Mystery Science Alignment with Tennessee Science Standards



Mystery Science is a hands-on curriculum that aligns with the Tennessee Academic Standards for Science (2017).

Mystery Science's units of study contain:

- Hands-on, easy-prep activities with EVERY lesson
- Engaging, real-world investigative phenomena
- Thoughtful discussions to build background knowledge
- Lesson & unit assessments to evaluate comprehension
- Curated, cross-curricular extensions

Mystery Science also offers the Anchor Layer, which enriches the unit with an anchor phenomenon, incorporates anchor connections after each lesson, & concludes the unit with a performance task.

mystery science

Updated 08/25/2023

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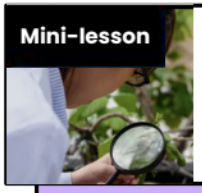
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Animal Needs Unit (Animal Secrets)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
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** Use information from observations to identify differences between plants and animals (locomotion, obtainment of food, and take in air/gasses).
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.ESS3.1** Use a model to represent the relationship between the basic needs (shelter, food, water) of different plants and animals (including humans) and the places they live.
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.ESS3.1** Use a model to represent the relationship between the basic needs (shelter, food, water) of different plants and animals (including humans) and the places they live.
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.ESS3.1** Use a model to represent the relationship between the basic needs (shelter, food, water) of different plants and animals (including humans) and the places they live.

Tennessee Specific Standard:
K.LS1.3 Explain how humans use their five senses in making scientific findings.
The following mini-lessons can be used to support Tennessee Specific Science Standards.

Mini-lesson



K.LS1.3

How do scientists know so much?

Mini-lesson



K.LS1.3

How do scientists learn about wild animals?

Plant Needs Unit (Plant Secrets)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	✨New!✨ **Living & Nonliving** Are plants alive?	Students make observations of plants in order to identify their needs and that they are, in fact, living things.	**K.LS1.2** Recognize differences between living organisms and non-living materials and sort them into groups by observable physical attributes.
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** Use information from observations to identify differences between plants and animals (locomotion, obtainment of food, and take in air/gasses). **K.LS3.1** Make observations to describe that young plants and animals resemble their parents.
Lesson 3 	**Human Impacts on 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 that will reduce the impact from humans on land, water, air, and other living things in the local environment.

***This unit is found under 1st Grade on our site**, but we recommend teaching some lessons in Kindergarten if you are following Tennessee Standards.*

Animal Traits & Survival Unit (Animal Superpowers)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	**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.	**K.LS3.1** Make observations to describe that young plants and animals resemble their parents.
Lesson 2 	*We **recommend teaching this in Kindergarten** if following Tennessee Standards.* ***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.*	***2.LS1.1** Use evidence and observations to explain that many 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.*
Lesson 3 	*We **recommend teaching this in Kindergarten** if following Tennessee Standards.* ***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.*	***2.LS3.1** Use evidence to explain that living things have physical traits inherited from parents and that variations of these traits exist in groups of similar organisms.*
Lesson 4 	*We **recommend teaching this in Kindergarten** if following Tennessee Standards.* ***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.*	***2.LS1.1** Use evidence and observations to explain that many 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.*
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.	**K.LS3.1** Make observations to describe that young plants and animals resemble their parents.

Severe Weather Unit (Wild Weather)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
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** Explain the purpose of weather forecasting to prepare for, and respond to, severe weather in Tennessee.
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.ESS2.2** Develop and use models to predict weather and identify patterns in spring, summer, autumn, and winter.
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.ESS2.1** Analyze and interpret weather data (precipitation, wind, temperature, cloud cover) to describe weather patterns that occur over time (hourly, daily) using simple graphs, pictorial weather symbols, and tools (thermometer, rain gauge).

Weather Patterns Unit (Circle of Seasons)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	**Daily Weather 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** Analyze and interpret weather data (precipitation, wind, temperature, cloud cover) to describe weather patterns that occur over time (hourly, daily) using simple graphs, pictorial weather symbols, and tools (thermometer, rain gauge).
Lesson 2 	**Seasonal Weather 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.ESS2.2** Develop and use models to predict weather and identify patterns in spring, summer, autumn, and winter.
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.ESS2.2** Develop and use models to predict weather and identify patterns in spring, summer, autumn, and winter.

Tennessee Specific Standard: **K.PS1.1** Plan and conduct an investigation to describe and classify different kinds of materials including wood, plastic, metal, cloth, and paper by their observable properties (color, texture, hardness, and flexibility) and whether they are natural or human-made.

Tennessee Specific Standard: **K.PS1.2** Conduct investigations to understand that matter can exist in different states (solid and liquid) and has properties that can be observed and tested.

Tennessee Specific Standard: **K.PS1.3** Construct an evidence-based account of how an object made of a small set of pieces (blocks, snap cubes) can be disassembled and made into a new object.

Plant Traits & Survival Unit (Plant Superpowers)

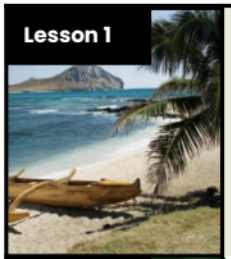
	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	✨New!✨ **Plant Traits & Offspring** What will a baby plant look like when it grows up?	Students observe seedlings and adult plants and use their observations to identify the pattern that young plants are similar to their parent plants.	**1.LS1.1** Recognize the structure of plants (roots, stems, leaves, flowers, fruits) and describe the function of the parts (taking in water and air, producing food, making new plants). **1.LS1.2** Illustrate and summarize the life cycle of plants.
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** Recognize the structure of plants (roots, stems, leaves, flowers, fruits) and describe the function of the parts (taking in water and air, producing food, making new plants). **1.ETS1.1** Solve scientific problems by asking testable questions, making short-term and long-term observations, and gathering information.
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.LS1.3** Analyze and interpret data from observations to describe how changes in the environment cause plants to respond in different ways.

Tennessee Specific Standard: **1.LS2.2** Obtain and communicate information to classify plants by where they grow (water, land) and the plant's physical characteristics.

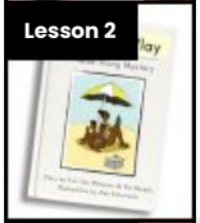
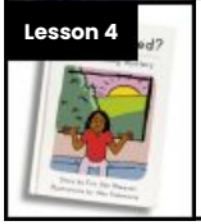
Tennessee Standards Alignment
1st Grade - Life Science

***This unit is found under 2nd Grade on our site**, but we recommend teaching all lessons in 1st grade if you are following Tennessee Standards.*

Plant Adaptations Unit (Plant Adventures)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	✨New!✨ **Seed Dispersal** How did a tree travel halfway around the world?	Students develop physical models of seed structures. They observe how structure affects the seed's function in dispersing away from the tree.	**1.LS2.1** Conduct an experiment to show how plants depend on air, water, minerals from soil, and light to grow and thrive. **1.LS1.2** Illustrate and summarize the life cycle of plants.
Lesson 2 	✨New!✨ **Animal Seed Dispersal** Why do seeds have so many different shapes?	Students develop a model of a furry animal and then use it to test how far seed models with different structures can travel.	**1.LS2.3** Recognize how plants depend on their surroundings and other living things to meet their needs in the places they live.
Lesson 3 	**Water, Sunlight, & Plant Growth** Could a plant survive without light?	Students conduct an investigation to determine that plants need water and light to grow.	**1.LS2.1** Conduct an experiment to show how plants depend on air, water, minerals from soil, and light to grow and thrive. **1.LS1.1** Recognize the structure of plants (roots, stems, leaves, flowers, fruits) and describe the function of the parts (taking in water and air, producing food, making new plants).
Lesson 4 	✨New!✨ **Plant Needs & Habitats** How much water should you give a plant?	Students plan and conduct a series of virtual experiments in order to determine how much water and sunlight a set of mystery plants need in order to stay healthy and survive.	**1.LS2.1** Conduct an experiment to show how plants depend on air, water, minerals from soil, and light to grow and thrive.

Day Patterns Unit (Sun & Shadows)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
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 or models of the sun, moon, and stars to describe patterns that can be predicted.
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 or models of the sun, moon, and stars to describe patterns that can be predicted.
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.ESS1.3** Analyze data to predict patterns between sunrise and sunset, and the change of seasons.
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.ESS1.3** Analyze data to predict patterns between sunrise and sunset, and the change of seasons.

Night Patterns Unit (Moon & Stars)

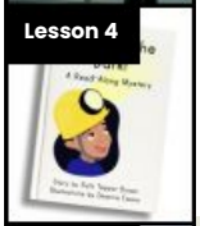
	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	**Moon Phases & Patterns** When can you see the full moon?	Students record observations of the Moon's shape using a series of photos collected over the course of four weeks. Using this information, students 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 or models of the sun, moon, and stars to describe patterns that can be predicted. **1.ETS1.1** Solve scientific problems by asking testable questions, making short-term and long-term observations, and gathering information.
Lesson 2 	**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 or models of the sun, moon, and stars to describe patterns that can be predicted.
Lesson 3 	**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.ESS1.2** Observe natural objects in the sky that can be seen from Earth with the naked eye and recognize that a telescope, used as a tool, can provide greater detail of objects in the sky.

***This unit is found under Kindergarten on our site**, but we recommend teaching all lessons in 1st grade if you are following Tennessee Standards.*

Sunlight & Warmth Unit (Sunny Skies)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
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.	**1.PS3.1** Make observations to determine how sunlight warms Earth's surfaces (sand, soil, rocks, and water).
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.)	**1.PS3.1** Make observations to determine how sunlight warms Earth's surfaces (sand, soil, rocks, and water). **1.ETS2.1** Use appropriate tools (magnifying glass, basic balance scale) to make observations and answer testable scientific questions.
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.	**1.PS3.1** Make observations to determine how sunlight warms Earth's surfaces (sand, soil, rocks, and water).

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

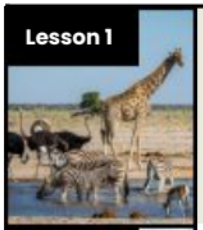
	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	*We **recommend teaching this in 2nd Grade** if following Tennessee Standards.* ***Sounds & Vibrations*** *How do they make silly sounds in cartoons?*	*Students explore how to make different sounds with everyday objects. They construct an explanation that objects vibrate when they make a sound, and if the vibration stops, the sound stops.*	***2.PS4.1** Plan and conduct investigations to demonstrate the cause and effect relationship between vibrating materials (tuning forks, water, bells) and sound.*
Lesson 2 	*We **recommend teaching this in 2nd Grade** if following Tennessee Standards.* *Where do sounds come from?*	*construct an explanation about where the vibrations are happening in each sound experiment.*	*the cause and effect relationship between vibrating materials (tuning forks, water, bells) and sound.*
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.PS4.2** Determine the effect of placing objects made with different materials (transparent, translucent, opaque, and reflective) 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.PS4.1** Use a model to describe how light is required to make objects visible. Summarize how Illumination could be from an external light source or by an object giving off its own light.
Lesson 5 	*We **recommend teaching this in 2nd Grade** if following Tennessee Standards.* ***Light, Communication, & Engineering*** *How could you send a secret message to someone far away?*	*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.*	***2.PS4.2** Use tools and materials to design and build a device to understand that light and sound travel in waves and can send signals over a distance.*
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.PS4.1** Use a model to describe how light is required to make objects visible. Summarize how Illumination could be from an external light source or by an object giving off its own light.

***This unit is found under 1st Grade on our site**, but we recommend teaching some lessons in 2nd grade if you are following Tennessee Standards.*

Animal Traits & Survival Unit (Animal Superpowers)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	*We **recommend teaching this in Kindergarten** if following Tennessee Standards.*		
	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.*	***K.LS3.1** Make observations to describe that young plants and animals resemble their parents.*
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.	**2.LS1.1** Use evidence and observations to explain that many 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.
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.	**2.LS3.1** Use evidence to explain that living things have physical traits inherited from parents and that variations of these traits exist in groups of similar organisms.
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.	**2.LS1.1** Use evidence and observations to explain that many 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.
Lesson 5 	*We **recommend teaching this in Kindergarten** if following Tennessee Standards.*		
	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.*	***K.LS3.1** Make observations to describe that young plants and animals resemble their parents.*

Animal Biodiversity Unit (Animal Adventures)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
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.	**2.LS1.2** Obtain and communicate information to classify animals (vertebrates-mammals, birds, amphibians, reptiles, fish, invertebrates-insects) based on their physical characteristics.
Lesson 2 	**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.LS2.1** Develop and use models to compare how animals depend on their surroundings and other living things to meet their needs in the places they live. **2.ETS2.1** Use appropriate tools to make observations, record data, and refine design ideas.
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.LS2.1** Develop and use models to compare how animals depend on their surroundings and other living things to meet their needs in the places they live.
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.LS2.1** Develop and use models to compare how animals depend on their surroundings and other living things to meet their needs in the places they live. **2.ETS1.2** Develop a simple sketch, drawing, or physical model that communicates solutions to others.

***This unit is found under 3rd Grade on our site**, but we recommend teaching all lessons in 2nd grade if you are following Tennessee Standards.*

Life Cycles Unit (Circle of Life)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	**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.	**2.LS1.3** Use simple graphical representations to show that species have unique and diverse life cycles.
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.	**2.LS2.2** Predict what happens to animals when the environment changes (temperature, cutting down trees, wildfires, pollution, salinity, drought, land preservation). **2.ETS1.2** Develop a simple sketch, drawing, or physical model that communicates solutions to others.
Lesson 3 	**Pollination & Plant Reproduction** Why do plants grow flowers?	Students model the structure and function of flower parts that are responsible for creating seeds.	**2.LS1.3** Use simple graphical representations to show that species have unique and diverse life cycles.
Lesson 4 	**Fruit, Seeds, & Plant Reproduction** Why do plants give us fruit?	Students explore the function of fruits in plants and practice classification.	**2.LS1.3** Use simple graphical representations to show that species have unique and diverse life cycles.
Lesson 5 	**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.	**2.LS1.3** Use simple graphical representations to show that species have unique and diverse life cycles.

Tennessee Specific Standard: **2.LS3.1** Use evidence to explain that living things have physical traits inherited from parents and that variations of these traits exist in groups of similar organisms.

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

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
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.ESS2.3** Compare simple maps of different land areas to observe the shapes and kinds of land (rock, soil, sand) and water (river, stream, lake, pond). **2.ESS2.4** Use information obtained from reliable sources to explain that water is found in the ocean, rivers, 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.ESS2.3** Compare simple maps of different land areas to observe the shapes and kinds of land (rock, soil, sand) and water (river, stream, lake, pond).
Lesson 3 	**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.ESS2.3** Compare simple maps of different land areas to observe the shapes and kinds of land (rock, soil, sand) and water (river, stream, lake, pond). **2.ESS1.1** Recognize that some of Earth's natural processes are cyclical, while others have a beginning and an end. Some events happen quickly, while others occur slowly over time.
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.ESS2.2** Observe and analyze how blowing wind and flowing water can move Earth materials (soil, rocks) from one place to another, changing the shape of a landform and affecting the habitats of living things. **2.ESS1.1** Recognize that some of Earth's natural processes are cyclical, while others have a beginning and an end. Some events happen quickly, while others occur slowly over time.
Lesson 5 	**Erosion & Engineering** How can you stop a landslide?	Students compare multiple solutions for preventing erosion.	**2.ESS2.1** Compare the effectiveness of multiple solutions designed to slow or prevent wind or water from changing the shape of the land. **2.ETS1.1** Define a simple problem that can be solved through the development of a new or improved object or tool by asking questions, making observations, and gather accurate information about a situation people want to change. **2.ETS1.4** Compare and contrast solutions to a design problem by using evidence to point out strengths and weaknesses of the design.

***This unit is found under Kindergarten on our site**, but we recommend teaching all lessons in 2nd grade if you are following Tennessee Standards.*

Pushes & Pulls Unit (Force Olympics)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
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 2.PS2.2** Evaluate the effects of different strengths and directions of a push or a pull 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 2.PS2.2** Evaluate the effects of different strengths and directions of a push or a pull 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.	**2.PS2.1** Analyze the push or the pull that occurs when objects collide or are connected. **2.PS3.1** Demonstrate how a stronger push or pull makes things go faster and how faster speeds during a collision can cause a bigger change in the shape of the colliding objects.
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.	**2.PS2.1** Analyze the push or the pull that occurs when objects collide or are connected. **2.PS2.3** Recognize the effect of multiple pushes and pulls on an object's movement or non-movement.
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.	**2.PS2.2** Evaluate the effects of different strengths and directions of a push or a pull on the motion of an object. **2.PS2.3** Recognize the effect of multiple pushes and pulls on an object's movement or non-movement.
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.	**2.PS2.2** Evaluate the effects of different strengths and directions of a push or a pull on the motion of an object.

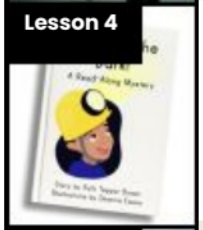
Tennessee Specific Standard: **2.PS3.2** Make observations and conduct experiments to provide evidence that friction produces heat and reduces or increases the motion of an object.

Tennessee Standards Alignment
2nd Grade - Physical Science

mystery science

***This unit is found under 1st Grade on our site**, but we recommend teaching some lessons in 2nd grade if you are following Tennessee Standards.*

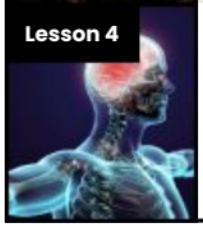
Light, Sound, & Communication Unit (Lights & Sounds)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
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.	**2.PS4.1** Plan and conduct investigations to demonstrate the cause and effect relationship between vibrating materials (tuning forks, water, bells) and sound.
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.	**2.PS4.1** Plan and conduct investigations to demonstrate the cause and effect relationship between vibrating materials (tuning forks, water, bells) and sound.
Lesson 3 	*We **recommend teaching this in 1st Grade** if following Tennessee Standards.* ***Light, Materials, Transparent & Opaque*** *What if there were no windows?*	*cannot see through. Then they create a stained glass window using tissue paper to explore how materials interact with light.*	***1.PS4.2** Determine the effect of placing objects made with different materials (transparent, translucent, opaque, and reflective) in the path of a beam of light.*
Lesson 4 	*We **recommend teaching this in 1st Grade** if following Tennessee Standards.* ***Light & Illumination Read-Along*** *Can you see in the dark?*	*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.PS4.1** Use a model to describe how light is required to make objects visible. Summarize how Illumination could be from an external light source or by an object giving off its own light.*
Lesson 5 	*We **recommend teaching this in 1st Grade** if following Tennessee Standards.* **Engineering** How could you send a secret message to someone far away?	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.	lerstand that light and sound travel in waves and can send signals over a distance. **2.ETS1.3** Recognize that to solve a problem, one may need to break the problem into parts, address each part, and then bring the parts back together
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.PS4.1** Use a model to describe how light is required to make objects visible. Summarize how Illumination could be from an external light source or by an object giving off its own light.*

Tennessee Specific Standard: **2.PS4.3** Observe and demonstrate that waves move in regular patterns of motion by disturbing the surface of shallow and deep water.

***This unit is found under 4th grade on our site**, but we recommend teaching some lessons in 3rd grade if you are following Tennessee Standards.*

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

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
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.	**3.LS1.1** Analyze the internal and external structures that aquatic and land animals and plants have to support survival, growth, behavior, and reproduction.
Lesson 2 	*We **recommend teaching this in 4th Grade** if following Tennessee Standards.* ***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.PS4.2** Describe how the colors of available light sources and the bending of light waves determine what we see.*
Lesson 3 	*We **recommend teaching this in 4th Grade** if following Tennessee Standards.* ***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.PS4.2** Describe how the colors of available light sources and the bending of light waves determine what we see.*
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.	**3.LS1.1** Analyze the internal and external structures that aquatic and land animals and plants have to support survival, growth, behavior, and reproduction.

Fossils & Changing Environments Unit (Animals Through Time)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
 Lesson 1	**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.LS4.2** Infer that plant and animal adaptations help them survive in land and aquatic biomes. **3.LS4.1** Explain the cause and effect relationship between a naturally changing environment and an organism's ability to survive.
 Lesson 2	✨New!✨ **Fossil Evidence & Dinosaurs** 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.LS1.1** Analyze the internal and external structures that aquatic and land animals and plants have to support survival, growth, behavior, and reproduction.
 Lesson 3	**Trace Fossil Evidence & Animal Movement** Can you outrun a dinosaur?	Students learn how fossilized animal tracks can tell us a great deal about the animals that left them.	**3.LS1.1** Analyze the internal and external structures that aquatic and land animals and plants have to support survival, growth, behavior, and reproduction. **3.LS4.2** Infer that plant and animal adaptations help them survive in land and aquatic biomes

Tennessee Specific Standard: **3.LS4.3** Explain how changes to an environment's biodiversity influence human resources.

Heredity, Survival, & Selection Unit (Fates of Traits)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	*We **recommend teaching this in 5th grade** if following Tennessee Standards.*		
	How could you make the biggest fruit in the world?	*on our knowledge of how plants change from generation to generation.*	*traits inherited from parents and that variations of these traits exist in a group of similar organisms.*
Lesson 2 	*We **recommend teaching this in 5th grade** if following Tennessee Standards.*		
	What kinds of animals might there be in the future?	*dogs and their offspring, constructing an explanation about which traits a puppy gets from each parent.*	*group of similar organisms.* **5.LS4.2** *Use evidence to construct an explanation for how variations in characteristics among individuals within the same species may provide advantages to these individuals in their survival and reproduction.*
Lesson 3 	*We **recommend teaching this in 5th grade** if following Tennessee Standards.*		
	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.*	**5.LS3.2** *Provide evidence and analyze data that plants and animals have traits inherited from parents and that variations of these traits exist in a group of similar organisms.* **5.LS4.2** *Use evidence to construct an explanation for how variations in characteristics among individuals within the same species may provide advantages to these individuals in their survival and reproduction.*
Lesson 4 	**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.LS2.1** Construct an argument to explain why some animals benefit from forming groups.
Lesson 5 	*We **recommend teaching this in 5th grade** if following Tennessee Standards.*		
	How long can people (and animals) survive in outer space?	*balance, and height) and analyze the information to construct an explanation for how the environment can influence traits.*	*characteristics that result from a direct interaction with the environment. Apply this concept by giving examples of characteristics of living organisms that are influenced by both inheritance and the environment.*

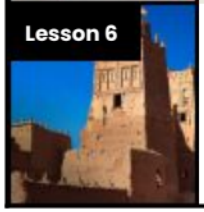
Weather & Climate Unit (Stormy Skies)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
	**Water Cycle & States 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.	**3.ESS2.1** Explain the cycle of water on Earth.
	**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.ESS2.2** Associate major cloud types (cumulus, cumulonimbus, cirrus, stratus, nimbostratus) with weather conditions.
	**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.ESS2.3** Use tables, graphs, and tools to describe precipitation, temperature, and wind (direction and speed) to determine local weather and climate.
	**Climate & Global Weather Patterns** Why are some places always hot?	Students obtain and combine information to describe the different climate regions of the world.	**3.ESS2.4** Incorporate weather data to describe major climates (polar, temperate, tropical) in different regions of the world.
	**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** Explain how natural hazards (fires, landslides, earthquakes, volcanic eruptions, floods) impact humans and the environment. **3.ESS3.2** Design solutions to reduce the impact of natural hazards (fires, landslides, earthquakes, volcanic eruptions, floods) on the environment.

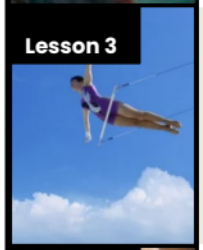
Tennessee Specific Standard: **3.ESS1.1** Use data to categorize the planets in the solar system as inner or outer planets according to their physical properties.

***This unit is found under 2nd grade on our site**, but we recommend teaching all lessons in 3rd grade if you are following Tennessee Standards.*

Material Properties Unit (Material Magic)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	**Material 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.	**3.PS1.3** Describe and compare the physical properties of matter including color, texture, shape, length, mass, temperature, volume, state, hardness, and flexibility.
Lesson 2 	**Classify Materials: Insulators** 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.	**3.PS1.2** Differentiate between changes caused by heating or cooling that can be reversed and that cannot.
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.	**3.PS1.2** Differentiate between changes caused by heating or cooling that can be reversed and that 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.	**3.PS1.3** Describe and compare the physical properties of matter including color, texture, shape, length, mass, temperature, volume, state, hardness, and flexibility.
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.	**Foundational for 3.PS1.1** Describe the properties of solids, liquids, and gases and identify that matter is made up of particles too small to be seen.
Lesson 6 	**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.	**3.PS1.3** Describe and compare the physical properties of matter including color, texture, shape, length, mass, temperature, volume, state, hardness, and flexibility.

Forces, Motion, & Magnets Unit (Invisible Forces)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
 Lesson 1	*We **recommend teaching this in 5th grade** if following Tennessee Standards.*		
	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.*	***5.PS2.1** Test the effects of balanced and unbalanced forces on the speed and direction of motion of objects.* ***5.PS2.2** Make observations and measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.*
 Lesson 2	*We **recommend teaching this in 5th grade** if following Tennessee Standards.*		
	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.*	***5.PS2.1** Test the effects of balanced and unbalanced forces on the speed and direction of motion of objects.*
 Lesson 3	*We **recommend teaching this in 5th grade** if following Tennessee Standards.*		
	Pattern of Motion, Gravity, & Friction *How high can you swing on a flying trapeze?*	*measurements of a trapeze model. Then, using that information they predict the motion of a real trapeze.*	***5.PS2.5** Explain how forces can create patterns within a system (moving in one direction, shifting back and forth, or moving in cycles), and describe conditions that affect how fast or slowly these patterns occur.*
 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.PS2.1** Explain the cause and effect relationship of magnets. **3.PS3.3** Evaluate how magnets cause changes in the motion and position of objects, even when the objects are not touching the magnet.
 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.PS2.2** Solve a problem by applying the use of the interactions between two magnets. **3.ETS1.1** Design a solution to a real-world problem that includes specified criteria for constraints. **3.ETS1.2** Apply evidence or research to support a design solution.

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

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
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.	**3.PS3.1** Recognize that energy is present when objects move; describe the effects of energy transfer from one object to another.
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.	**3.PS3.1** Recognize that energy is present when objects move; describe the effects of energy transfer from one object to another.
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.	**3.PS3.2** Apply scientific ideas to design, test, and refine a device that converts electrical energy to another form of energy, using open or closed simple circuits. **3.ETS1.2** Apply evidence or research to support a design solution. **3.ETS2.1**) Identify and demonstrate how technology can be used for different purposes.
Lesson 7 	*We **recommend teaching this in 4th grade** if following Tennessee Standards.* ***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.PS3.3** Describe how stored energy can be converted into another form for practical use.*
Lesson 8 	*We **recommend teaching this in 4th grade** if following Tennessee Standards.* ***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.*	*and fuels are derived from natural resources and that some energy and fuel sources are renewable (sunlight, wind, water) and some are not (fossil fuels, minerals).* ***4.ETS1.1** Categorize the effectiveness of design solutions by comparing them to specified criteria for constraints.*

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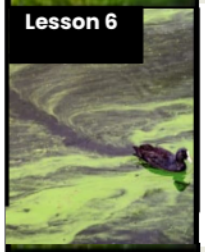
Ecosystems & The Food Web Unit (Web of Life)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
 Lesson 1	**Food Chains, Producers, & Consumers** 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.	**4.LS2.2** Develop models of terrestrial and aquatic food chains to describe the movement of energy among producers, herbivores, carnivores, omnivores, and decomposers.
 Lesson 2	**Matter & Plant Growth** What do plants eat?	Students conduct an investigation and interpret data and figure out that water and air account for a plant's weight.	**4.LS2.1** Support an argument with evidence that plants get the materials they need for growth and reproduction chiefly through a process in which they use carbon dioxide from the air, water, and energy from the sun to produce sugars, plant materials, and waste (oxygen); and that this process is called photosynthesis.
 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.	**4.LS2.3** Using information about the roles of organisms (producers, consumers, decomposers), evaluate how those roles in food chains are interconnected in a food web, and communicate how the organisms are continuously able to meet their needs in a stable food web. **4.LS2.5** Analyze and interpret data about changes (land characteristics, water distribution, temperature, food, and other organisms) in the environment and describe what mechanisms organisms can use to affect their ability to survive and reproduce.
 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.	**4.LS2.4** Develop and use models to determine the effects of introducing a species to, or removing a species from, an ecosystem and how either one can damage the balance of an ecosystem.

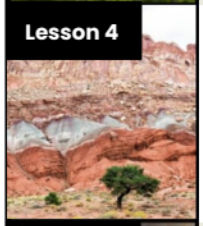
Ecosystems & The Food Web Unit continues on the next page

***This unit is found under 5th grade on our site**, but we recommend teaching all lessons in 4th grade if you are following Tennessee Standards.*

Ecosystems & The Food Web Unit (Web of Life)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
 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.	**4.LS2.4** Develop and use models to determine the effects of introducing a species to, or removing a species from, an ecosystem and how either one can damage the balance of an ecosystem. **4.LS2.5** Analyze and interpret data about changes (land characteristics, water distribution, temperature, food, and other organisms) in the environment and describe what mechanisms organisms can use to affect their ability to survive and reproduce.
 Lesson 6	✨New ✨ **Protecting Environments** How can we protect Earth's environments?	In this lesson, students learn about what happens in unbalanced ecosystems and how that can lead to an overabundance of algae and harmful algal blooms. In the activity, Bloom Busters, students play a game in which they obtain and combine science ideas in order to help a community respond to and prevent harmful algal blooms.	**4.ESS3.2** Create an argument, using evidence from research, that human activity (farming, mining, building) can affect the land and ocean in positive and/or negative ways.
 Lesson 7	**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.	**4.LS2.2** Develop models of terrestrial and aquatic food chains to describe the movement of energy among producers, herbivores, carnivores, omnivores, and decomposers. **4.LS2.3** Using information about the roles of organisms (producers, consumers, decomposers), evaluate how those roles in food chains are interconnected in a food web, and communicate how the organisms are continuously able to meet their needs in a stable food web. **4.LS4.1** Obtain information about what a fossil is and ways a fossil can provide information about the past.

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

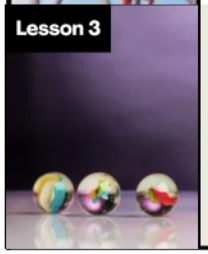
	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
 Lesson 1	**Volcanoes & Patterns of Earth's Features** Could a volcano pop up where you live?	Students use coordinates to develop a map of volcanoes to discover a pattern of where volcanoes exist on Earth. Students identify the pattern of volcanoes in the "Ring of Fire."	**4.ESS2.2** Interpret maps to determine that the location of mountain ranges, deep ocean trenches, volcanoes, and earthquakes occur in patterns.
 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.ESS2.2** Interpret maps to determine that the location of mountain ranges, deep ocean trenches, volcanoes, and earthquakes occur in patterns. **4.ETS2.1** Use appropriate tools and measurements to build a model.
 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** Collect and analyze data from observations to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering (frost wedging, abrasion, tree root wedging) and are transported by water, ice, wind, gravity, and vegetation. **4.ESS2.3** Provide examples to support the claim that organisms affect the physical characteristics of their regions.
 Lesson 4	*We **recommend teaching this in 5th grade** if following Tennessee Standards.* ***Sedimentary Rock & Fossils*** *What did your town look like 100 million years ago?*	*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.*	*differences of those to living organisms and their environments. Recognize that most kinds of animals (and plants) that once lived on Earth are now extinct.* ***5.ESS1.7** Use evidence from the presence and location of fossils to determine the order in which rock strata were formed.*
 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.ESS1.1** Generate and support a claim with evidence that over long periods of time, erosion (weathering and transportation) and deposition have changed landscapes and created new landforms. **4.ETS1.1** Categorize the effectiveness of design solutions by comparing them to specified criteria for constraints.

Tennessee Specific Standard: **4.ESS2.4** Analyze and interpret data on the four layers of the Earth, including thickness, composition, and physical states of these layers.

Stars & The Solar System Unit (Spaceship Earth)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
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.	**4.ESS1.2** Use a model to explain how the orbit of the Earth and sun cause observable patterns: a. day and night; b. changes in length and direction of shadows over a day.
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.	**4.ESS1.2** Use a model to explain how the orbit of the Earth and sun cause observable patterns: a. day and night; b. changes in length and direction of shadows over a day.
Lesson 3 	*We **recommend teaching this in 5th grade** if following Tennessee Standards.* ***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.ESS1.5** Relate the tilt of the Earth's axis, as it revolves around the sun, to the varying intensities of sunlight at different latitudes. Evaluate how this causes changes in day-lengths and seasons.*
Lesson 4 	*We **recommend teaching this in 5th grade** if following Tennessee Standards.* ***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.ESS1.6** Use tools to describe how stars and constellations appear to move from the Earth's perspective throughout the seasons.*

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

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
 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 explain the cause and effect relationship between the speed of an object and the energy of an object.
 Lesson 2	**Gravitational Energy, Speed, & Collisions** 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.PS3.2** Observe and explain the relationship between potential energy and kinetic energy.
 Lesson 3	✨New!✨ **Collisions & Energy Transfer** How can marbles save the world?	Students investigate how energy transfers when objects collide. In the activity, Bumper Jumper, students ask questions and make predictions about how far a marble will launch over a jump after colliding with other objects.	**4.PS3.2** Observe and explain the relationship between potential energy and kinetic energy.

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

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

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 4 	*We **recommend teaching this in 3rd grade** if following Tennessee Standards.* ***Energy Transfer & Engineering*** *Could you knock down a building using only dominoes?*	*Students experiment with ways to store and [illegible] 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.*	***3.PS3.1** Recognize that energy is present when objects move; describe the effects of energy transfer from one object to another.*
Lesson 5 	*We **recommend teaching this in 3rd grade** if following Tennessee Standards.* ***Energy Transfer & Engineering*** *Can you build a chain reaction machine?*	*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.*	***3.PS3.1** Recognize that energy is present when objects move; describe the effects of energy transfer from one object to another.*
Lesson 6 	*We **recommend teaching this in 3rd grade** if following Tennessee Standards.* ***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.*	*[illegible]rts circuits.* ***3.ETS1.2** Apply evidence or research to support a design solution.* ***3.ETS2.1**) Identify and demonstrate how technology can be used for different purposes.*
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.PS3.3** Describe how stored energy can be converted into another form for practical use.
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 and combine information to describe that energy and fuels are derived from natural resources and that some energy and fuel sources are renewable (sunlight, wind, water) and some are not (fossil fuels, minerals). **4.ETS1.1** Categorize the effectiveness of design solutions by comparing them to specified criteria for constraints.

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

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
 Lesson 1	✨New!✨ **Pattern Transfer & Technology** How do you send a secret code?	Students explore how digital devices encode complex information. Students generate their own codes in order to transfer information across the classroom. Then, they compare their codes and evaluate which worked best given the criteria and constraints.	**5.5** Sound can be produced and transmitted. Key ideas include: (a) sound is produced when an object or substance vibrates; (b) sound is the transfer of energy; (c) different media transmit sound differently; (d) sound waves have many uses and applications.
 Lesson 2	**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.	**5.5** Sound can be produced and transmitted. Key ideas include: (a) sound is produced when an object or substance vibrates; (b) sound is the transfer of energy; (c) different media transmit sound differently; (d) sound waves have many uses and applications.
 Lesson 3	**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.	**5.5** Sound can be produced and transmitted. Key ideas include: (a) sound is produced when an object or substance vibrates; (b) sound is the transfer of energy; (c) different media transmit sound differently; (d) sound waves have many uses and applications.
 Lesson 4	**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.	**5.5** Sound can be produced and transmitted. Key ideas include: (a) sound is produced when an object or substance vibrates; (b) sound is the transfer of energy; (c) different media transmit sound differently; (d) sound waves have many uses and applications.

Tennessee Specific Standard: **4.ETS2.2** Explain how engineers have improved existing technologies to increase their benefits, to decrease known risks, and to meet societal demands (artificial limbs, seatbelts, cell phones).

Tennessee Specific Standard: **4.PS4.3** Investigate how lenses and digital devices like computers or cell phones use waves to enhance human senses.

The following mini-lessons can be used to support Tennessee Specific Science Standards.


Mini-lesson

4.PS4.3 & 4.ETS2.2

How do phones work?


Mini-lesson

4.PS4.3 & 4.ETS2.2

What were the first computers like?

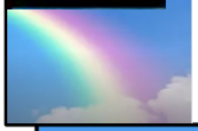
***This unit is found under 4th grade on our site**, but we recommend teaching some lessons in 3rd grade if you are following Tennessee Standards.*

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

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	*We **recommend teaching this in 3rd grade** if following Tennessee Standards.*		
	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.*	***3.LS1.1** Analyze the internal and external structures that aquatic and land animals and plants have to support 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.PS4.2** Describe how the colors of available light sources and the bending of light waves determine what we see. **4.ETS2.1** Use appropriate tools and measurements to build a model.
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.PS4.2** Describe how the colors of available light sources and the bending of light waves determine what we see.
Lesson 4 	*We **recommend teaching this in 3rd grade** if following Tennessee Standards.*		
	Brain, Nerves, & Information Processing *How does your brain control your body?*	*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.*	***3.LS1.1** Analyze the internal and external structures that aquatic and land animals and plants have to support survival, growth, behavior, and reproduction.*

The following mini-lessons can be used to support Tennessee Specific Science Standards.

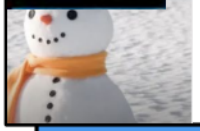
Mini-lesson



4.PS4.2

How is a rainbow made?

Mini-lesson



4.PS4.2

Why is snow white?

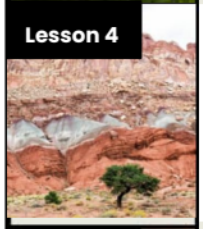
***This unit is found under 3rd Grade on our site**, but we recommend teaching some lessons in 5th grade if you are following Tennessee Standards.*

Heredity, Survival, & Selection Unit (Fates of Traits)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
 Lesson 1	**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.	**5.LS3.2** Provide evidence and analyze data that plants and animals have traits inherited from parents and that variations of these traits exist in a group of similar organisms.
 Lesson 2	**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.	**5.LS3.2** Provide evidence and analyze data that plants and animals have traits inherited from parents and that variations of these traits exist in a group of similar organisms. **5.LS4.2** Use evidence to construct an explanation for how variations in characteristics among individuals within the same species may provide advantages to these individuals in their survival and reproduction.
 Lesson 3	**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.	**5.LS3.2** Provide evidence and analyze data that plants and animals have traits inherited from parents and that variations of these traits exist in a group of similar organisms. **5.LS4.2** Use evidence to construct an explanation for how variations in characteristics among individuals within the same species may provide advantages to these individuals in their survival and reproduction.
 Lesson 4	*We **recommend teaching this in 3rd grade** if following Tennessee Standards.* ***Animal Groups & Survival*** *Why do dogs wag their tails?*	*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.LS2.1** Construct an argument to explain why some animals benefit from forming groups.*
 Lesson 5	**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.	**5.LS3.1** Distinguish between inherited characteristics and those characteristics that result from a direct interaction with the environment. Apply this concept by giving examples of characteristics of living organisms that are influenced by both inheritance and the environment.

***This unit is found under 4th grade on our site**, but we recommend teaching some lessons in 5th grade if you are following Tennessee Standards.*

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

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
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** Interpret maps to determine that the location of mountain ranges, deep ocean trenches, volcanoes, and earthquakes occur in patterns.*
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.ESS2.2** Interpret maps to determine that the location of mountain ranges, deep ocean trenches, volcanoes, and earthquakes occur in patterns.*
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** Collect and analyze data from observations to provide evidence that rocks, soils, and sediments are broken into smaller pieces through mechanical weathering (frost wedging, abrasion, tree root wedging) and are transported by water, ice, wind, gravity, and vegetation.* ***4.ESS2.3** Provide examples to support the claim that organisms affect the physical characteristics of their regions.*
Lesson 4 	**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.	**5.LS4.1** Analyze and interpret data from fossils to describe types of organisms and their environments that existed long ago. Compare similarities and differences of those to living organisms and their environments. Recognize that most kinds of animals (and plants) that once lived on Earth are now extinct. **5.ESS1.7** Use evidence from the presence and location of fossils to determine the order in which rock strata were formed.
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.ESS1.1** Generate and support a claim with evidence that over long periods of time, erosion (weathering and transportation) and deposition have changed landscapes and created new landforms.*

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

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	**Hydrosphere & Water Distribution** 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.	**Foundational for 5.PS1.1** Analyze and interpret data from observations and measurements of the physical properties of matter to explain phase changes between a solid, liquid, or gas.
Lesson 2 	**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** Analyze and interpret data to show that the amount of matter is conserved even when it changes form, including transitions where matter seems to vanish.
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.	**Foundational for 5.PS1.1** Analyze and interpret data from observations and measurements of the physical properties of matter to explain phase changes between a solid, liquid, or gas.
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.PS1.1** Analyze and interpret data from observations and measurements of the physical properties of matter to explain phase changes between a solid, liquid, or gas.
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.ETS1.1** Research, test, re-test, and communicate a design to solve a problem. **5.ETS2.1** Use appropriate measuring tools, simple hand tools, and fasteners to construct a prototype of a new or improved technology. **5.ETS1.3** Describe how failure provides valuable information toward finding a solution.

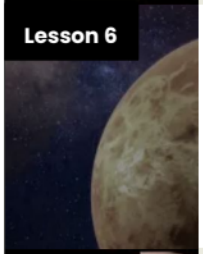
Tennessee Specific Standard: **5.ETS1.2** Plan and carry out tests on one or more elements of a prototype in which variables are controlled and failure points are considered to identify which elements need to be improved. Apply the results of tests to redesign the prototype.

Stars & The Solar System Unit (Spaceship Earth)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	*We **recommend teaching this in 4th grade** if following Tennessee Standards.*		
	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.*	***4.ESS1.2** Use a model to explain how the orbit of the Earth and sun cause observable patterns: a. day and night; b. changes in length and direction of shadows over a day.*
Lesson 2 	*We **recommend teaching this in 4th grade** if following Tennessee Standards.*		
	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.*	***4.ESS1.2** Use a model to explain how the orbit of the Earth and sun cause observable patterns: a. day and night; b. changes in length and direction of shadows over a day.*
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.ESS1.5** Relate the tilt of the Earth's axis, as it revolves around the sun, to the varying intensities of sunlight at different latitudes. Evaluate how this causes changes in day-lengths and seasons.
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.ESS1.6** Use tools to describe how stars and constellations appear to move from the Earth's perspective throughout the seasons.

Stars & The Solar System Unit continues on the next page

Stars & The Solar System Unit (Spaceship Earth)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
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.ESS1.4** Explain the cause and effect relationship between the positions of the sun, earth, and moon and resulting eclipses, position of constellations, and appearance of the moon.
Lesson 6 	✨New!✨ **Solar System & Sun Brightness** How can the Sun help us explore other planets?	Students gather evidence to support an argument that the apparent brightness of the Sun is dependent upon an observer's distance from the Sun. They construct a model of the solar system and gather observations of the Sun's apparent brightness from each planet within their model.	**5.ESS1.1** Explain that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth. **5.ETS2.2** Describe how human beings have made tools and machines (X-ray cameras, microscopes, satellites, computers) to observe and do things that they could not otherwise sense or do at all, or as quickly or efficiently.
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.PS2.3** Use evidence to support that the gravitational force exerted by Earth on objects is directed toward the Earth's center. **5.PS2.4** Explain the cause and effect relationship of two factors (mass and distance) that affect gravity.
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** Explain that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.

Tennessee Specific Standard: **5.ESS1.2** Research and explain the position of the Earth and the solar system within the Milky Way galaxy, and compare the size and shape of the Milky Way to other galaxies in the universe

Tennessee Specific Standard:
5.ESS1.3 Use data to categorize different bodies in our solar system including moons, asteroids, comets, and meteoroids according to their physical properties and motion.

The following mini-lessons can be used to support Tennessee Specific Science Standards.



Supports 5.ESS1.3

Has a shooting star ever landed on someone?



Supports 5.ESS1.3

What is the Moon made of?

Tennessee Specific Standard:
5.ESS1.4 Explain the cause and effect relationship between the positions of the sun, earth, and moon and resulting eclipses, position of constellations, and appearance of the moon.

The following mini-lessons can be used to support Tennessee Specific Science Standards.



Supports 5.ESS1.4

Who created the constellations?



Supports 5.ESS1.4

Why does the Moon turn blood red during a lunar eclipse?

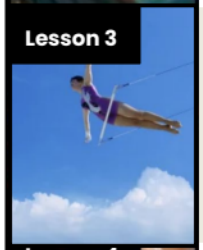
Tennessee Standards Alignment

5th Grade - Physical Science

mystery science

***This unit is found under 3rd grade on our site**, but we recommend teaching some lessons in 5th grade if you are following Tennessee Standards.*

Forces, Motion, & Magnets Unit (Invisible Forces)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
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.	**5.PS2.1** Test the effects of balanced and unbalanced forces on the speed and direction of motion of objects. **5.PS2.2** Make observations and measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.
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.	**5.PS2.1** Test the effects of balanced and unbalanced forces on the speed and direction of motion of objects. **5.ETS2.3** Identify how scientific discoveries lead to new and improved technologies.
Lesson 3 	✨New!✨ **Pattern of Motion, Gravity, & Friction** How high can you swing on a flying trapeze?	Students make observations and measurements of a trapeze model. Then, using that information they predict the motion of a real trapeze.	**5.PS2.5** Explain how forces can create patterns within a system (moving in one direction, shifting back and forth, or moving in cycles), and describe conditions that affect how fast or slowly these patterns occur.
Lesson 4 	*We **recommend teaching this in 3rd grade** if following Tennessee Standards.* ***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.PS3.3** Evaluate how magnets cause changes in the motion and position of objects, even when the objects are not touching the magnet.*
Lesson 5 	*We **recommend teaching this in 3rd grade** if following Tennessee Standards.* ***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.PS2.2** Solve a problem by applying the use of the interactions between two magnets.*

Chemical Reactions & Properties of Matter Unit (Chemical Magic)

	Topic & Guiding Question	Student Objectives	Tennessee Academic Standards for Science (2017)
Lesson 1 	**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** Analyze and interpret data to show that the amount of matter is conserved even when it changes form, including transitions where matter seems to vanish.
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** Analyze and interpret data to show that the amount of matter is conserved even when it changes form, including transitions where matter seems to vanish.
Lesson 3 	**Properties of Matter: Acids** 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.PS1.4** Evaluate the results of an experiment to determine whether the mixing of two or more substances result in a change of properties.
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** Evaluate the results of an experiment to determine whether the mixing of two or more substances result in a change of properties. **5.ETS2.3** Identify how scientific discoveries lead to new and improved technologies.
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** Analyze and interpret data from observations and measurements of the physical properties of matter to explain phase changes between a solid, liquid, or gas.

Tennessee Specific Standard: **5.PS1.3** Design a process to measure how different variables (temperature, particle size, stirring) affect the rate of dissolving solids into liquids.