Engineering** How can you stop a landslide?	Students compare multiple solutions for preventing erosion.	**2-ESS2-1** Investigate and compare the effectiveness of multiple solutions designed to slow or prevent wind or water from changing the shape of the land. **1.K-2.ETS1-3** Analyze data from tests of two objects designed to solve the same design problem to compare the strengths and weaknesses of how each object performs.

Material Properties Unit (Material Magic)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Materials, Properties, & Engineering** Why do we wear clothes?	Students investigate different material properties, such as flexibility and absorbency, and use those properties to design and build a hat that protects them from the sun.	**2-PS1-1** Describe and classify different kinds of materials by observable properties of color, flexibility, hardness, texture, and absorbency.
Lesson 2 	**Classify Materials, Insulators, and Properties** Can you really fry an egg on a hot sidewalk?	Students conduct an investigation of conductors and insulators in order to determine which are best suited for allowing people to handle hot items.	**2-PS1-2** Test different materials and analyze the data obtained to determine which materials have the properties that are best suited for an intended purpose.
Lesson 3 	**Heating, Cooling, & Phases of Matter** Why are so many toys made out of plastic?	Student conduct an investigation of different materials in order to determine which are most and least easily melted.	**2-PS1-4** Construct an argument with evidence that some changes to materials caused by heating or cooling can be reversed and some cannot.
Lesson 4 	**Inventions & Engineering** What materials might be invented in the future?	Students design a new invention that takes advantage of the unique properties of a futuristic material.	**2-PS1-1** Describe and classify different kinds of materials by observable properties of color, flexibility, hardness, texture, and absorbency.
Lesson 5 	**Materials, Properties, & Engineering** Could you build a house out of paper?	Students construct an evidence- based account of how a structure built of paper can be disassembled and rebuilt in new ways.	**2-PS1-3** Analyze a variety of evidence to conclude that when a chunk of material is cut or broken into pieces, each piece is still the same material and, however small each piece is, has weight. Show that the material properties of a small set of pieces do not change when the pieces are used to build larger objects.
Lesson 6 	✨New ✨ **Soil Properties** How do you build a city out of mud?	Students conduct an investigation where they examine three different soil models. They use this information to determine which type of soil has the properties that will result in the best mud that can be used to build a house.	**2-PS1-2** Test different materials and analyze the data obtained to determine which materials have the properties that are best suited for an intended purpose.

Fossils, Animal Survival, & Heredity Unit (Animals Through Time)

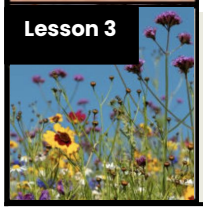
	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
	**Habitats, Fossils, & Environments Over Time** Where can you find whales in a desert?	Students explore the idea that the rock under our feet sometimes contains fossils, and investigate how these fossils reveal changes in habitats through time.	**3-LS4-1** Use fossils to describe types of organisms and their environments that existed long ago and compare those to living organisms and their environments. Recognize that most kinds of plants and animals that once lived on Earth are no longer found anywhere.
	**Fossil Evidence & Classification** How do we know what dinosaurs looked like?	Students learn how we can infer what the outside of an animal looked like by using clues about their skeleton.	**3-LS4-1** Use fossils to describe types of organisms and their environments that existed long ago and compare those to living organisms and their environments. Recognize that most kinds of plants and animals that once lived on Earth are no longer found anywhere.
	**Fossil Evidence, Trace Fossils, & Animal Behavior** Can you outrun a dinosaur?	Students learn how fossilized animal tracks can tell us a great deal about the animals that left them.	**3-LS4-1** Use fossils to describe types of organisms and their environments that existed long ago and compare those to living organisms and their environments. Recognize that most kinds of plants and animals that once lived on Earth are no longer found anywhere.
	**Trait Variation, Inheritance, & Artificial Selection** What kinds of animals might there be in the future?	Students analyze the traits of parent dogs and their offspring, constructing an explanation about which traits a puppy gets from each parent.	**3-LS4-2** Use evidence to construct an explanation for how the variations in characteristics among individuals within the same species may provide advantages to these individuals in their survival and reproduction.

Fossils, Animal Survival, & Heredity Unit continues on the next page

Fossils, Animal Survival, & Heredity Unit (Animals Through Time)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 5 	**Trait Variation, Natural Selection, & Survival** Can selection happen without people?	Students compare the structures of lizards that live on an island. They simulate multiple generations of these lizards, and analyze and interpret the data to understand how these structures aid in their survival.	**3-LS3-1** Provide evidence, including through the analysis of data, that plants and animals have traits inherited from parents and that variation of these traits exist in a group of similar organisms. **3-LS4-2** Use evidence to construct an explanation for how the variations in characteristics among individuals within the same species may provide advantages to these individuals in their survival and reproduction. **3-LS4-3** Construct an argument with evidence that in a particular environment some organisms can survive well, some survive less well, and some cannot survive.
Lesson 6 	**Animal Groups & Survival** Why do dogs wag their tails?	Students observe animals that live in groups in order to obtain, evaluate, and communicate information about animal social behavior. Students use evidence to show how animals form groups to help them survive.	**3-LS4-2** Use evidence to construct an explanation for how the variations in characteristics among individuals within the same species may provide advantages to these individuals in their survival and reproduction.
Lesson 7 	**Traits & Environmental Variation** How long can people (and animals) survive in outer space?	Students measure and compare their own physical traits (arm strength, balance, and height) and analyze the information to construct an explanation for how the environment can influence traits.	**3-LS3-2** Distinguish between inherited characteristics and those characteristics that result from a direct interaction with the environment. Give examples of characteristics of living organisms that are influenced by both inheritance and the environment.

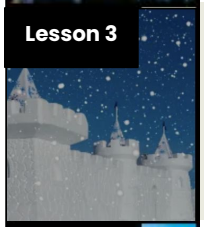
Life Cycles Unit (Circle of Life)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	✨New ✨ **Animal Life Cycles** How is your life like an alligator's life?	Students create models of several different animal life cycles and compare them to one another. They use these models to discover the pattern that all animals are born, grow, can have babies, and eventually die.	**3-LS1-1** Use simple graphical representations to show that different types of organisms have unique and diverse life cycles. Describe that all organisms have birth, growth, reproduction, and death in common but there are a variety of ways in which these happen.
Lesson 2 	**Environmental Change & Engineering** What's the best way to get rid of mosquitoes?	Students obtain and evaluate information about mosquitoes from different sources. They analyze and interpret information about the mosquito life cycle to reduce the number of mosquitoes that live in a certain area.	**3-LS4-4** Analyze and interpret given data about changes in a habitat and describe how the changes may affect the ability of organisms that live in that habitat to survive and reproduce. **3-LS4-5(MA)** Provide evidence to support a claim that the survival of a population is dependent upon reproduction. **3.3-5-ETS1-2 & 3.3-5-ETS1-4(MA)**
Lesson 3 	✨New ✨ **Plant Life Cycles** Why are there so many different kinds of flowers?	Students play a game that models the stages of the plant life cycle. After playing the game students use the model to show how changes to one part of the life cycle affect all other stages.	**3-LS1-1** Use simple graphical representations to show that different types of organisms have unique and diverse life cycles. Describe that all organisms have birth, growth, reproduction, and death in common but there are a variety of ways in which these happen.

Plant Life Cycle & Heredity Unit (Power of Flowers)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Pollination & Plant Reproduction** Why do plants grow flowers?	Students model the structure and function of flower parts that are responsible for creating seeds.	**3-LS1-1** Use simple graphical representations to show that different types of organisms have unique and diverse life cycles. Describe that all organisms have birth, growth, reproduction, and death in common but there are a variety of ways in which these happen.
Lesson 2 	**Seed Dispersal & Plant Life Cycle** Why do plants give us fruit?	Students explore the function of fruits in plants and practice classification.	**3-LS1-1** Use simple graphical representations to show that different types of organisms have unique and diverse life cycles. Describe that all organisms have birth, growth, reproduction, and death in common but there are a variety of ways in which these happen.
Lesson 3 	**Trait Variation, Inheritance, & Artificial Selection** Why are some apples red and some green?	Students explore how human beings have developed fruits with specific traits through selection.	**3-LS3-1** Provide evidence, including through the analysis of data, that plants and animals have traits inherited from parents and that variation of these traits exist in a group of similar organisms.
Lesson 4 	**Trait Variation, Inheritance, & Artificial Selection** How could you make the biggest fruit in the world?	Students investigate how human beings have modified plants based on our knowledge of how plants change from generation to generation.	**3-LS3-1** Provide evidence, including through the analysis of data, that plants and animals have traits inherited from parents and that variation of these traits exist in a group of similar organisms.

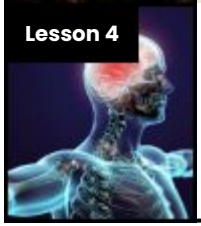
Weather & Climate Unit (Stormy Skies)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Water Cycle & Phases of Matter** Where do clouds come from?	Students obtain and combine information that water can change from liquid to gas, but that it is always made of tiny drops. Clouds are made of water that has evaporated.	**Foundational for 3-ESS2-1** Use graphs and tables of local weather data to describe and predict typical weather during a particular season in an area.
Lesson 2 	**Local Weather Patterns & Weather Prediction** How can we predict when it's going to storm?	Students make observations of clouds and develop a tool to make predictions about what kind of weather might happen next.	**3-ESS2-1** Use graphs and tables of local weather data to describe and predict typical weather during a particular season in an area.
Lesson 3 	✨New ✨ **Seasonal Weather Patterns** Where's the best place to build a snow fort?	Students gather winter temperature data from three different towns. They represent the data in a table to compare the weather and decide which town is the best candidate to host a snow fort festival in future years.	**3-ESS2-1** Use graphs and tables of local weather data to describe and predict typical weather during a particular season in an area.
Lesson 4 	**Climate, Geography, & Global Weather Patterns** Why are some places always hot?	Students obtain and combine information to describe the different climate regions of the world.	**3-ESS2-2** Obtain and summarize information about the climate of different regions of the world to illustrate that typical weather conditions over a year vary by region.
Lesson 5 	**Natural Hazards & Engineering** How can you keep a house from blowing away in a windstorm?	Students design and build solutions that reduce the hazards associated with strong winds that could damage buildings.	**3-ESS3-1** Evaluate the merit of design solutions that reduces the damage caused by weather. **3.3-5-ETS1-2 & 3.3-5-ETS1-4(MA)**

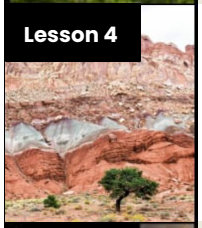
Forces, Motion, & Magnets Unit (Invisible Forces)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
 **Lesson 1**	**Balanced & Unbalanced Forces** How could you win a tug-of-war against a bunch of adults?	Students develop a mental model of the nature of forces and motion and use that model to explain the behavior of an elastic jumper.	**3-PS2-1** Provide evidence to explain the effect of multiple forces, including friction, on an object. Include balanced forces that do not change the motion of the object and unbalanced forces that do change the motion of the object.
 **Lesson 2**	**Balanced Forces & Engineering** What makes bridges so strong?	Students develop and design a bridge to be as strong as possible while working with limited materials.	**3-PS2-1** Provide evidence to explain the effect of multiple forces, including friction, on an object. Include balanced forces that do not change the motion of the object and unbalanced forces that do change the motion of the object. **3.3-5-ETS1-2 & 3.3-5-ETS1-4(MA)**
 **Lesson 3**	**Friction & Pattern of Motion** How can you go faster down a slide?	Students plan and carry out investigations of the behaviors of different materials as they slide past one another.	**3-PS2-1** Provide evidence to explain the effect of multiple forces, including friction, on an object. Include balanced forces that do not change the motion of the object and unbalanced forces that do change the motion of the object.
 **Lesson 4**	**Magnets & Forces** What can magnets do?	Students investigate the properties of magnets and the fact that they exert forces that act at a distance.	**3-PS2-3** Conduct an investigation to determine the nature of the forces between two magnets based on their orientations and distance relative to each other.
 **Lesson 5**	**Magnets & Engineering** How can you unlock a door using a magnet?	Students investigate magnetic attraction and repulsion, and design a magnetic lock in the hands-on activity.	**3-PS2-4** Define a simple design problem that can be solved by using interactions between magnets. **3.3-5-ETS1-2 & 3.3-5-ETS1-4(MA)**

Human Body, Vision, & The Brain Unit (Human Machine)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Muscles & Skeleton** Why do your biceps bulge?	Students construct a model of the human hand to explain how muscles pull on bones to create movement.	**4-LS1-1** Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction.
Lesson 2 	**Light, Eyes, & Vision** What do people who are blind see?	Students develop a working model of an eye. They use the model to reason about how light reflects off an object and into the eye, helping an organism process information from the environment.	**4-LS1-1** Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction.
Lesson 3 	**Structure & Function of Eyes** How can some animals see in the dark?	Students use their eye model to discover that the pupil controls the amount of light let into the eye. In the dark, pupils get larger to let in more light.	**4-LS1-1** Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction.
Lesson 4 	**Brain, Nerves, & Information Processing** How does your brain control your body?	Students investigate how their own brain works by testing their reflexes. They discover that the brain receives information from the senses, processes the information, and sends signals to the muscles to enable movement.	**4-LS1-1** Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction.

Earth's Features & Processes Unit (The Birth of Rocks)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
 Lesson 1	**Volcanoes & Patterns of Earth's Features** Could a volcano pop up where you live?	Students use coordinates to develop a map of volcanoes to discover a pattern of where volcanoes exist on Earth. Students identify the pattern of volcanoes in the "Ring of Fire."	**4-ESS2-2** Analyze and interpret maps of Earth's mountain ranges, deep ocean trenches, volcanoes, and earthquake epicenters to describe patterns of these features and their locations relative to boundaries between continents and oceans.
 Lesson 2	**Volcanoes & Rock Cycle** Why do some volcanoes explode?	Students investigate the properties of thin and thick lava by attempting to create air bubbles. Students realize that thick lava will cause a volcano to explode, while thin lava will not.	**4-ESS1-1** Use evidence from a given landscape that includes simple landforms and rock layers to support a claim about the role of erosion or deposition in the formation of the landscape over long periods of time.
 Lesson 3	**Weathering & Erosion** Will a mountain last forever?	Students make observations of the effects of weathering to discover that rocks will become rounded and break into small pieces when they tumble down a mountain.	**4-ESS2-1** Make observations and collect data to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering and moved around through erosion.
 Lesson 4	✨New ✨ **Sedimentary Rock & Fossils** What did your town look like 100 million years ago?	Students create a model canyon and use the pattern of fossils found in each rock layer to support the explanation that the landscape has changed many times over millions of years.	**4-ESS1-1** Use evidence from a given landscape that includes simple landforms and rock layers to support a claim about the role of erosion or deposition in the formation of the landscape over long periods of time.
 Lesson 5	**Erosion, Natural Hazards, & Engineering** How could you survive a landslide?	Students generate multiple possible solutions to protect homes from a landslide. Students realize that there are many causes for the erosion that causes rocks to fall in landslides.	**4-ESS2-1** Make observations and collect data to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering and moved around through erosion.

Sound, Waves, & Communication Unit (Waves of Sound)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Sound, Vibration, & Engineering** How far can a whisper travel?	Students investigate sound energy using paper cup telephones. Students figure out that sound is a vibration that can travel through a medium.	**4-PS4-1** Develop a model of a simple mechanical wave (including sound) to communicate that waves (a) are regular patterns of motion along which energy travels and (b) can cause objects to move. **4-PS4-3** Develop and compare multiple ways to transfer information through encoding, sending, receiving, and decoding a pattern.
Lesson 2 	**Sound & Vibrations** What would happen if you screamed in outer space?	Students construct a model of sound vibrations to explain how air is a medium that sound vibrations travel through.	**4-PS4-1** Develop a model of a simple mechanical wave (including sound) to communicate that waves (a) are regular patterns of motion along which energy travels and (b) can cause objects to move.
Lesson 3 	**Sound Waves & Wavelength** Why are some sounds high and some sounds low?	Students make observations of vibrations and sound waves to discover that high pitch sounds vibrate faster and have short wavelengths and low pitch sounds vibrate slower and have long wavelengths.	**4-PS4-1** Develop a model of a simple mechanical wave (including sound) to communicate that waves (a) are regular patterns of motion along which energy travels and (b) can cause objects to move.

Energy, Energy Transfer, & Electricity Unit (Energizing Everything)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Speed & Energy** How is your body similar to a car?	Students learn about stored energy and about the relationship between motion and energy. Students build models of an amusement park ride and discover how energy can be stored in materials. Stored energy can be converted to speed.	**4-PS3-1** Use evidence to construct an explanation relating the speed of an object to the energy of that object.
Lesson 2 	**Collisions & Energy Transfer** What makes roller coasters go so fast?	Students build a model of a roller coaster and carry out an investigation using marbles. Students learn that lifting an object up stores energy in the object. When the object falls, that stored energy is released. They realize that energy is transferred when objects collide.	**4-PS3-1** Use evidence to construct an explanation relating the speed of an object to the energy of that object. **4-PS3-3** Ask questions and predict outcomes about the changes in energy that occur when objects collide.
Lesson 3 	**Energy Transfer & Engineering** Why is the first hill of a roller coaster always the highest?	Using a model roller coaster, students conduct an investigation to determine that a hill's height determines the amount of energy stored in a marble at the top of the hill. Students figure out that the greater the height of an object, the more energy it stores and the faster it will move when released or dropped.	**4-PS3-3** Ask questions and predict outcomes about the changes in energy that occur when objects collide.
Lesson 4 	**Energy Transfer & Engineering** Could you knock down a building using only dominoes?	Students experiment with ways to store and release energy, creating the beginning of a chain reaction machine with a lever and a ramp. Students figure out that a domino standing on end is storing energy, only requiring a small amount of energy (a tiny push) to release the stored energy.	**4-PS3-4** Apply scientific principles of energy and motion to test and refine a device that converts kinetic energy to electrical energy or uses stored energy to cause motion or produce light or sound. **3.3-5-ETS1-3 & 3.3-5-ETS1-5(MA)**

Energy, Energy Transfer, & Electricity Unit continues on the next page

Energy, Energy Transfer, & Electricity Unit (Energizing Everything)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 5 	**Energy Transfer & Engineering** Can you build a chain reaction machine?	Students continue to build a chain reaction machine — identifying a goal, brainstorming and testing multiple ideas, and determining an optimal solution. The chain reaction machine uses multiple components to transfer energy from one part to the next.	**4-PS3-4** Apply scientific principles of energy and motion to test and refine a device that converts kinetic energy to electrical energy or uses stored energy to cause motion or produce light or sound. **3.3-5-ETS1-3 & 3.3-5-ETS1-5(MA)**
Lesson 6 	**Electrical Energy** What if there were no electricity?	Students design a flashlight with an on/off switch, using batteries, flights, and tin foil. Students figure out that electricity can be transformed to other forms of energy, such as movement, light, and heat.	**4-PS3-2** Make observations to show that energy can be transferred from place to place by sound, light, heat, and electric currents.
Lesson 7 	**Heat Energy & Energy Transfer** How long did it take to travel across the country before cars and planes?	Students build a paper spinner and conduct an investigation to explain how heat makes things move. Students realize that heat energy can be transformed into motion energy using a turbine.	**4-PS3-2** Make observations to show that energy can be transferred from place to place by sound, light, heat, and electric currents. **4-PS3-4** Apply scientific principles of energy and motion to test and refine a device that converts kinetic energy to electrical energy or uses stored energy to cause motion or produce light or sound.
Lesson 8 	**Renewable Energy & Natural Resources** Where does energy come from?	Students evaluate the advantages and disadvantages of wind, water, and solar energy to power a town. Students obtain and evaluate information about the needs of each source of energy and analyze and interpret data about the town's resources.	**4-ESS3-1** Obtain information to describe that energy and fuels humans use are derived from natural resources and that some energy and fuel sources are renewable and some are not.

Ecosystems & The Food Web Unit (Web of Life)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
 Lesson 1	**Food Chains, Predators, Herbivores & Carnivores** Why would a hawk move to New York City?	Students construct models of food chains by linking cards discovering that different interrelationships exist between organisms.	**5-LS2-1** Develop a model to describe the movement of matter among producers, consumers, decomposers, and the air, water, and soil in the environment to (a) show that plants produce sugars and plant materials, (b) show that animals can eat plants and/or other animals for food, and (c) show that some organisms, including fungi and bacteria break down dead organisms and recycle some materials back to the air and soil.
 Lesson 2	**Plant Needs: Air & Water** What do plants eat?	Students conduct an investigation and interpret data and figure out that water and air account for a plant's weight.	**5-LS1-1** Ask testable questions about the process by which plants use air, water, and energy from sunlight to produce sugars and plant materials needed for growth and reproduction.
 Lesson 3	**Decomposers & Matter Cycle** Where do fallen leaves go?	Students conduct an investigation to test how mold grows under different conditions to decompose food. Students realize that decomposers, like mold, break down and consume dead plant material.	**5-LS2-1** Develop a model to describe the movement of matter among producers, consumers, decomposers, and the air, water, and soil in the environment to (a) show that plants produce sugars and plant materials, (b) show that animals can eat plants and/or other animals for food, and (c) show that some organisms, including fungi and bacteria break down dead organisms and recycle some materials back to the air and soil.
 Lesson 4	**Decomposers, Nutrients, & Matter Cycle** Do worms really eat dirt?	Students make observations of worms to realize that worms act as decomposers to eat dead matter in an ecosystem and cycle nutrients into the soil.	**5-LS2-1** Develop a model to describe the movement of matter among producers, consumers, decomposers, and the air, water, and soil in the environment to (a) show that plants produce sugars and plant materials, (b) show that animals can eat plants and/or other animals for food, and (c) show that some organisms, including fungi and bacteria break down dead organisms and recycle some materials back to the air and soil.
 Lesson 5	**Ecosystems & Matter Cycle** Why do you have to clean a fish tank but not a pond?	Students develop a model of a pond ecosystem and realize that interrelationships exist between decomposers, plants, and animals. Students discover that each organism must be in balance for the pond ecosystem to function.	**5-LS2-1** Develop a model to describe the movement of matter among producers, consumers, decomposers, and the air, water, and soil in the environment to (a) show that plants produce sugars and plant materials, (b) show that animals can eat plants and/or other animals for food, and (c) show that some organisms, including fungi and bacteria break down dead organisms and recycle some materials back to the air and soil.
 Lesson 6	**Food Webs & Flow of Energy** Why did the dinosaurs go extinct?	Students develop a model of a dinosaur food web. Students realize that blocking the sun's energy would have disastrous effects on the organisms that rely on this energy in the food web and cause the extinction of some entire species.	**5-PS3-1** Use a model to describe that the food animals digest (a) contains energy that was once energy from the Sun, and (b) provides energy and nutrients for life processes, including body repair, growth, motion, body warmth, and reproduction.

Water Cycle & Earth's Systems Unit (Watery Planet)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
 Lesson 1	**Hydrosphere & The Roles of Water** How much water is in the world?	Students analyze and interpret data from world maps to determine the relative amounts of fresh, salt, and frozen water. Students figure out that while the Earth has a lot of water, most of Earth's water is not fresh or accessible.	**5-ESS2-2** Describe and graph the relative amounts of salt water in the ocean; fresh water in lakes, rivers, and groundwater; and fresh water frozen in glaciers and polar ice caps to provide evidence about the availability of fresh water in Earth's biosphere.
 Lesson 2	✨New!✨ **Mixtures & Solutions** How much salt is in the ocean?	Students create a model ocean to observe how salt seems to completely vanish when dissolved in water. Students measure and graph quantities to provide evidence that the salt is still in the solution, even though we can't see it.	**5-PS1-2** Measure and graph the weights (masses) of substances before and after a reaction or phase change to provide evidence that regardless of the type of change that occurs when heating, cooling, or combining substances, the total weight (mass) of matter is conserved.
 Lesson 3	**Groundwater as a Natural Resource** When you turn on the faucet, where does the water come from?	Students learn most people get fresh water from underground sources. Students determine the best place to settle a town by considering features of the landscape & the characteristics of the plants that thrive there.	**5-ESS2-2** Describe and graph the relative amounts of salt water in the ocean; fresh water in lakes, rivers, and groundwater; and fresh water frozen in glaciers and polar ice caps to provide evidence about the availability of fresh water in Earth's biosphere.
 Lesson 4	**Water Cycle** Can we make it rain?	Students create a model of the ocean and sky to investigate how temperature influences evaporation and condensation. Students figure out that higher ocean temperatures lead to more evaporation, thus leading to more rain.	**5-ESS2-1** Use a model to describe the cycling of water through a watershed through evaporation, precipitation, absorption, surface runoff, and condensation.
 Lesson 5	**Natural Disasters & Engineering** How can you save a town from a hurricane?	Students define the problem that a town needs protection from flooding. They design solutions using different types of flood protection. They realize flooding is caused by severe rainfall generated by hurricanes. Hurricanes are created where ocean temperatures are warm.	**5-ESS3-1** Obtain and combine information about ways communities reduce human impact on the Earth's resources and environment by changing the agricultural, industrial, or community practice or process. **3.3-5-ETS3-1(MA) & 3.3-5-ETS3-2(MA)**

Stars & The Solar System Unit (Spaceship Earth)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
 Lesson 1	**Day, Night, & Earth's Rotation** How fast does the Earth spin?	Students model the rotation of the Earth and investigate why the Sun looks like it's moving across the sky. Using evidence they gathered in the investigation, students build a model that explains how the Earth's rotation around its own axis causes the Sun to appear to rise and set.	**5-ESS1-2** Use a model to communicate Earth's relationship to the Sun, Moon, and other stars that explain (a) why people on Earth experience day and night, (b) patterns in daily changes in length and direction of shadows over a day, and (c) changes in the apparent position of the Sun, Moon, and stars at different times during a day, over a month, and over a year.
 Lesson 2	**Earth's Rotation & Daily Shadow Patterns** Who set the first clock?	Students make a shadow clock (sundial) and investigate how the direction and length of shadows change with the position of the light shining on the sundial. Students realize that the Sun's position in the sky can be used to tell the time of day.	**5-ESS1-2** Use a model to communicate Earth's relationship to the Sun, Moon, and other stars that explain (a) why people on Earth experience day and night, (b) patterns in daily changes in length and direction of shadows over a day, and (c) changes in the apparent position of the Sun, Moon, and stars at different times during a day, over a month, and over a year.
 Lesson 3	**Seasonal Changes & Shadow Length** How can the Sun tell you the season?	Students examine photos taken at different times of year and figure out the time of year that each photo was taken. Students discover that the Sun's path changes with the seasons, as does the time of sunrise and sunset. The Sun is always highest in the sky at noon, but that height changes with the season.	**5-ESS1-2** Use a model to communicate Earth's relationship to the Sun, Moon, and other stars that explain (a) why people on Earth experience day and night, (b) patterns in daily changes in length and direction of shadows over a day, and (c) changes in the apparent position of the Sun, Moon, and stars at different times during a day, over a month, and over a year.
 Lesson 4	**Seasonal Patterns & Earth's Orbit** Why do the stars change with the seasons?	Students build a model of the universe and use it to explain why different stars are visible at different times of year. Using evidence from this model, students make an argument that supports the claim that the Earth orbits the Sun.	**5-ESS1-2** Use a model to communicate Earth's relationship to the Sun, Moon, and other stars that explain (a) why people on Earth experience day and night, (b) patterns in daily changes in length and direction of shadows over a day, and (c) changes in the apparent position of the Sun, Moon, and stars at different times during a day, over a month, and over a year.

Stars & The Solar System Unit continues on the next page

Stars & The Solar System Unit (Spaceship Earth)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 5 	**Moon Phases, Lunar Cycle** Why does the Moon change shape?	Students use a physical model of the Sun and Moon to investigate how the Moon's phase relates to its position relative to the Sun. Students notice that the Moon's phases repeat in a predictable pattern.	**5-ESS1-2** Use a model to communicate Earth's relationship to the Sun, Moon, and other stars that explain (a) why people on Earth experience day and night, (b) patterns in daily changes in length and direction of shadows over a day, and (c) changes in the apparent position of the Sun, Moon, and stars at different times during a day, over a month, and over a year.
Lesson 6 	**Planets & Solar System** What are the wandering stars?	Students learn that planets look like stars, but don't move like them. The apparent movement of planets is caused by both the Earth's spin and the planets' movement around the Sun. Students use a model of the solar system to learn the order of the planets and their relative distance from the Sun, and each other.	**5-ESS1-2** Use a model to communicate Earth's relationship to the Sun, Moon, and other stars that explain (a) why people on Earth experience day and night, (b) patterns in daily changes in length and direction of shadows over a day, and (c) changes in the apparent position of the Sun, Moon, and stars at different times during a day, over a month, and over a year.
Lesson 7 	**Gravity** Why is gravity different on other planets?	Using mathematics and computational thinking, students calculate how high they could jump on planets and moons that have stronger or weaker gravity than Earth. Students analyze and interpret this data to construct an explanation for why the amount of gravity is different on other planets.	**5-PS2-1** Support an argument with evidence that the gravitational force exerted by Earth on objects is directed toward Earth's center.
Lesson 8 	**Star Brightness & Habitable Planets** Could there be life on other planets?	Students discover that the Earth is in the "Goldilocks Zone" — a distance from the Sun with the right amount of light and heat for life to exist. Students evaluate other solar systems, comparing their stars to our Sun. Based on their analysis, students plan a space mission to a planet with conditions similar to those on Earth.	**5-ESS1-1** Use observations, first-hand and from various media, to argue that the Sun is a star that appears brighter than other stars because it is closer to Earth.

Chemical Reactions & Properties of Matter Unit (Chemical Magic)

	Topic & Guiding Question	Student Objectives	Massachusetts Science Standards
Lesson 1 	**Chemistry & Conservation of Matter** Are magic potions real?	Students observe that a salt and vinegar solution will turn a dull penny shiny again indicating that substances can change other substances.	**Foundational for 5-PS1-2** Measure and graph the weights (masses) of substances before and after a reaction or phase change to provide evidence that regardless of the type of change that occurs when heating, cooling, or combining substances, the total weight (mass) of matter is conserved.
Lesson 2 	**Dissolving & Particulate Nature of Matter** Could you transform something worthless into gold?	Students coat a steel nail in copper by placing it into the solution that dissolved bits of the penny. Students realize that substances can change to become particles too small to be seen, but they still exist.	**Foundational for 5-PS1-2** Measure and graph the weights (masses) of substances before and after a reaction or phase change to provide evidence that regardless of the type of change that occurs when heating, cooling, or combining substances, the total weight (mass) of matter is conserved.
Lesson 3 	**Acids, Reactions, & Properties of Matter** What would happen if you drank a glass of acid?	Students figure out that acids are very reactive substances. Students investigate reactions between different substances to determine how known acids react with other materials.	**5-PS1-3** Make observations and measurements of substances to describe characteristic properties of each, including color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility.
Lesson 4 	**Chemical Reactions** What do fireworks, rubber, and Silly Putty have in common?	Students combine different substances together to discover that chemical reactions can create new substances.	**5-PS1-4** Conduct an experiment to determine whether the mixing of two or more substances results in new substances with new properties (a chemical reaction) or not (a mixture).
Lesson 5 	**Gases & Particle Models** Why do some things explode?	Students investigate and model the reaction between baking soda and vinegar. They figure out that gases are made of particles too small to be seen.	**5-PS1-1** Use a particle model of matter to explain common phenomena involving gases, and phase changes between gas and liquid and between liquid and solid.