# Mystery Science Alignment with Missouri Learning Standards for Science

**Mystery Science - Missouri Learning Standards for Science Alignment**
Mystery Science is aligned to the Missouri Learning Standards for Science (2016). Each lesson (exploration & hands-on activity) is designed to take one hour per week. Mini-lessons are 5-minute videos that answer K-5 student questions and can be used as a jumping off point to engage learners for a full lesson planned by the teacher.

**Grade Level Pacing Guides**
The Pacing Guide is a resource to support your year-long planning. The units can be taught in any order. In most units, the lessons build on one another. Therefore, we strongly recommend the lessons within each unit are taught in the sequence they are presented. Extensions are available for each lesson and offer an opportunity for students to continue their science content learning. They include assessments and a curated collection of additional activity suggestions, online resources, project ideas, and readings.

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# Kindergarten: Physical Science

MYSTERY science

## Light, Sound, & Communication

| Lights & Sounds Unit (Mystery Science Grade 1)* | | | |
|---|---|---|---|
| **Lesson Number** | **Lesson Focus** | **Missouri Learning Standards (2016)** | **What Students Figure Out in this Lesson** |
| **LESSON 3**<br>What if there were no windows? | **Light & Material Properties** | **K.PS1.A.1** Make qualitative observations of the physical properties of objects (i.e. size, shape, color, mass). | 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.** |
| **LESSON 4**<br>Can you see in the dark? | **Light & Illumination** | **K.PS1.A.1** Make qualitative observations of the physical properties of objects (i.e. size, shape, color, mass). | 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 to construct an explanation that objects need light to be seen.** |
| | | | * Lessons 1, 2, 5, & 6 in this unit align to Missouri Learning Standards in Grade 1. |

# Kindergarten: Physical Science

MYSTERY science

## Pushes & Pulls

### Force Olympics Unit (Mystery Science Kindergarten)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>What's the biggest excavator? | Pushes & Pulls | **K.PS2.A.1** Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object<br><br>**K.PS2.A.2** Describe ways to change the motion of an object (i.e. how to cause an object to go slower, go fast, go farther, change direction, stop). | Students **observe different machines** and use those observations as evidence for why machines make work easier. |
| **LESSON 2**<br>Why do builders need so many big machines? | Pushes, Pulls, & "Work Words" | **K.PS2.A.1** Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object<br><br>**K.PS2.A.2** Describe ways to change the motion of an object (i.e. how to cause an object to go slower, go fast, go farther, change direction, stop). | Students **observe construction equipment being used in different ways to move objects.** |
| **LESSON 3**<br>How can you knock down a wall made of concrete? | Motion, Speed, & Strength | **K.PS2.A.1** Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object<br><br>**K.PS2.A.2** Describe ways to change the motion of an object (i.e. how to cause an object to go slower, go fast, go farther, change direction, stop). | 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. |
| **LESSON 4**<br>How can you knock down the most bowling pins? | Speed & Direction of Force | **K.PS2.A.1** Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object<br><br>**K.PS2.A.2** Describe ways to change the motion of an object (i.e. how to cause an object to go slower, go fast, go farther, change direction, stop). | Students play a game of bumper bowling to **observe the way that objects can move in straight lines, zigzags, and back and forth.** |
| **LESSON 5**<br>How can you protect a mountain town from falling rocks? | Direction of Motion & Engineering | **K.PS2.A.1** Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object<br><br>**K.PS2.A.2** Describe ways to change the motion of an object (i.e. how to cause an object to go slower, go fast, go farther, change direction, stop). | 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.** |
| **LESSON 6**<br>How could you invent a trap? | Forces & Engineering | **K.PS2.A.1** Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object<br><br>**K.PS2.A.2** Describe ways to change the motion of an object (i.e. how to cause an object to go slower, go fast, go farther, change direction, stop). | 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.** |

# Sunlight & Warmth

## Sunny Skies Unit (Mystery Science Kindergarten)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>How could you walk barefoot across hot pavement without burning your feet? | Sunlight, Heat, & Earth's Surface | **K.PS3.A.1** Make observations to determine the effect of sunlight on Earth's surface.<br><br>**K.PS3.B.1** With prompting and support, use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area. | 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. |
| **LESSON 2**<br>How could you warm up a frozen playground? | Sunlight, Warming, & Engineering | **K.PS3.A.1** Make observations to determine the effect of sunlight on Earth's surface.<br><br>**K.PS3.B.1** With prompting and support, use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area. | Students **carry out an investigation to test which materials can redirect the light and heat** of sunlight. |
| **LESSON 3**<br>Why does it get cold in winter? | Sunlight & Warmth | **K.PS3.A.1** Make observations to determine the effect of sunlight on Earth's surface.<br><br>**K.PS3.B.1** With prompting and support, use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.<br><br>**K.ESS1.B.1** Make observations during different seasons to relate the amount of daylight to the time of year. | 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. |

# Plant & Animal Needs

## Plant & Animal Secrets Unit (Mystery Science Kindergarten)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| LESSON 1<br>Why do woodpeckers peck wood? | Animal Needs: Food | **K.LS1.C.1** Use observations to describe patterns of what plants and animals (including humans) need to survive. | 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.** |
| LESSON 2<br>Where do animals live? | Animal Needs: Shelter | **K.LS1.C.1** Use observations to describe patterns of what plants and animals (including humans) need to survive. | Students obtain information through media about how different animal homes are built. They **use this evidence to explain that animals need shelter.** |
| LESSON 3<br>How can you find animals in the woods? | Animal Needs: Safety | **K.LS1.C.1** Use observations to describe patterns of what plants and animals (including humans) need to survive. | 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.** |
| LESSON 4<br>How do animals make their homes in the forest? | Animals & Changing the Environment | **K.LS1.C.1** Use observations to describe patterns of what plants and animals (including humans) need to survive. | Students **take a nature walk to look for evidence of animal homes.** |

# Kindergarten: Life Science

## Plant & Animal Needs

| Plant & Animal Secrets Unit (Mystery Science Kindergarten) | | | |
|---|---|---|---|
| **Lesson Number** | **Lesson Focus** | **Missouri Learning Standards (2016)** | **What Students Figure Out in this Lesson** |
| **NEW Lesson Coming Soon** | | **K.LS1.C.1** Use observations to describe patterns of what plants and animals (including humans) need to survive. | |
| **LESSON 5** [How do plants and trees grow?] | **Plant Needs: Water & Light** | **K.LS1.C.1** Use observations to describe patterns of what plants and animals (including humans) need to survive. | Students **carry out an investigation to determine the basic needs of plants.** They use observations to identify ways that **young plants resemble the parent plant and how the plant changes as it proceeds through its life cycle.** |
| **LESSON 6** [Why would you want an old log in your backyard?] | **Animal Needs & Changing the Environment** | **K.LS1.C.1** Use observations to describe patterns of what plants and animals (including humans) need to survive. | Students **obtain evidence of living organisms** by virtually keeping watch of a log and the living things that visit it. |

**MINI-LESSON** + **ACTIVITY**
**K.LS1.C.1**
What's the biggest apple in the world?

**MINI-LESSON**
**K.LS1.C.1**
What's the biggest tree in the world?

# Weather Patterns

## Circle of Seasons Unit (Mystery Science Kindergarten)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>How do you know what to wear for the weather? | Local Weather & Daily Patterns | **K.ESS1.D.1** Use and share observations of local weather conditions to describe patterns over time. | 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. |
| **LESSON 2**<br>What will the weather be like on your birthday? | Seasonal Patterns | **K.ESS1.D.1** Use and share observations of local weather conditions to describe patterns over time. | Students **obtain and evaluate information** in a series of unnamed drawings of each season. They **use these clues to identify characteristics of each season.** |
| **LESSON 3**<br>Why do birds lay eggs in the spring? | Animals Changing Their Environment | **K.ESS2.E.1** With prompting and support, construct an argument using evidence for how plants and animals (including but not limited to humans) can change the environment to meet their needs. | 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 use plants to protect their young.** |

**MINI-LESSON**

**K.ESS2.E.1**

Why do beavers build dams?

# 1st Grade: Physical Science

MYSTERY science

## Light, Sound, & Communication

### Lights & Sounds Unit (Mystery Science Grade 1)*

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>How do they make silly sounds in cartoons? | Sounds & Vibrations | **1.PS4.A.1** Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. | 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 as well. |
| **LESSON 2**<br>Where do sounds come from? | Sounds & Vibrations | **1.PS4.A.1** Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. | Students **create three different sound makers** and construct an explanation about where the vibrations are happening in each sound experiment. |
| **LESSON 5**<br>How could you send a secret message to someone far away? | Light, Communication, & Engineering | **1.PS4.C.1** Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance. | Students are presented with the problem that they need to send a message at night, without using noise. They **design a solution to create a color-coded message system and communicate with light signals.** |
| **LESSON 6**<br>How do boats find their way in the fog? | Lights, Sounds, & Communication | **1.PS4.A.1** Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. | Students **obtain information about light and sound signals.** They analyze different sounds with their eyes closed to determine which type of sound they hear. |

* Lessons 3 & 4 in this unit align to Missouri Learning Standards in Kindergarten.

# Plant & Animal Structures and Survival

## Plant & Animal Superpowers Unit (Mystery Science Grade 1)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>How can you help a lost baby animal find its parents? | Parent & Offspring Traits | **1.LS3.A.1** Make observations to construct an evidence based account that young plants and animals are like, but not exactly like, their parents. | 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.** |
| **LESSON 2**<br>Why do birds have beaks? | Animal Structures & Survival | **1.LS1.A.1** Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. | Students **investigate how different bird beaks are well suited for eating different kinds of food.** They construct an explanation about which beak would help a particular bird survive in a particular environment. |
| **LESSON 3**<br>Why do baby ducks follow their mother? | Animal Behavior & Offspring Survival | **1.LS3.A.1** Make observations to construct an evidence based account that young plants and animals are like, but not exactly like, their parents. | Students **obtain information about the behaviors of animal parents** that help their offspring survive. |
| **LESSON 4**<br>Why are polar bears white? | Camouflage & Animal Survival | **1.LS1.A.1** Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. | Students model how **camouflage helps moths survive in certain environments, but not in others** by carrying out an investigation with differently patterned paper moths. |
| **LESSON 5**<br>Why do family members look alike? | Inheritance & Variation of Traits | **1.LS3.A.1** Make observations to construct an evidence based account that young plants and animals are like, but not exactly like, their parents. | 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.** |

# 1st Grade: Life Science

MYSTERY science

## Plant & Animal Structures and Survival

| Plant & Animal Superpowers Unit (Mystery Science Grade 1) | | | |
|---|---|---|---|
| **Lesson Number** | **Lesson Focus** | **Missouri Learning Standards (2016)** | **What Students Figure Out in this Lesson** |
| **NEW Lesson Coming Soon** | | **1.LS3.A.1** Make observations to construct an evidence based account that young plants and animals are like, but not exactly like, their parents. | |
| **LESSON 6**<br>Why don't trees blow down in the wind? | **Plant Survival & Engineering** | **1.LS1.A.1** Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. | Students **identify the 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.** |
| **LESSON 7**<br>What do sunflowers do when you're not looking? | **Plant Movement & Survival** | **1.LS1.A.1** Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. | Students learn how plants respond to light. They **conduct an investigation to compare how the parts of a plant respond to light.** |

**MINI-LESSON + ACTIVITY**
**1.LS1.A.1**
How do flowers bloom in the spring?

**MINI-LESSON + ACTIVITY**
**1.LS1.A.1**
Why do leaves change color in the fall?

# 1st Grade: Earth & Space Science

MYSTERY science

## Sun, Moon, & Stars

### Spinning Sky Unit (Mystery Science Grade 1)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>Could a statue's shadow move? | Sun, Shadows, & Daily Patterns | **1.ESS1.A.1** Describe the presence of the Sun, Moon, and stars in the sky over time.<br>**1.ESS1.A.1** Use observations of the sun, moon, and stars to describe patterns that can be predicted. | 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. |
| **LESSON 2**<br>What does your shadow do when you're not looking? | Sun, Shadows, & Daily Patterns | **1.ESS1.A.1** Describe the presence of the Sun, Moon, and stars in the sky over time.<br>**1.ESS1.A.1** Use observations of the sun, moon, and stars to describe patterns that can be predicted. | Students **conduct an investigation to gather information about how their shadow changes throughout the day.** |
| **LESSON 3**<br>How can the Sun help you if you're lost? | Sun & Daily Patterns | **1.ESS1.A.1** Describe the presence of the Sun, Moon, and stars in the sky over time.<br>**1.ESS1.A.1** Use observations of the sun, moon, and stars to describe patterns that can be predicted. | 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. |
| **LESSON 4**<br>Why do you have to go to bed early in the summer? | Daylight & Seasonal Patterns | **1.ESS1.A.1** Use observations of the sun, moon, and stars to describe patterns that can be predicted. | Students **obtain information about the seasonal patterns** of sunrise and sunset. |

# 1st Grade: Earth & Space Science

MYSTERY science

## Sun, Moon, & Stars

### Spinning Sky Unit (Mystery Science Grade 1)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 5**<br>**NEW**<br>When can you see the full moon? | Moon Phases & Patterns | **1.ESS1.A.1** Describe the presence of the Sun, Moon, and stars in the sky over time.<br><br>**1.ESS1.A.1** Use observations of the sun, moon, and stars to describe patterns that can be predicted. | Students **record observations** of the Moon's shape using a series of photographs there were 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.** |
| **LESSON 6**<br>Why do the stars come out at night? | Stars & Daily Patterns | **1.ESS1.A.1** Describe the presence of the Sun, Moon, and stars in the sky over time.<br><br>**1.ESS1.A.1** Use observations of the sun, moon, and stars to describe patterns that can be predicted. | 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.** |
| **LESSON 7**<br>How can stars help you if you get lost? | Stars & Seasonal Patterns | **1.ESS1.A.1** Describe the presence of the Sun, Moon, and stars in the sky over time.<br><br>**1.ESS1.A.1** Use observations of the sun, moon, and stars to describe patterns that can be predicted. | 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. |

**MINI-LESSON**

**1.ESS1.A.1**

Who created the constellations?

# 1st Grade: Earth & Space Science

MYSTERY science

## Severe Weather

| Wild Weather Unit (Mystery Science Kindergarten) | | | |
|---|---|---|---|
| **Lesson Number** | **Lesson Focus** | **Missouri Learning Standards (2016)** | **What Students Figure Out in this Lesson** |
| **LESSON 1**<br>How can you get ready for a big storm? | **Severe Weather & Preparation** | **1.ESS2.D.1** Identify patterns indicating relationships between observed weather data and weather phenomena (e.g. temperature and types of precipitation, clouds and amount of precipitation). | 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. |
| **LESSON 2**<br>Have you ever watched a storm? | **Wind & Storms** | **1.ESS2.D.1** Identify patterns indicating relationships between observed weather data and weather phenomena (e.g. temperature and types of precipitation, clouds and amount of precipitation). | 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 ask questions about other ways to forecast the weather. |
| **LESSON 3**<br>How many different kinds of weather are there? | **Weather Conditions** | **1.ESS2.D.1** Identify patterns indicating relationships between observed weather data and weather phenomena (e.g. temperature and types of precipitation, clouds and amount of precipitation). | Students **obtain information through observations of the weather.** They communicate the information by acting as weather watchers and creating drawings of the weather conditions. |

# 2nd Grade: Physical Science

MYSTERY science

## Material Properties

### Material Magic Unit (Mystery Science Grade 2)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>Why do we wear clothes? | Material Properties & Engineering | **2.PS1.A.1** Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.<br><br>**2.PS1.A.2** Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. | Students **investigate the different properties of matter and use those properties to design and build** a hat that protects them from the sun. |
| **LESSON 2**<br>Can you really fry an egg on a hot sidewalk? | Classify Materials, Insulators, Properties | **2.PS1.A.2** Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. | Students **conduct an investigation of different materials in order to determine which are best suited** for allowing people to handle hot items. |
| **LESSON 3**<br>Why are so many toys made out of plastic? | Heating, Cooling, & Phases of Matter | **2.PS1.A.2** Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. | Student **conduct an investigation of different materials in order to determine** which are most and least easily melted. |
| **LESSON 4**<br>What materials might be invented in the future? | Inventions & Engineering | **2.PS1.A.1** Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. | Students **design a new invention that takes advantage of the unique properties** of a futuristic material. |
| **LESSON 5**<br>Could you build a house out of paper? | Material Properties & Engineering | **2.PS1.A.2** Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. | Students **construct an evidence-based account** of how a structure built of paper can be disassembled and rebuilt in new ways. |
| **LESSON 6**<br>**NEW**<br>How can you build a city out of mud? | Soil & Properties | **2.PS1.A.1** Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.<br><br>**2.PS1.A.2** Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. | 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. |

# Plant Adaptations

## Plant Adventures Unit (Mystery Science Grade 2)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1** How did a tree travel halfway around the world? | Seed Dispersal | **2.LS2.A.2** Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. | Students observe how **different types of plants produce different types of seeds** in the process of reproduction. |
| **LESSON 2** Could a plant survive without light? | Water, Sunlight, & Plant Growth | **2.LS2.A.1** Plan and conduct investigations on the growth of plants when growing conditions are altered (e.g., dark vs. light, water vs. no water). | Students **conduct an investigation to determine that plants need water and light to grow.** |
| **LESSON 3** Why do trees grow so tall? | Light, Leaves, & Competition | **2.LS2.A.1** Plan and conduct investigations on the growth of plants when growing conditions are altered (e.g., dark vs. light, water vs. no water). | Students **observe that plants require light** in order to fully grow and be healthy. |
| **LESSON 4** Should you water a cactus? | Adaptations & Habitat | **2.LS2.A.1** Plan and conduct investigations on the growth of plants when growing conditions are altered (e.g., dark vs. light, water vs. no water). | Students **observe that different plants require different amounts of light and water.** |
| **LESSON 5** Where do plants grow best? | Adaptations & Habitat | **2.LS2.A.1** Plan and conduct investigations on the growth of plants when growing conditions are altered (e.g., dark vs. light, water vs. no water). | Students practice thinking like gardeners, **considering what plants need** and how a simple habitat can change over time. |

# 2nd Grade: Life Science

MYSTERY science

## Plant Life Cycle & Heredity

### Power of Flowers Unit (Mystery Science Grade 3)*

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| LESSON 1<br>Why do plants grow flowers? | Pollination & Plant Reproduction | **2.LS2.A.2** Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. | Students **model the structure and function of flower parts that are responsible for creating seeds.** |
| LESSON 2<br>Why do plants give us fruit? | Seed Dispersal & Plant Life Cycle | **2.LS2.A.2** Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants. | Students **explore the function of fruits in plants and practice classification.** |

* Lessons 3 & 4 in this unit align to Missouri Learning Standards in Grade 3.

# 2nd Grade: Earth & Space Science

MYSTERY science

## Erosion & Earth's Surface

### Work of Water Unit (Mystery Science Grade 2)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>If you floated down a river, where would you end up? | Mapping & Earth's Surface Features | **2.ESS2.B.1** Develop a model to represent the shapes and kinds of land and bodies of water in an area. | 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.** |
| **LESSON 2**<br>Why is there sand at the beach? | Rocks, Sand, & Erosion | **2.ESS2.B.1** Develop a model to represent the shapes and kinds of land and bodies of water in an area. | 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.** |
| **LESSON 3**<br>**NEW**<br>Where do flash floods happen? | Mapping & Severe Weather | **2.ESS2.B.1** Develop a model to represent the shapes and kinds of land and bodies of water in an area.<br><br>**2.ESS1.C.1** Use information from several sources to provide evidence that Earth events can occur quickly or slowly. | Students **use a model (i.e. a map) of Texas to examine the different factors that contribute to flash floods.** They use this to predict where flash floods are most likely to happen. |
| **LESSON 4**<br>What's strong enough to make a canyon? | Erosion, Earth's Surface, & Landforms | **2.ESS1.C.1** Use information from several sources to provide evidence that Earth events can occur quickly or slowly. | Students create a model landform and investigate **how some Earth events can occur quickly, while others occur slowly.** |
| **LESSON 5**<br>How can you stop a landslide? | Erosion & Engineering | **2.ESS1.C.1** Use information from several sources to provide evidence that Earth events can occur quickly or slowly.<br><br>**2.ESS2.A.1** Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. | Students **compare multiple solutions for preventing erosion.** |

# 3rd Grade: Physical Science

MYSTERY science

## Magnets

### Invisible Forces Unit (Mystery Science Grade 3)*

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| LESSON 4<br>What can magnets do? | Magnets & Forces | **3.PS2.B.1** Plan and conduct investigations to determine the cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. | Students **investigate the properties of magnets and the fact that they exert forces that act at a distance.** |
| LESSON 5<br>How can you unlock a door using a magnet? | Magnets & Engineering | **3.PS2.B.1** Plan and conduct investigations to determine the cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. | Students **investigate magnetic attraction and repulsion, and design a magnetic lock in the hands-on lab.** |

* Lessons 1, 2, & 3 in this unit align to Missouri Learning Standards in Grade 4.

**MINI-LESSON**

**3.PS2.B.1**

How are magnets made?

# Animal Biodiversity

## Animal Adventures Unit (Mystery Science Grade 2)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>How many different kinds of animals are there? | Biodiversity & Classification | **3.LS3.C.1** Construct an argument with evidence that in a particular ecosystem some organisms – based on structural adaptations or behaviors – can survive well, and some cannot survive at all. | Students examine how scientists **organize animals into groups based on their characteristics.** |
| **LESSON 2**<br>**NEW**<br>Why would a wild animal visit a playground? | Habitat Diversity | **3.LS3.C.1** Construct an argument with evidence that in a particular ecosystem some organisms – based on structural adaptations or behaviors – can survive well, and some cannot survive at all. | Students **observe animals, plants, and the physical characteristics** of two different habitats. They analyze this information to create an understanding of how the living and nonliving parts of a habitat support the animals that live there. |
| **LESSON 3**<br>Why do frogs say "ribbit"? | Biodiversity, Habitats, & Species | **3.LS3.C.1** Construct an argument with evidence that in a particular ecosystem some organisms – based on structural adaptations or behaviors – can survive well, and some cannot survive at all. | Students identify frogs based on their unique calls and use that information to **determine the level of biodiversity within multiple habitats.** |
| **LESSON 4**<br>How could you get more birds to visit a bird feeder? | Biodiversity & Engineering | **3.LS3.C.1** Construct an argument with evidence that in a particular ecosystem some organisms – based on structural adaptations or behaviors – can survive well, and some cannot survive at all. | 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.** |

# 3rd Grade: Life Science

MYSTERY science

## Fossils, Animal Survival, & Heredity

### Animals Through Time Unit (Mystery Science Grade 3)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>Where can you find whales in the desert? | Habitats, Fossils, & Environments Over Time | **3.LS3.C.1** Construct an argument with evidence that in a particular ecosystem some organisms – based on structural adaptations or behaviors – can survive well, and some cannot survive at all. | Students explore the idea that the rock under our feet sometimes contains fossils, and investigate how these **fossils reveal changes in habitats through time.** |
| **LESSON 2**<br>How do we know what dinosaurs looked like? | Fossil Evidence & Classification | **3.LS3.C.1** Construct an argument with evidence that in a particular ecosystem some organisms – based on structural adaptations or behaviors – can survive well, and some cannot survive at all. | Students learn how **we can infer what the outside of an animal looked like by using clues about their skeleton.** |
| **LESSON 3**<br>Can you outrun a dinosaur? | Fossil Evidence, Trace Fossils, & Animal Behavior | **3.LS3.C.1** Construct an argument with evidence that in a particular ecosystem some organisms – based on structural adaptations or behaviors – can survive well, and some cannot survive at all. | Students learn how **fossilized animal tracks can tell us a great deal about the animals that left them.** |

**MINI-LESSON**

**3.LS3.C.1**

Were dragons ever real?

# 3rd Grade: Life Science

MYSTERY science

## Fossils, Animal Survival, & Heredity

### Animals Through Time Unit (Mystery Science Grade 3)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| LESSON 4<br>What kinds of animals might there be in the future? | Trait Variation, Inheritance, & Artificial Selection | **3.LS3.A.1** Construct scientific arguments to support claims that some characteristics of organisms are inherited from parents and some are influenced by the environment. | Students analyze the traits of parent dogs and their offspring, constructing an explanation about **which traits a puppy gets from each parent.** |
| LESSON 5<br>Can selection happen without people? | Trait Variation, Natural Selection, & Survival | **3.LS3.A.1** Construct scientific arguments to support claims that some characteristics of organisms are inherited from parents and some are influenced by the environment.<br><br>**3.LS3.B.1** Use evidence to construct an explanation for how the variation in characteristics among individuals of the same species may provide advantages in surviving and finding mates. | 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. |
| LESSON 6<br>Why do dogs wag their tails? | Animal Groups & Survival | **3.LS3.A.1** Construct scientific arguments to support claims that some characteristics of organisms are inherited from parents and some are influenced by the environment. | 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. |
| LESSON 8<br>How long can people (and animals) survive in outer space? | Traits & Environmental Variation | **3.LS3.A.1** Construct scientific arguments to support claims that some characteristics of organisms are inherited from parents and some are influenced by the environment. | 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.** |

# 3rd Grade: Life Science

MYSTERY science

## Life Cycles

### Animals Through Time Unit (Mystery Science Grade 3)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| LESSON 7<br>What's the best way to get rid of mosquitoes? | Environmental Change & Engineering | **3.LS3.D.1** Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. | 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. |
| NEW Lesson Coming Soon | | **3.LS1.B.1** Develop a model to compare and contrast observations on the life cycle of different plants and animals. | |
| NEW Lesson Coming Soon | | **3.LS1.B.1** Develop a model to compare and contrast observations on the life cycle of different plants and animals. | |

MINI-LESSON + ACTIVITY

**3.LS1.B.1**

Are butterflies the only animals that start out as caterpillars?

# 3rd Grade: Life Science

MYSTERY science

## Plant Life Cycle & Heredity

### Power of Flowers Unit (Mystery Science Grade 3)*

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 3**<br>Why are some apples red and some green? | Trait Variation, Inheritance, & Artificial Selection | **3.LS3.A.1** Construct scientific arguments to support claims that some characteristics of organisms are inherited from parents and some are influenced by the environment. | Students **explore how human beings have developed fruits with specific traits through selection.** |
| **LESSON 4**<br>How could you make the biggest fruit in the world? | Trait Variation, Inheritance, & Artificial Selection | **3.LS3.A.1** Construct scientific arguments to support claims that some characteristics of organisms are inherited from parents and some are influenced by the environment. | Students **investigate how human beings have modified plants based on our knowledge of how plants change from generation to generation.** |

* Lessons 1 & 2 in this unit align to Missouri Learning Standards in Grade 2.

# 3rd Grade: Earth & Space Science

MYSTERY science

## Weather & Climate

### Stormy Skies Unit (Mystery Science Grade 3)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| LESSON 1<br>Where do clouds come from? | Water Cycle & Phases of Matter | **3.PS1.A.1** Predict and investigate that water can change from a liquid to a solid (freeze), and back again (melt), or from a liquid to a gas (evaporation), and back again (condensation) as the result of temperature changes. | 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.** |
| LESSON 2<br>How can we predict when it's going to storm? | Local Weather Patterns & Weather Prediction | **3.ESS2.D.1** Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. | Students make observations of clouds and **develop a tool to make predictions about what kind of weather might happen next.** |
| NEW Lesson Coming Soon | | **3.ESS2.D.1** Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. | |
| LESSON 3<br>Why are some places always hot? | Climates | **3.ESS2.D.2** Obtain and combine information to describe climates in different regions of the world. | Students **obtain and combine information to describe the different climate regions of the world.** |
| LESSON 4<br>How can you keep a house from blowing away in a windstorm? | Natural Hazards & Engineering | **3.ESS3.B.1** Make a claim about the merit of an existing design solution (e.g. levies, tornado shelters, sea walls, etc.) that reduces the impacts of a weather-related hazard. | Students **design and build solutions that reduce the hazards associated with strong winds that could damage buildings.** |

# 4th Grade: Physical Science

MYSTERY science

## Forces & Motion

### Invisible Forces Unit (Mystery Science Grade 3)*

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>How could you win a tug-of-war against a bunch of adults? | Balanced & Unbalanced Forces | **4.PS2.A.2** Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. | Students **develop a mental model of the nature of forces and motion and use that model to explain the behavior of an elastic jumper.** |
| **LESSON 2**<br>What makes bridges so strong? | Balanced Forces & Engineering | **4.PS2.A.2** Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. | Students **develop and design a bridge to be as strong as possible while working with limited materials.** |
| **LESSON 3**<br>How can you go faster down a slide? | Friction & Patterns of Motion | **4.PS2.A.1** Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.<br><br>**4.PS2.B.1** Plan and conduct a fair test to compare and contrast the forces (measured by a spring scale in Newtons) required to overcome friction when an object moves over different surfaces (i.e. rough/smooth). | Students **plan and carry out investigations of the behaviors of different materials as they slide past one another.** |

* Lessons 4 & 5 in this unit align to Missouri Learning Standards in Grade 3.

# 4th Grade: Physical Science

MYSTERY science

## Energy, Energy Transfer, & Electricity

### Energizing Everything Unit (Mystery Science Grade 4)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| LESSON 1<br>How is your body similar to a car? | Speed & Energy | **4.PS2.B.2** Predict how changes in either the amount of force applied to an object or the mass of the object affects the motion (speed and direction) of the object.<br><br>**4.PS3.A.1** Use evidence to construct an explanation relating the speed of an object to the energy of that object. | 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.** |
| LESSON 2<br>What makes roller coasters go so fast? | Collisions & Energy Transfer | **4.PS2.B.2** Predict how changes in either the amount of force applied to an object or the mass of the object affects the motion (speed and direction) of the object. | 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.** |
| LESSON 3<br>Why is the first hill of a roller coaster always the highest? | Energy Transfer & Engineering | **4.PS2.B.2** Predict how changes in either the amount of force applied to an object or the mass of the object affects the motion (speed and direction) of the object. | Using a model roller coaster, students conduct an investigation to determine that a hill's height determines the amount of energy stored in a marble at the top of the hill. **Students figure out that the greater the height of an object, the more energy it stores and the faster it will move when released or dropped.** |
| LESSON 4<br>Could you knock down a building using only dominoes? | Energy Transfer & Engineering | **4.PS3.C.1** Use models to explain that simple machines change the amount of effort force and/or direction of force. | 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.** |
| LESSON 5<br>Can you build a chain reaction machine? | Energy Transfer & Engineering | **4.PS3.C.1** Use models to explain that simple machines change the amount of effort force and/or direction of force. | 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. |

# 4th Grade: Physical Science

MYSTERY science

## Energy, Energy Transfer, & Electricity

### Energizing Everything Unit (Mystery Science Grade 4)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 6**<br>What if there were no electricity? | Electrical Energy | **4.PS3.B.2** Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. | 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.** |
| **LESSON 7**<br>How long did it take to travel across the country before cars and planes? | Heat Energy & Energy Transformation | **4.PS3.B.1** Provide evidence to construct an explanation of an energy transformation (e.g. temperature change, light, sound, motion, and magnetic effects). | 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.** |
| **LESSON 8**<br>Where does energy come from? | Renewable Energy & Natural Resources | **4.PS3.B.2** Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. | 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. |

**MINI-LESSON**

**4.PS3.B.2**

How do batteries work?

# 4th Grade: Physical Science

MYSTERY science

## Sound, Waves, & Communication

### Waves of Sound Unit (Mystery Science Grade 4)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>How far can a whisper travel? | Sound, Vibrations, & Engineering | **4.PS4.A.1** Develop a model of waves to describe patterns in terms of amplitude or wavelength and that waves can cause objects to move. | Students investigate sound energy using paper cup telephones. Students figure out that **sound is a vibration that can travel through a medium.** |
| **LESSON 2**<br>What would happen if you screamed in outer space? | Sound & Vibrations | **4.PS4.A.1** Develop a model of waves to describe patterns in terms of amplitude or wavelength and that waves can cause objects to move. | Students construct a model of sound vibrations to explain how **air is a medium that sound vibrations travel through.** |
| **LESSON 3**<br>Why are some sounds high and some sounds low? | Sound Waves & Wavelength | **4.PS4.A.1** Develop a model of waves to describe patterns in terms of amplitude or wavelength and that waves can cause objects to move. | 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.** |

**MINI-LESSON**

**4.PS4.A.1**
How do phones work?

# 4th Grade: Life Science

MYSTERY science

## Human Body, Vision, & The Brain

### Human Machine Unit (Mystery Science Grade 4)*

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| LESSON 1<br>Why do our biceps bulge? | Muscles & Skeleton | **4.LS1.A.1** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and plant reproduction. | Students construct a model of the human hand to explain how **muscles pull on bones to create movement.** |
| LESSON 4<br>How does your brain control your body? | Brain, Nerves, & Information Processing | **4.LS1.D.1** Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. | 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.** |

* Lessons 2 & 3 in this unit align to Missouri Learning Standards in Grade 5.

**MINI-LESSON + ACTIVITY**

**4.LS1.A.1**

Why does our skeleton have so many bones?

**MINI-LESSON + ACTIVITY**

**4.LS1.A.1**

What would happen if you didn't have a skull?

# 4th Grade: Earth & Space Science

MYSTERY science

## Earth's Features and Processes

### The Birth of Rocks Unit (Mystery Science Grade 4)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1** Could a volcano pop up where you live? | Volcanoes & Patterns of Earth's Surface | **4.ESS2.B.1** Analyze and interpret data from maps to describe patterns of Earth's features. | 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."** |
| **LESSON 2** Why do some volcanoes explode? | Volcanoes & Rock Cycle | **4.ESS2.B.1** Analyze and interpret data from maps to describe patterns of Earth's features. | 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**. |
| **LESSON 3** Will a mountain last forever? | Weathering & Erosion | **4.ESS2.A.1** Plan and conduct scientific investigations or simulations to provide evidence how natural processes (e.g. weathering and erosion) shape Earth's surfaces. | 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.** |
| **NEW Lesson Coming Soon** | | **4.ESS1.C.1** Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. | |
| **LESSON 4** How could you survive a landslide? | Erosion, Natural Hazards, & Engineering | **4.ESS3.A.1** Generate and compare multiple solutions to reduce the impact of natural Earth processes on humans. | 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.** |

**MINI-LESSON**

**4.ESS1.C.1**
What's the best place to look for dinosaur fossils?

# Chemical Reactions & Properties of Matter

## Chemical Magic Unit (Mystery Science Grade 5)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>Are magic potions real? | Chemistry & Conservation of Matter | **5.PS1.A.1** Develop a model to describe that matter is made of particles too small to be seen. | Students observe that a salt and vinegar solution will turn a dull penny shiny again indicating that **substances can change other substances.** |
| **LESSON 2**<br>Could you transform something worthless into gold? | Dissolving & Particulate Nature of Matter | **5.PS1.A.1** Develop a model to describe that matter is made of particles too small to be seen.<br><br>**5.PS1.A.2** Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. | 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.** |
| **LESSON 3**<br>What would happen if you drank a glass of acid? | Acids, Reactions, & Properties of Matter | **5.PS1.B.2** Conduct an investigation to determine whether the combining of two or more substances results in new substances. | Students figure out that **acids are very reactive substances.** Students investigate reactions between different substances to determine how known acids react with other materials. |
| **LESSON 4**<br>What do fireworks, rubber, and silly putty have in common? | Chemical Reactions | **5.PS1.B.2** Conduct an investigation to determine whether the combining of two or more substances results in new substances. | Students combine different substances together to discover that **chemical reactions can create new substances.** |
| **LESSON 5**<br>Why do some things explode? | Gases & Particle Models | **5.PS1.A.1** Develop a model to describe that matter is made of particles too small to be seen. | 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.** |

# Human Body, Vision, & The Brain

## Human Machine Unit (Mystery Science Grade 4)*

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 2**<br>What do people who are blind see? | Light, Eyes, & Vision | **5.PS4.A.1** Develop a model to describe that objects can be seen only when light is reflected off them or when they produce their own light. | 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.** |
| **LESSON 3**<br>How can some animals see in the dark? | Structure & Function of Eyes | **5.PS4.A.1** Develop a model to describe that objects can be seen only when light is reflected off them or when they produce their own light. | 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.** |

* Lessons 1 & 4 in this unit align to Missouri Learning Standards in Grade 4.

**MINI-LESSON + ACTIVITY**
**5.PS4.A.1**
How is a rainbow made?

**MINI-LESSON + ACTIVITY**
**5.PS4.A.1**
Why is snow white?

# Ecosystems & The Food Web

## Web of Life Unit (Mystery Science Grade 5)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>Why would a hawk move to New York City? | Food Chains, Predators, Herbivores, & Carnivores | **5.PS3.D.1** Use models to describe that energy stored in food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. | Students construct models of food chains by linking cards discovering that **different interrelationships exist between organisms.** |
| **LESSON 2**<br>What do plants eat? | Plant Needs: Air & Water | **5.LS1.C.1** Support an argument that plants get the materials (i.e. carbon dioxide, water, sunlight) they need for growth chiefly from air and water. | Students conduct an investigation and interpret data and figure out that **water and air account for a plant's weight.** |
| **LESSON 3**<br>Where do fallen leaves go? | Decomposers & Matter Cycle | **5.LS2.B.1** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. | 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.** |
| **LESSON 4**<br>Do worms really eat dirt? | Decomposers, Nutrients, & Matter Cycle | **5.LS2.B.1** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. | 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.** |
| **LESSON 5**<br>Why do you have to clean a fish tank but not a pond? | Ecosystems & Matter Cycle | **5.LS2.B.1** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. | 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. |
| **LESSON 6**<br>Why did the dinosaurs go extinct? | Food Webs & Flow of Energy | **5.PS3.D.1** Use models to describe that energy stored in food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. | 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. |

# 5th Grade: Earth & Space Science

MYSTERY science

## Stars & The Solar System

### Spaceship Earth Unit (Mystery Science Grade 5)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>How fast does the Earth spin? | Day, Night, & Earth's Rotation | **5.ESS1.B.2** Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. | 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.** |
| **LESSON 2**<br>Who set the first clock? | Earth's Rotation & Daily Shadow Patterns | **5.ESS1.B.2** Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. | 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.** |
| **LESSON 3**<br>How can the Sun tell you the season? | Seasonal Changes & Shadow Length | **5.ESS1.B.1** Make observations during different seasons to relate the amount of daylight to the time of year. | 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. |
| **LESSON 4**<br>Why do the stars change with the season? | Seasonal Patterns & Earth's Orbit | **5.ESS1.B.2** Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. | 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.** |

# Stars & The Solar System

## Spaceship Earth Unit (Mystery Science Grade 5)

| Lesson Number | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 5**<br>How does the Moon change shape? | Moon Phases & Lunar Cycle | **5.ESS1.B.2** Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. | 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.** |
| **LESSON 6**<br>What are the wandering stars? | Planets & Solar System | **5.ESS1.B.2** Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. | Students learn that planets look like stars, but don't move like them. The apparent movement of planets is caused by both the Earth's spin and the planets' movement around the Sun. **Students use a model of the solar system to learn the order of the planets and their relative distance from the Sun, and each other.** |
| **LESSON 7**<br>Why is gravity different on other planets? | Gravity | **5.PS2.B.1** Support an argument that the gravitational force exerted by Earth on objects is directed towards the planet's center. | 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.** |
| **LESSON 8**<br>Could there be life on other planets? | Star Brightness & Relative Distance | **5.ESS1.A.1** Support an argument that relative distances from Earth affects the apparent brightness of the sun compared to other stars. | 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.** |

# 5th Grade: Earth & Space Science

MYSTERY science

## Water Cycle & Earth's Systems

### Watery Planet Unit (Mystery Science Grade 5)

| Lesson Sequence | Lesson Focus | Missouri Learning Standards (2016) | What Students Figure Out in this Lesson |
|---|---|---|---|
| **LESSON 1**<br>How much water is in the world? | **Hydrosphere & The Roles of Water** | **5.ESS1.A.1** Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. | 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.** |
| **LESSON 2**<br>**NEW**<br>How much salt is in the ocean? | **Mixtures, Solutions, & Conservation of Matter** | **5.PS1.B.1** Plan and conduct investigations to separate the components of a mixture/solution by their physical properties (ie. sorting, filtration, magnets, screening). | 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. |
| **LESSON 3**<br>When you turn on the faucet, where does the water come from? | **Groundwater as a Natural Resource** | **5.ESS2.A.1** Describe a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. | **Students learn that most people get their fresh water from underground sources.** Students determine the best place to settle a new town by considering features of the landscape and the characteristics of the plants that thrive there. |
| **LESSON 4**<br>Can we make it rain? | **Water Cycle** | **5.ESS2.A.1** Describe a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. | 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.** |
| **LESSON 5**<br>How can you save a town from a hurricane? | **Natural Disasters & Engineering** | **5.ESS3.C.1** Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. | Students define the problem that a town needs protection from flooding. They design solutions using different types of flood protection. Students realize that **flooding is caused by severe rainfall generated by hurricanes.** Hurricanes are created where ocean temperatures are warm. |