Mystery Science Alignment with Arizona Science Standards

Mystery Science is a hands-on curriculum that aligns with the Arizona Science Standards of Learning (2018).

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 05/31/2024

Kindergarten

1st Grade

2nd Grade

3rd Grade

4th Grade

5th Grade

Animal Needs Unit (Animal Secrets)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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.L1U1.6** Obtain, evaluate, and communicate information about how organisms use different body parts for survival.
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.L1U1.6** Obtain, evaluate, and communicate information about how organisms use different body parts for survival.
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.L1U1.7** Observe, ask questions, and explain how specialized structures found on a variety of plants and animals (including humans) help them sense and respond to their environment.
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.L1U1.6** Obtain, evaluate, and communicate information about how organisms use different body parts for survival.

Plant Needs Unit (Plant Secrets)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
	**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.L2U1.8** Observe, ask questions, and explain the differences between the characteristics of living and non-living things.
	**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.L1U1.6** Obtain, evaluate, and communicate information about how organisms use different body parts for survival. **K.L1U1.7** Observe, ask questions, and explain how specialized structures found on a variety of plants and animals (including humans) help them sense and respond to their environment.
	**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.L1U1.6** Obtain, evaluate, and communicate information about how organisms use different body parts for survival.

Severe Weather Unit (Wild Weather)

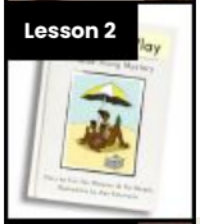
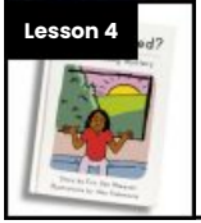
	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
Lesson 1 	**Severe Weather & Preparation Read-Along** How can you get ready for a big storm?	Students obtain information of different types of severe weather to observe and describe how the weather changes during these events and what students can do to prepare and stay safe.	**K.EU1.3** Observe, record, and ask questions about temperature, precipitation, and other weather data to identify patterns or changes in local weather.
Lesson 2 	**Wind & Storms** Have you ever watched a storm?	Students create a simple tool that allows them to observe how hard the wind is blowing. They use this tool to observe weather changes and describe the pattern of faster wind speeds right before a storm.	**K.EU1.3** Observe, record, and ask questions about temperature, precipitation, and other weather data to identify patterns or changes in local weather.
Lesson 3 	**Weather Conditions** How many different kinds of weather are there?	Students obtain information through observations of the weather. They communicate the information by acting as weather watchers and creating drawings of the weather conditions.	**K.EU1.3** Observe, record, and ask questions about temperature, precipitation, and other weather data to identify patterns or changes in local weather.

Weather Patterns Unit (Circle of Seasons)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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.E1U1.4** Observe, describe, ask questions, and predict seasonal weather patterns; and how those patterns impact plants and animals (including humans).
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.E1U1.4** Observe, describe, ask questions, and predict seasonal weather patterns; and how those patterns impact plants and animals (including humans).
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.E1U1.4** Observe, describe, ask questions, and predict seasonal weather patterns; and how those patterns impact plants and animals (including humans).

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

Day Patterns Unit (Sun & Shadows)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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.	**K.E2U1.5** Observe and ask questions about patterns of the motion of the sun, moon, and stars in the sky.*
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.	**K.E2U1.5** Observe and ask questions about patterns of the motion of the sun, moon, and stars in the sky.*
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.	**K.E2U1.5** Observe and ask questions about patterns of the motion of the sun, moon, and stars in the sky.*
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.	**K.E2U1.5** Observe and ask questions about patterns of the motion of the sun, moon, and stars in the sky.*

*Patterns of the moon and stars are covered in Grade 2.

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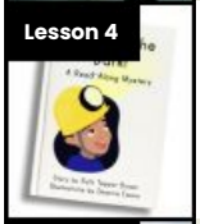
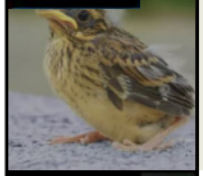
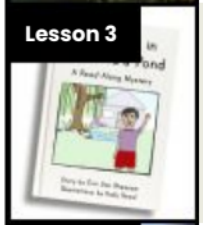
Light, Sound, & Communication Unit (Lights & Sounds)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
Lesson 1 	***Sounds & Vibrations*** *How do they make silly sounds in cartoons?*	*Students explore how to make different sounds with everyday objects. They construct an explanation that objects vibrate when they make a sound, and if the vibration stops, the sound stops.*	***1.P2U1.2** Use models to provide evidence that vibrating matter creates sound and sound can make matter vibrate.*
Lesson 2 	***Sounds & Vibrations Read-Along*** *Where do sounds come from?*	*Students create three different sound makers and construct an explanation about where the vibrations are happening in each sound experiment.*	***1.P2U1.2** Use models to provide evidence that vibrating matter creates sound and sound can make matter vibrate.*
Lesson 3 	***Light, Materials, Transparent & Opaque*** *What if there were no windows?*	*Students investigate the properties of different materials that they can and cannot see through. Then they create a stained glass window using tissue paper to explore how materials interact with light.*	***1.P2U1.1** Plan and carry out investigations demonstrating the effect of placing objects made with different materials in the path of a beam of light and predict how objects with similar properties will affect the 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.	**K.P2U1.1** Investigate how senses can detect light, sound, and vibrations even when they come from far away; use the collected evidence to develop and support an explanation.*
Lesson 5 	**Light, Communication, & Engineering** How could you send a secret message to someone far away?	Students are presented with the problem that they need to send a message at night, without using noise. They design a solution to create a color-coded message system and communicate with light signals.	**K.P2U2.2** Design and evaluate a tool that helps people extend their senses.*
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.	**K.P2U1.1** Investigate how senses can detect light, sound, and vibrations even when they come from far away; use the collected evidence to develop and support an explanation.*

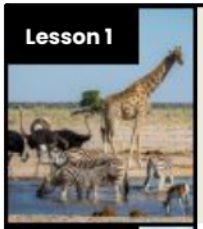
*Sound and vibrations are covered in Grade 2.

Animal Traits & Survival Unit (Animal Superpowers)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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.	**1.L1U1.6** Observe, describe, and predict life cycles of animals and plants **1.L3U1.9** Obtain, evaluate, and communicate information to support an evidence-based explanation that plants and animals produce offspring of the same kind, but offspring are generally not identical to each other or 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.	**1.L2U1.8** Construct an explanation describing how organisms obtain resources from the environment including materials that are used again by other organisms.
Lesson 3 	**Animal Behavior & Offspring Survival Read-Along** Why do baby ducks follow their mother?	Students obtain information about the behaviors of animal parents that help their offspring survive.	**1.L3U1.9** Obtain, evaluate, and communicate information to support an evidence-based explanation that plants and animals produce offspring of the same kind, but offspring are generally not identical to each other or their parents
Lesson 4 	**Camouflage & Animal Survival** Why are polar bears white?	Students use observations of animal parents and their offspring to construct an explanation about young plants and animals being similar, but not identical, to their parents.	**1.L2U2.7** Develop and use models about how living things use resources to grow and survive; design and evaluate habitats for organisms using earth materials.
Lesson 5 	**Inheritance & Variation of Traits Read-Along** Why do family members look alike?	Students identify parts of plants such as roots, branches, and leaves. They evaluate these plant parts and apply that information to design an umbrella that won't blow down in the wind.	**1.L3U1.9** Obtain, evaluate, and communicate information to support an evidence-based explanation that plants and animals produce offspring of the same kind, but offspring are generally not identical to each other or their parents.

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

Animal Biodiversity Unit (Animal Adventures)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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.	**1.L4U1.10** Develop a model to describe how animals and plants are classified into groups and subgroups according to their similarities.
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.	**1.L2U2.7** Develop and use models about how living things use resources to grow and survive; design and evaluate habitats for organisms using earth materials.
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.	**1.L2U2.7** Develop and use models about how living things use resources to grow and survive; design and evaluate habitats for organisms using earth materials.
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.	**1.L2U2.7** Develop and use models about how living things use resources to grow and survive; design and evaluate habitats for organisms using earth materials.

Arizona Specific Standard: **1.L4U3.11** Ask questions and explain how factors can cause species to go extinct.

Plant Traits & Survival Unit (Plant Superpowers)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
Lesson 1 	**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.L1U1.6** Observe, describe, and predict life cycles of animals and plants. **1.L3U1.9** Obtain, evaluate, and communicate information to support an evidence-based explanation that plants and animals produce offspring of the same kind, but offspring are generally not identical to each other or their parents.
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.L2U1.8** Construct an explanation describing how organisms obtain resources from the environment including materials that are used again by other organisms.
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.L2U1.8** Construct an explanation describing how organisms obtain resources from the environment including materials that are used again by other organisms.

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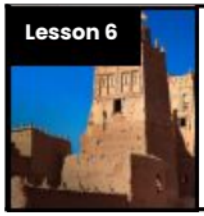
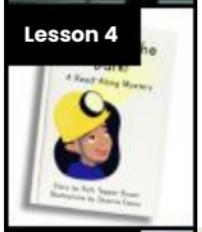
Material Properties Unit (Material Magic)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards 2018
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.	**1.E1U1.5** Obtain, evaluate, and communicate information about the properties of Earth materials and investigate how humans use natural resources in everyday life.

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

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
Lesson 1 	**Sounds & Vibrations** How do they make silly sounds in cartoons?	Students explore how to make different sounds with everyday objects. They construct an explanation that objects vibrate when they make a sound, and if the vibration stops, the sound stops.	**1.P2U1.2** Use models to provide evidence that vibrating matter creates sound and sound can make matter vibrate.
Lesson 2 	**Sounds & Vibrations Read-Along** Where do sounds come from?	Students create three different sound makers and construct an explanation about where the vibrations are happening in each sound experiment.	**1.P2U1.2** Use models to provide evidence that vibrating matter creates sound and sound can make matter vibrate.
Lesson 3 	**Light, Materials, Transparent & Opaque** What if there were no windows?	Students investigate the properties of different materials that they can and cannot see through. Then they create a stained glass window using tissue paper to explore how materials interact with light.	**1.P2U1.1** Plan and carry out investigations demonstrating the effect of placing objects made with different materials in the path of a beam of light and predict how objects with similar properties will affect the beam of light.
Lesson 4 	*Although this appears on our site, we **recommend teaching this in Kindergarten** if following Arizona Standards.* ***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.*	***K.P2U1.1** Investigate how senses can detect light, sound, and vibrations even when they come from far away; use the collected evidence to develop and support an explanation.*
Lesson 5 	*Although this appears on our site, we **recommend teaching this in Kindergarten** if following Arizona Standards.* ***Light, Communication, & Engineering*** *How could you send a secret message to someone far away?*	*Students are presented with the problem that they need to send a message at night, without using noise. They design a solution to create a color-coded message system and communicate with light signals.*	***K.P2U2.2** Design and evaluate a tool that helps people extend their senses.*
Lesson 6 	*Although this appears on our site, we **recommend teaching this in Kindergarten** if following Arizona Standards.* ***Read-Along*** *How do boats find their way in the fog?*	*sound signals. They analyze different sounds with eyes closed to determine which type of sound they hear.*	*and vibrations even when they come from far away; use the collected evidence to develop and support an explanation.*

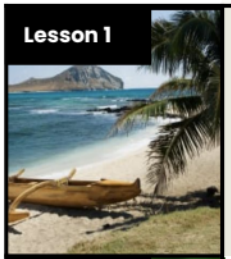
***This unit is found under Kindergarten on our site**, but we recommend teaching all lessons in 1st Grade if you are following Arizona Standards.*

Pushes & Pulls Unit (Force Olympics)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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 1.P3U1.3** Plan and carry out investigations which demonstrate how equal forces can balance objects and how unequal forces can push, pull, or twist objects, making them change their speed, direction, or shape.
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 1.P3U1.3** Plan and carry out investigations which demonstrate how equal forces can balance objects and how unequal forces can push, pull, or twist objects, making them change their speed, direction, or shape.
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.	**1.P3U1.3** Plan and carry out investigations which demonstrate how equal forces can balance objects and how unequal forces can push, pull, or twist objects, making them change their speed, direction, or shape.
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.	**1.P3U1.3** Plan and carry out investigations which demonstrate how equal forces can balance objects and how unequal forces can push, pull, or twist objects, making them change their speed, direction, or shape.
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.	**1.P3U1.3** Plan and carry out investigations which demonstrate how equal forces can balance objects and how unequal forces can push, pull, or twist objects, making them change their speed, direction, or shape.
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.	**1.P3U1.3** Plan and carry out investigations which demonstrate how equal forces can balance objects and how unequal forces can push, pull, or twist objects, making them change their speed, direction, or shape.

Arizona Specific Standard: **1.P4U2.4** Design and evaluate ways to increase or reduce heat from friction between two objects.

Plant Adaptations Unit (Plant Adventures)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
 Lesson 1	**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.	**2.L2U1.9** Obtain, analyze, and communicate evidence that organisms need a source of energy, air, water, and certain temperature conditions to survive.
 Lesson 2	**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.	**2.L2U1.9** Obtain, analyze, and communicate evidence that organisms need a source of energy, air, water, and certain temperature conditions to survive.
 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.	**2.L2U1.9** Obtain, analyze, and communicate evidence that organisms need a source of energy, air, water, and certain temperature conditions to survive.
 Lesson 4	**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.	**2.L2U1.9** Obtain, analyze, and communicate evidence that organisms need a source of energy, air, water, and certain temperature conditions to survive.

Arizona Specific Standard: **2.L2U1.10** Develop a model representing how life on Earth depends on energy from the Sun and energy from other organisms.

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

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
 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.E1U1.5** Develop and use models to represent that water can exist in different states and is found in oceans, glaciers, lakes, rivers, ponds, and the atmosphere.
 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.E1U1.4** Observe and investigate how wind and water change the shape of the land resulting in a variety of landforms.
 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.E1U2.6** Analyze patterns in weather conditions of various regions of the world and design, test, and refine solutions to protect humans from severe weather conditions.
 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.E1U1.4** Observe and investigate how wind and water change the shape of the land resulting in a variety of landforms.
 Lesson 5	**Erosion & Engineering** How can you stop a landslide?	Students compare multiple solutions for preventing erosion.	**2.E1U1.4** Observe and investigate how wind and water change the shape of the land resulting in a variety of landforms. **2.E1U3.7** Construct an argument from evidence regarding positive and negative changes in water and land systems that impact humans and the environment.

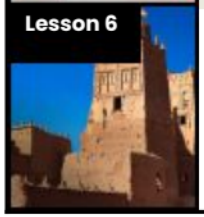
Night Patterns Unit (Moon & Star)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
Lesson 5 	**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.	**2.E2U1.8** Observe and explain the Sun's position at different times during a twenty-four-hour period and changes in the apparent shape of the Moon from one night to another.*
Lesson 6 	**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.	**2.E2U1.8** Observe and explain the Sun's position at different times during a twenty-four-hour period and changes in the apparent shape of the Moon from one night to another.*
Lesson 7 	**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.	**2.E2U1.8** Observe and explain the Sun's position at different times during a twenty-four-hour period and changes in the apparent shape of the Moon from one night to another.* *The Sun's position at different times is covered in Kindergarten.

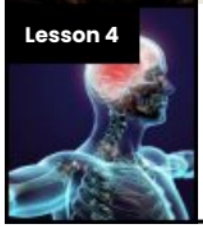
Sunlight & Warmth Unit (Sunny Skies)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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.	**2.P4U1.3** Obtain, evaluate and communicate information about ways heat energy can cause change in objects or materials.
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.)	**2.P4U1.3** Obtain, evaluate and communicate information about ways heat energy can cause change in objects or materials.
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.	**2.P4U1.3** Obtain, evaluate and communicate information about ways heat energy can cause change in objects or materials. **2.P1U1.2** Plan and carry out investigations to gather evidence to support an explanation on how heating or cooling can cause a phase change in matter.

Material Properties Unit (Material Magic)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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.	**2.P1U1.1** Plan and carry out an investigation to determine that matter has mass, takes up space, and is recognized by its observable properties; use the collected evidence to develop and support an explanation.
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.	**2.P1U1.2** Plan and carry out investigations to gather evidence to support an explanation on how heating or cooling can cause a phase change in matter. **2.P4U1.3** Obtain, evaluate and communicate information about ways heat energy can cause change in objects or materials.
Lesson 3 	**Heating, Cooling, & Phases of Matter** Why are so many toys made out of plastic?	Student conduct an investigation of different materials in order to determine which are most and least easily melted.	**2.P1U1.2** Plan and carry out investigations to gather evidence to support an explanation on how heating or cooling can cause a phase change in matter. **2.P4U1.3** Obtain, evaluate and communicate information about ways heat energy can cause change in objects or materials.
Lesson 4 	**Inventions & Engineering** What materials might be invented in the future?	Students design a new invention that takes advantage of the unique properties of a futuristic material.	**2.P1U1.1** Plan and carry out an investigation to determine that matter has mass, takes up space, and is recognized by its observable properties; use the collected evidence to develop and support an explanation.
Lesson 5 	**Materials, Properties, & Engineering** Could you build a house out of paper?	Students construct an evidence- based account of how a structure built of paper can be disassembled and rebuilt in new ways.	**2.P1U1.1** Plan and carry out an investigation to determine that matter has mass, takes up space, and is recognized by its observable properties; use the collected evidence to develop and support an explanation.
Lesson 6 	*Although this appears on our site, we **recommend teaching this in 1st grade** if following Arizona Standards.* ***Soil & Properties*** *How do you build a city out of mud?*	*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.*	***1.E1U1.5** Obtain, evaluate, and communicate information about the properties of Earth materials and investigate how humans use natural resources in everyday life.*

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

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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.L1U1.5** Develop and use models to explain that plants and animals (including humans) have internal and external structures that serve various functions that aid in growth, survival, 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.	**3.P2U1.1** Ask questions and investigate the relationship between light, objects, and the human eye.
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.	**3.P2U1.1** Ask questions and investigate the relationship between light, objects, and the human eye. **3.L1U1.5** Develop and use models to explain that plants and animals (including humans) have internal and external structures that serve various functions that aid in growth, survival, behavior, and reproduction.
Lesson 4 	**Brain, Nerves, & Information Processing** How does your brain control your body?	Students investigate how their own brain works by testing their reflexes. They discover that the brain receives information from the senses, processes the information, and sends signals to the muscles to enable movement.	**3.L2U1.6** Plan and carry out investigations to demonstrate ways plants and animals react to stimuli.

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

⭐ Animal & Plant Adaptations Unit (Animal & Plant Adaptations)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
Lesson 1 	✨New!✨ **Animal Adaptations** Why do some sea creatures look so strange?	Students make observations of underwater animals in order to collect evidence that external structures serve specific functions. They use their observations to construct an argument that an animal's structures work together as part of a system to support their growth and survival.	**3.L1U1.5** Develop and use models to explain that plants and animals (including humans) have internal and external structures that serve various functions that aid in growth, survival, behavior, and reproduction.
Lesson 2 	✨New!✨ **Learned Behavior & Instinct** Why would a sea turtle eat a plastic bag?	Students use models to understand how an animal's senses, brain, and memories all work together as a system to influence their behavior and support their survival.	**3.L2U1.6** Plan and carry out investigations to demonstrate ways plants and animals react to stimuli.
Lesson 3 	✨New!✨ **Plant Adaptations** Why don't the same trees grow everywhere?	Students use models of roots and branches to explore their functions and then construct an argument about how these structures must work together in order to support the survival of trees in the unique environment of the frozen taiga.	**3.L1U1.5** Develop and use models to explain that plants and animals (including humans) have internal and external structures that serve various functions that aid in growth, survival, behavior, and reproduction.

Life Cycles Unit (Circle of Life)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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.	**3.L2U1.8** Construct an argument from evidence that organisms are interdependent.
Lesson 2 	**Environmental Change & Engineering** What's the best way to get rid of mosquitoes?	Students obtain and evaluate information about mosquitoes from different sources. They analyze and interpret information about the mosquito life cycle to reduce the number of mosquitoes that live in a certain area.	**3.L2U1.8** Construct an argument from evidence that organisms are interdependent.
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.	**3.L1U1.5** Develop and use models to explain that plants and animals (including humans) have internal and external structures that serve various functions that aid in growth, survival, behavior, and reproduction.
Lesson 4 	**Fruit, Seeds, & Plant Reproduction** Why do plants give us fruit?	Students explore the function of fruits in plants and practice classification.	**3.L1U1.5** Develop and use models to explain that plants and animals (including humans) have internal and external structures that serve various functions that aid in growth, survival, behavior, and reproduction.
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.	**3.L2U1.8** Construct an argument from evidence that organisms are interdependent.

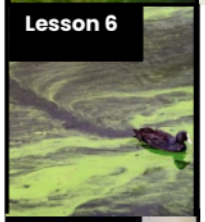
Ecosystems & The Food Web Unit (Web of Life)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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.	**3.L2U1.8** Construct an argument from evidence that organisms are interdependent.
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.	**3.L2U1.8** Construct an argument from evidence that organisms are interdependent.
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.	**3.L2U1.8** Construct an argument from evidence that organisms are interdependent.
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.	**3.L2U1.8** Construct an argument from evidence that organisms are interdependent.

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 3rd Grade if you are following Arizona Standards.*

Ecosystems & The Food Web Unit (Web of Life)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
 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.	**3.L2U1.8** Construct an argument from evidence that organisms are interdependent.
 Lesson 6	**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.	**3.L2U1.8** Construct an argument from evidence that organisms are interdependent.
 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.	**3.L2U1.7** Develop and use system models to describe the flow of energy from the Sun to and among living organisms. **3.E1U1.4** Construct an explanation describing how the Sun is the primary source of energy impacting Earth systems.

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

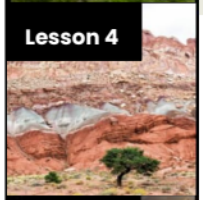
	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
Lesson 1 	**Pattern Transfer & Technology** How do you send a secret code?	Students explore how digital devices encode complex information. Students generate their own codes in order to transfer information across the classroom. Then, they compare their codes and evaluate which worked best given the criteria and constraints.	**3.P2U1.2** Plan and carry out an investigation to explore how sound waves affect objects at varying distances.
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.	**3.P2U1.2** Plan and carry out an investigation to explore how sound waves affect objects at varying distances. **3.P4U1.3** Develop and use models to describe how light and sound waves transfer energy.
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.	**3.P2U1.2** Plan and carry out an investigation to explore how sound waves affect objects at varying distances. **3.P4U1.3** Develop and use models to describe how light and sound waves transfer energy.
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.	**3.P2U1.2** Plan and carry out an investigation to explore how sound waves affect objects at varying distances. **3.P4U1.3** Develop and use models to describe how light and sound waves transfer energy.

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

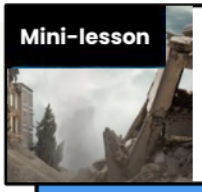
Fossils & Changing Environments Unit (Animals Through Time)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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.	**4.L4U1.11** Analyze and interpret environmental data to demonstrate that species either adapt and survive, or go extinct over time.
Lesson 2 	**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.	**4.L4U1.11** Analyze and interpret environmental data to demonstrate that species either adapt and survive, or go extinct over time.
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.	**4.L4U1.11** Analyze and interpret environmental data to demonstrate that species either adapt and survive, or go extinct over time.

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

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
 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.E1U1.6** Plan and carry out an investigation to explore and explain the interactions between Earth's major systems and the impact on Earth's surface materials and processes.
 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.E1U1.6** Plan and carry out an investigation to explore and explain the interactions between Earth's major systems and the impact on Earth's surface materials and processes.
 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.E1U1.7** Develop and/or revise a model using various rock types, fossil location, and landforms to show evidence that Earth's surface has changed over time.
 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.	**4.E1U1.7** Develop and/or revise a model using various rock types, fossil location, and landforms to show evidence that Earth's surface has changed over time.
 Lesson 5	**Erosion, Natural Hazards, & Engineering** How could you survive a landslide?	Students generate multiple possible solutions to protect homes from a landslide. Students realize that there are many causes for the erosion that causes rocks to fall in landslides.	**4.E1U1.10** Define problem(s) and design solution(s) to minimize the effects of natural hazards.

Arizona Specific Standard
4.E1U1.5 Use models to explain seismic waves and their effect on the Earth.
The following mini-lesson can be used to support Arizona Specific Science Standards.



4.E1U1.5

How do earthquakes happen?

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

Weather & Climate Unit (Stormy Skies)

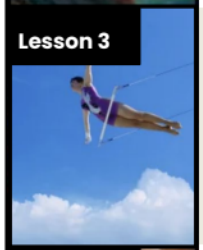
	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
Lesson 1 	**Water Cycle & States of Matter** Where do clouds come from?	Students obtain and combine information that water can change from liquid to gas, but that it is always made of tiny drops. Clouds are made of water that has evaporated.	**4.E1U1.6** Plan and carry out an investigation to explore and explain the interactions between Earth's major systems and the impact on Earth's surface materials and processes.
Lesson 2 	**Local Weather Patterns & Weather Prediction** How can we predict when it's going to storm?	Students make observations of clouds and develop a tool to make predictions about what kind of weather might happen next.	**4.E1U1.8** Collect, analyze, and interpret data to explain weather and climate patterns.
Lesson 3 	**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.	**4.E1U1.8** Collect, analyze, and interpret data to explain weather and climate patterns.
Lesson 4 	**Climate & Global Weather Patterns** Why are some places always hot?	Students obtain and combine information to describe the different climate regions of the world.	**4.E1U1.8** Collect, analyze, and interpret data to explain weather and climate patterns.
Lesson 5 	**Natural Hazards & Engineering** How can you keep a house from blowing away in a windstorm?	Students design and build solutions that reduce the hazards associated with strong winds that could damage buildings.	**4.E1U1.10** Define problem(s) and design solution(s) to minimize the effects of natural hazards.

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

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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.	**4.E1U3.9** Construct and support an evidence-based argument about the availability of water and its impact on life.
Lesson 2 	*Although this appears next on our site, we **recommend teaching this in 5th grade** if following Arizona Standards.* ***Mixtures & Solutions*** *How much salt is in the ocean?*	*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.P1U1.1** Analyze and interpret data to explain that matter of any type can be subdivided into particles too small to see and, in a closed system, if properties change or chemical reactions occur, the amount of matter stays the same.*
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.	**4.E1U3.9** Construct and support an evidence-based argument about the availability of water and its impact on life.
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.	**4.E1U1.6** Plan and carry out an investigation to explore and explain the interactions between Earth's major systems and the impact on Earth's surface materials and processes.
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.	**4.E1U1.10** Define problem(s) and design solution(s) to minimize the effects of natural hazards.

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

Forces, Motion, & Magnets Unit (Invisible Forces)

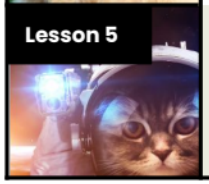
	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
 **Lesson 1**	*Although this appears on our site, we **recommend teaching this in 5th grade** if following Arizona Standards.*		
	Balanced & Unbalanced Forces *How could you win a tug-of-war against a bunch of adults?*	*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.P3U1.4** Obtain, analyze, and communicate evidence of the effects that balanced and unbalanced forces have on the motion of objects.*
 **Lesson 2**	*Although this appears on our site, we **recommend teaching this in 5th grade** if following Arizona 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.P3U1.4** Obtain, analyze, and communicate evidence of the effects that balanced and unbalanced forces have on the motion of objects.*
 **Lesson 3**	*Although this appears on our site, we **recommend teaching this in 5th grade** if following Arizona Standards.*		
	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.P3U1.4** Obtain, analyze, and communicate evidence of the effects that balanced and unbalanced forces have on the motion of objects.*
 **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.	**4.P2U1.3** Develop and use a model to demonstrate magnetic forces.
 **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.	**4.P2U1.3** Develop and use a model to demonstrate magnetic forces.

✔⭐ Electricity, Light, & Heat Unit (Electricity, Light & Heat)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
Lesson 1 	✨New!✨ **Renewable Energy & Natural Resources** What's the best way to light up a city?	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.P4U3.4** Engage in argument from evidence on the use and impact of renewable and nonrenewable resources to generate electricity.
Lesson 2 	**Electrical Energy** What if there were no electricity?	Students design a flashlight with an on/off switch, using batteries, flights, and tin foil. Students figure out that electricity can be transformed to other forms of energy, such as movement, light, and heat.	**4.P4U1.2** Develop and use a model that explains how energy is moved from place to place through electric currents.
Lesson 3 	**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.P4U1.1** Develop and use a model to demonstrate how a system transfers energy from one object to another even when the objects are not touching.

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

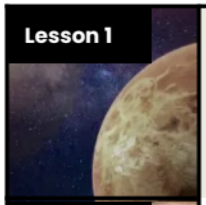
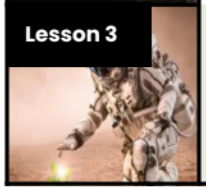
⭐Heredity, Survival, & Selection Unit (Fates of Traits)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
Lesson 1 	✨New!✨ **Traits & Inheritance** How do you identify a mysterious fruit?	Students examine plant traits and use that information as evidence to help them identify an unknown fruit. They look for similarities and differences in the leaves, flowers, and fruits of plants to sort them into groups and identify patterns of inheritance.	**5.L3U1.9** Obtain, evaluate, and communicate information about patterns between the offspring of plants, and the offspring of animals (including humans); construct an explanation of how genetic information is passed from one generation to the next.
Lesson 2 	✨New!✨ **Trait Variation, Inheritance, & Artificial Selection** What do dogs and pigeons have in common?	Students analyze trait similarities and differences among parent, offspring, and sibling pigeons. They interpret this data to discover that the variation and inheritance of traits creates a pattern that explains why we see such extreme traits in artificially selected animal breeds.	**5.L3U1.9** Obtain, evaluate, and communicate information about patterns between the offspring of plants, and the offspring of animals (including humans); construct an explanation of how genetic information is passed from one generation to the next.
Lesson 3 	✨New!✨ **Trait Variation, Survival, & Natural Selection** How could a lizard's toes help it survive?	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.L3U1.9** Obtain, evaluate, and communicate information about patterns between the offspring of plants, and the offspring of animals (including humans); construct an explanation of how genetic information is passed from one generation to the next. **5.L3U1.10** Construct an explanation based on evidence that the changes in an environment can affect the development of the traits in a population of organisms. **5.L4U3.11** Obtain, evaluate, and communicate evidence about how natural and human-caused changes to habitats or climate can impact populations.
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.	**5.L4U3.12** Construct an argument based on evidence that inherited characteristics can be affected by behavior and/or environmental conditions.
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.L4U3.12** Construct an argument based on evidence that inherited characteristics can be affected by behavior and/or environmental conditions.

✔ Earth & Space Patterns Unit (Spaceship Earth)

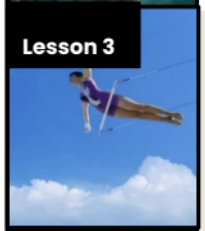
	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
 Lesson 1	**Day, Night, & Earth's Rotation** How fast does the Earth spin?	Students model the rotation of the Earth and investigate why the Sun looks like it's moving across the sky. Using evidence they gathered in the investigation, students build a model that explains how the Earth's rotation around its own axis causes the Sun to appear to rise and set.	**5.E2U1.7** Develop, revise, and use models based on evidence to construct explanations about the movement of the Earth and Moon within our solar system.
 Lesson 2	**Earth's Rotation & Daily Shadow Patterns** Who set the first clock?	Students make a shadow clock (sundial) and investigate how the direction and length of shadows change with the position of the light shining on the sundial. Students realize that the Sun's position in the sky can be used to tell the time of day.	**5.E2U1.7** Develop, revise, and use models based on evidence to construct explanations about the movement of the Earth and Moon within our solar system.
 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.E2U1.7** Develop, revise, and use models based on evidence to construct explanations about the movement of the Earth and Moon within our solar system.
 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.E2U1.7** Develop, revise, and use models based on evidence to construct explanations about the movement of the Earth and Moon within our solar system.
 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.E2U1.7** Develop, revise, and use models based on evidence to construct explanations about the movement of the Earth and Moon within our solar system.

✔ Earth & Space Patterns Unit (Spaceship Earth)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
 Lesson 1	**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.E2U1.7** Develop, revise, and use models based on evidence to construct explanations about the movement of the Earth and Moon within our solar system.
 Lesson 2	**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.E2U1.8** Obtain, analyze, and communicate evidence to support an explanation that the gravitational force of Earth on objects is directed toward the planet's center. **5.P2U1.3** Construct an explanation using evidence to demonstrate that objects can affect other objects even when they are not touching.
 Lesson 3	**Star Brightness & Habitable Planets** Could there be life on other planets?	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.E2U1.7** Develop, revise, and use models based on evidence to construct explanations about the movement of the Earth and Moon within our solar system.

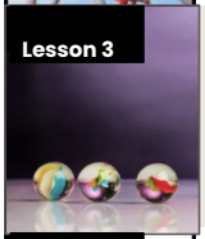
***This unit is found under 3rd Grade on our site**, but we recommend teaching lessons in 5th Grade if you are following Arizona Standards.*

Forces, Motion, & Magnets Unit (Invisible Forces)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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.P3U1.4** Obtain, analyze, and communicate evidence of the effects that balanced and unbalanced forces have on the motion of objects.
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.P3U1.4** Obtain, analyze, and communicate evidence of the effects that balanced and unbalanced forces have on the motion of objects.
Lesson 3 	**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.P3U1.4** Obtain, analyze, and communicate evidence of the effects that balanced and unbalanced forces have on the motion of objects.
Lesson 4 	*Although this appears next on our site, we **recommend teaching this in 4th grade** if following Arizona 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.*	***4.P2U1.3** Develop and use a model to demonstrate magnetic forces.*
Lesson 5 	*Although this appears next on our site, we **recommend teaching this in 4th grade** if following Arizona 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.*	***4.P2U1.3** Develop and use a model to demonstrate magnetic forces.*

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

✔ Energy & Energy Transfer Unit (Energizing Everything)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
 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.	**5.P4U1.6** Analyze and interpret data to determine how and where energy is transferred when objects move.
 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.	**5.P3U2.5** Define problems and design solutions pertaining to force and motion. **5.P4U1.6** Analyze and interpret data to determine how and where energy is transferred when objects move.
 Lesson 3	**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.	**5.P3U2.5** Define problems and design solutions pertaining to force and motion. **5.P4U1.6** Analyze and interpret data to determine how and where energy is transferred when objects move.
 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.	**5.P4U1.6** Analyze and interpret data to determine how and where energy is transferred when objects move.
 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.	**5.P4U1.6** Analyze and interpret data to determine how and where energy is transferred when objects move.

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

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
Lesson 1 	*Although this appears on our site, we **recommend teaching this in 4th grade** if following Arizona Standards.*		
	Hydrosphere & Water Distribution *How much water is in the world?*	*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.*	***4.E1U3.9** Construct and support an evidence-based argument about the availability of water and its impact on life.*
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.P1U1.1** Analyze and interpret data to explain that matter of any type can be subdivided into particles too small to see and, in a closed system, if properties change or chemical reactions occur, the amount of matter stays the same.
Lesson 3 	*Although this appears on our site, we **recommend teaching this in 4th grade** if following Arizona Standards.*		
	Groundwater as a Natural Resource *When you turn on the faucet, where does the water come from?*	*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.*	***4.E1U3.9** Construct and support an evidence-based argument about the availability of water and its impact on life.*
Lesson 4 	*Although this appears on our site, we **recommend teaching this in 4th grade** if following Arizona Standards.*		
	Water Cycle *Can we make it rain?*	*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.*	***4.E1U1.6** Plan and carry out an investigation to explore and explain the interactions between Earth's major systems and the impact on Earth's surface materials and processes.*
Lesson 5 	*Although this appears on our site, we **recommend teaching this in 4th grade** if following Arizona Standards.*		
	Natural Disasters & Engineering *How can you save a town from a hurricane?*	*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.*	***4.E1U1.10** Define problem(s) and design solution(s) to minimize the effects of natural hazards.*

Chemical Reactions & Properties of Matter Unit (Chemical Magic)

	Topic & Guiding Question	Student Objectives	Arizona Science Standards of Learning (2018)
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.	**5.P1U1.1** Analyze and interpret data to explain that matter of any type can be subdivided into particles too small to see and, in a closed system, if properties change or chemical reactions occur, the amount of matter stays the same.
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.	**5.P1U1.1** Analyze and interpret data to explain that matter of any type can be subdivided into particles too small to see and, in a closed system, if properties change or chemical reactions occur, the amount of matter stays the same.
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.P1U1.2** Plan and carry out investigations to demonstrate that some substances combine to form new substances with different properties and others can be mixed without taking on new 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.P1U1.2** Plan and carry out investigations to demonstrate that some substances combine to form new substances with different properties and others can be mixed without taking on new properties.
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.P1U1.1** Analyze and interpret data to explain that matter of any type can be subdivided into particles too small to see and, in a closed system, if properties change or chemical reactions occur, the amount of matter stays the same.