Grade 5 Planning Guide

Kindergarten Planning Guide | Grade 1 Planning Guide | Grade 2 Planning Guide
Grade 3 Planning Guide | Grade 4 Planning Guide | Grade 5 Planning Guide
Combined K-5 Planning Guide

What is Included in this Document?

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.

Mystery Science - NGSS Alignment
Mystery Science is aligned to the Next Generation Science Standards (NGSS). Each lesson is aligned to a topic, performance expectation, science and engineering practice, disciplinary core idea, and crosscutting concept. This document explains how each lesson is aligned to the Next Generation Science Standards. If you are interested in anchoring phenomena, we suggest using our Anchor Layer feature and exploring our NGSS Storylines.

Generate Activity Supply Lists
To make planning easier, you can generate supply lists by grade, classroom, unit, or lesson using our Supply Calculator.

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Grade 5

Mystery Science recommends teaching the lessons within each unit in the order they are presented. The units themselves can be taught in any order. The lesson (exploration & activity) is designed to take an hour per week. Extensions can expand upon each lesson.

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Week 1	Lesson 1: Why would a hawk move to New York City? ***(5-LS2-1)***	Lesson 1: How much water is in the world? (***5-ESS2-2)***	Lesson 1: How fast does the Earth spin? (***5-ESS1-2)***	Lesson 1: Are magic potions real? (***5-PS1-1, 5-PS1-2)***
Week 2	Lesson 2: What do plants eat? ***(5-LS1-1, 5-LS2-1)***	Lesson 2: How much salt is in the ocean? ***(5-PS1-2)***	Lesson 2: Who set the first clock? (***5-ESS1-2)***	Lesson 2: Could you transform something worthless into gold? (***5-PS1-1, 5-PS1-2)***
Week 3	Lesson 3: Where do fallen leaves go? ***(5-LS2-1)***	Lesson 3: When you turn on the faucet, where does the water come from? ***(5-ESS2-2)***	Lesson 3: How can the Sun tell you the season? (***5-ESS1-2)***	Lesson 3: What would happen if you drank a glass of acid? (***5-PS1-3)***
Week 4	Lesson 4: Do worms really eat dirt? ***(5-LS2-1)***	Lesson 4: Can we make it rain? ***(5-ESS2-1)***	Lesson 4: Why do the stars change with the seasons? (***5-ESS1-2)***	Lesson 4: What do fireworks, rubber, and silly putty have in common? (***5-PS1-4)***
Week 5	Lesson 5: Why do you have to clean a fish tank but not a pond? ***(5-LS2-1)***	Lesson 5: How can you save a town from a hurricane? ***(5-ESS2-1, 5-ESS3-1), 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3)***	Lesson 5: Why does the Moon change shape? (***5-ESS1-2)***	Lesson 5: Why do some things explode? (***5-PS1-1)***
Week 6	✨**New!**✨ Lesson 6: How can we protect Earth's environments? ***(5-ESS3-1)***		✨**New!**✨ Lesson 6: How can the Sun help us explore other planets? (***5-ESS1-1)***	
Week 7	Lesson 7: Why did the dinosaurs go extinct? ***(5-PS3-1)***		Lesson 7: Why is gravity different on other planets? (***5-PS2-1)***	
Week 8			Lesson 8: Could there be life on other planets? (***5-ESS1-1)***	

Lesson Extensions. 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.

More Science each week	**Longer Science units**	**Cross Curricular Integration**
Use items from the Extensions if you have more time.	Add a week after each lesson to teach items from the Extensions.	If you want to extend the lesson during literacy time, use reading and writing Extensions.

[Web of Life](https://mysteryscience.com) (7-14 weeks)

Ecosystems and the Food Web

Grade 5 Mystery Science & NGSS Alignment - Life Science (LS)

In this unit, students explore how organisms depend on one another and form an interconnected ecosystem. Students investigate food chains, food webs, and the importance of producers, consumers, and decomposers.

Grade 5 Life Science	Performance Expectations	Focus	Disciplinary Core Ideas (DCIs) (Lesson Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Lesson 1 Why would a hawk move to New York City?	5-LS2-1	Food Chains, Predators, Herbivores, & Carnivores	Animals are all around us--even in cities. We can learn to spot them by bearing in mind of one of the most basic relationships that all animals have with each other: some of them are predators and others are prey. (Where there are prey, there are predators, and vice versa.) **DCIs: LS2.A, Foundational for LS1.C**	Students **construct models** of different food chains by linking cards representing different organisms. The chains are used to explain the relationship between predators and prey. Students **argue using evidence and reasoning** about which organisms can be linked together and in what order.	This lesson begins to lay the foundation for thinking about **systems and energy/matter flow.** By constructing chains of relationships between organisms, students are exposed to an example of a system. Food chains set students up for considering energy & matter flow in future Mysteries in this unit.
Lesson 2 What do plants eat?	5-LS1-1 5-LS2-1	Plant Needs: Air & Water	Because predators depend on prey, all animals ultimately depend on plants--even carnivores that do not eat plants. Plants in turn derive their growth material primarily from water and air. **DCIs: LS1.C, Foundational for LS2.B**	Students **plan an investigation** to determine whether or not air has weight. As a whole class, students **conduct an investigation** to compare the weights of balloons with and without air. Students **analyze and interpret data** from the investigation to **explain** what happened and how the evidence may **explain** how plants gain weight.	Students observe that deflating a balloon **causes** the balloon to weigh less, leading to the conclusion that air has weight. This lesson also lays the foundation for an understanding of **conservation of matter** by considering how plants gain weight as they grow due to the air they absorb.
Lesson 3 Where do fallen leaves go?	5-LS2-1	Decomposers & Matter Cycle	Decomposers are yet another category of living thing, which consume dead plant and animal material and produce soil. Fungi--of which mushrooms and mold are types--is a conspicuous decomposer found everywhere, even in your home. **DCIs: LS2.A, Foundational for LS2.B**	Students **ask questions** about what conditions they think will induce and prevent the growth of mold. Students **plan and conduct an investigation** to test different conditions. Students **analyze and interpret data** that they record from their experiments to **explain** how different conditions impact mold growth.	Students observe **patterns** in the rates of **change** in the mold terrariums. They note similarities and differences to analyze how mold grows on different foods under different conditions.

Web of Life (7-14 weeks)

Ecosystems and the Food Web

Grade 5 Mystery Science & NGSS Alignment - Life Science (LS)

Grade 5 Life Science	Performance Expectations	Focus	Disciplinary Core Ideas (DCIs) (Lesson Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Lesson 4 Do worms really eat dirt?	5-LS2-1	Decomposers, Nutrients, & Matter Cycle	Earthworms aren't pests, they are decomposers! They eat dead and decaying matter, bacteria, and animal waste that is in soil. Worm castings (their excretions) release the nutrients from their food back into the soil. In addition to water and carbon dioxide from the air, plants need these nutrients to grow. Worms help gardens, not hurt them. **DCIs: LS2.A, LS2.B, *Supplementary* LS1.C**	Students observe worm behavior to help them determine a worm's role in a garden. Then, they **conduct an investigation** to test if worms prefer damp or dry places. They **create an argument** using the investigations results as **evidence** to support a claim about the worm's preferences. Lastly, students **plan and carry out an investigation** to answer a question they have about worms.	Students recognize that earthworms are part of a **system,** a food chain, with other organisms. Earthworms help **matter** flow back into the food chain.
Lesson 5 Why do you have to clean a fish tank but not a pond?	5-LS2-1	Ecosystems & Matter Cycle	All living things in an ecosystem depend on one another. In a pond, fish depend on plants as food and as a source of oxygen. Decomposers break down dead plant and animal matter, releasing micronutrients into the water. They also give off carbon dioxide. Plants take in carbon dioxide and give off oxygen. If one part is removed, the ecosystem would not function. **DCIs: LS2.A, LS2.B**	Students **develop a model** to show the flow of energy and matter within an ecosystem. Then, students **develop a model** of a pond ecosystem. They add different living things to the pond, considering what each organism needs to eat and how much carbon dioxide each organism adds or removes from the ecosystem.	Students recognize the living organisms in a habitat as a **system**, an ecosystem. If one organism were to disappear, the whole ecosystem would break down.
Lesson 6 How can we protect Earth's environments?	5-ESS3-1	Protecting Environments	All living things in an ecosystem are connected and affect one another. Too many nutrients in aquatic ecosystems, can lead to increased algae growth, a phenomenon known as harmful algae blooms. These algae blooms can overcrowd other living things and lead to unhealthy ecosystems. But the actions of individuals and communities can help to fix this problem and protect the Earth's environments. **DCIs: ESS3.C**	Students **obtain and combine** information about different methods that can quickly fix or prevent harmful algae blooms from occurring. Then students use this information to help a community respond to harmful algae blooms.	Students evaluate what happens in unbalanced **ecosystems** and recognize that when there is an overabundance of nutrients, that will affect all the organisms in that **system**.
Lesson 7 Why did the dinosaurs go extinct?	5-PS3-1	Food Webs & Flow of Energy	It is believed that an asteroid impact *could* have caused the dinosaurs to go extinct. When the asteroid hit the earth it filled the sky with dust, ash and debris which blocked sunlight. Plants all over the world couldn't get the sun's energy they needed to grow. When plants died out, the herbivores would eventually die as well, followed by the carnivores. Ultimately, the asteroid collapsed the dinosaur's food web causing a mass extinction. **DCIs: PS3.D, LS1.C**	Students **develop a model** of a dinosaur food web to show how all animals get their energy. They use the model to help **construct an explanation** about how an asteroid killed all of the dinosaurs.	Students identify the sun as the ultimate source of **energy** in an ecosystem. The sun's energy is used by plants to grow and transferred through an ecosystem in the form of food.

Watery Planet (5-10 weeks)

Water Cycle, Resources, & Systems

Grade 5 Mystery Science & NGSS Alignment - Earth & Space Science (ESS)

In this unit, students consider the profound importance of water as a natural resource. Students investigate the distribution of water, how it cycles through Earth's systems, and explore how it affects human societies.

Grade 5 Earth Science	Performance Expectations	Focus	Disciplinary Core Ideas (DCIs) (Lesson Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Lesson 1 How much water is in the world?	5-ESS2-2	Hydrosphere & The Roles of Water	Water is our most basic human need. Despite the fact that Earth is a watery planet, Earth's water is mostly salt water--a form not fit to drink. Easily accessible fresh water is a surprisingly small amount by comparison. Of that fresh water, much of it is frozen in glaciers and ice caps. **DCIs: ESS2.C**	Students **analyze and interpret dat**a from world maps to determine the relative amounts of fresh, salt and frozen water. Students **use mathematics and computational thinking** to calculate areas on a map and graph values to compare and graph quantities of fresh, salt and frozen water on Earth.	Students use standardized units of area to compare the **quantity** of fresh, salt and frozen water on Earth. Students use **proportional reasoning** to represent **quantities** in their graph comparing different types of water.
Lesson 2 How much salt is in the ocean?	5-PS1-2	Mixtures, Solutions, & Conservation of Matter	The ocean is a giant mixture of water and all the creatures that live in it! But what about the salt in the ocean? Why can't we see it? Salt water is a special type of mixture, called a solution. Even though the salt seems to vanish, it is actually still there. We can prove this by smelling the salt, tasting the salt, and even weighing the salt. You can also prove that the salt is in the ocean by letting some of that ocean water evaporate--you'll see all the salt left behind! **DCIs: PS1.A**	Students **create a model** ocean to explore the properties of salt water. They **use mathematics and computational thinking** to calculate the weight of the water and salt, before and after mixing. Students analyze their graphs to provide evidence that the weight of the substances stays the same. Finally, students **create model** salt flats, letting their oceans evaporate, leaving the salt behind.	Students use standardized units of weight to compare the **quantity** of water, salt, and salt water before and after mixing.
Lesson 2 When you turn on the faucet, where does the water come from?	5-ESS2-2	Groundwater as a Natural Resource	Most people get their drinking water from water that's located underground, where there turns out to be a surprisingly large amount within structures called "aquifers." People use science ideas about the location of aquifers to make decisions about where to build communities. **DCIs: ESS2.C, Foundational for ESS3.C & ESS2.A**	Students are asked to determine where is the best place to settle a new town by considering features of the landscape and what they know about where to find water. Students **obtain, evaluate and communicate** information from different sources about topography, plants and soil to inform their decision. Students **argue using evidence** to justify where their town should be built.	Students reason about information they get about natural patterns to determine where underground water is most likely to be found. These **patterns** involve correlations between elevation and water depth as well as how plant and soil **patterns** can give clues about where drinkable water may be found.

Watery Planet (5-10 weeks)

Water Cycle, Resources, & Systems

Grade 5 Mystery Science & NGSS Alignment - Earth & Space Science (ESS)

Grade 5 Earth Science	Performance Expectations	Focus	Disciplinary Core Ideas (DCIs) (Lesson Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Lesson 3 Can we make it rain?	5-ESS2-1	Water Cycle	Evaporation of ocean water is the ultimate source of rain, and thus all our easily accessible fresh water. (All water on Earth's surface is part of an interconnected system, the hydrosphere.) **DCIs: Foundational for ESS2.A**	Students create a **model** of the ocean and sky (hydrosphere and atmosphere). Students use the model to **plan and carry out an investigation** to determine how temperature influences evaporation and condensation.	Students reason about how the hydrosphere and atmosphere **systems** interact to produce rain. Students model the systems to explain how rain is created.
Lesson 4 How can you save a town from a hurricane?	5-ESS2-1 5-ESS3-1 3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3	Natural Disasters & Engineering	Hurricanes start out as small storms over the ocean. As they move across the ocean, warm water evaporates into the storm cloud, making the hurricane grow bigger and bigger. Hurricanes bring tons of rain, flooding entire cities. Engineers design solutions to protect towns from extreme flooding. **DCIs: ESS2.A, ESS3.C, ETS1.A, ETS1.B, ETS1.C**	Students **define the problem** that a town needs protection from flooding. They **obtain and communicate information** about different types of engineers and work as a team to design solutions using their different types of flood protection. Students use **mathematics and computational thinking** design a solution under budget.	Students reason about how the hydrosphere and atmosphere **systems** interact to produce hurricanes and extreme flooding. They also consider the impact of hurricanes on the biosphere and geosphere system.

Spaceship Earth (8-16 weeks)

Sun, Moon, Stars & Planets

Grade 5 Mystery Science & NGSS Alignment - Earth & Space Science (ESS)

In this unit, students explore the Earth, Sun, Moon, and stars using observations of shadows and changing patterns in the sky. Students also explore the planets of our Solar System and begin to consider what might lie beyond.

Grade 5 Space Science	Performance Expectations	Focus	Disciplinary Core Ideas (DCIs) (Lesson Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Lesson 1 How fast does the Earth spin?	5-ESS1-2	Day, Night, & Earth's Rotation	The Sun appears to move across the sky each day, creating an observable pattern. It rises in the morning, and sets in the evening. It is natural for us to assume that the Sun is moving--this is what we believed for most of human history. But scientists have have figured out that the Earth is spinning. The Earth's spinning is the cause of day and night and the length of a day is a result of the speed of the Earth spinning on its axis. **DCIs: ESS1.B**	Students explore the phenomena of the Sun appearing to move across the sky. They use their own bodies as a **model** for the Earth to explain why the Sun rises and sets. Then students use **mathematics and computational thinking** to figure out the length of a day on hypothetical planets that spin faster and slower than the Earth.	Students recognize that the Sun moving across the sky is a **pattern** that can be explained by the Earth spinning. Students investigate this pattern to realize that the Earth spinning **causes** the **effect** of the Sun appearing to move across the sky.
Lesson 2 Who set the first clock?	5-ESS1-2	Earth's Rotation & Daily Shadow Patterns	A long time ago, our ancestors divided the day into 24 hours. Clocks measure the Sun's apparent movement. But before clocks existed, the change in shadows helped us measure the Sun's movement. The sun's position causes the length and direction of an object's shadow. Since the Sun moves across the sky each day in a pattern, shadow clocks (sundials) can be used to tell the time of day. **DCIs: ESS1.B**	Students create a shadow clock, to observe how shadows change throughout the day. Students **carry out an investigation** to determine how the position of the sun changes the direction of the shadow at different times of day. Then, they go outside and **interpret data** from their shadow clock to determine what time of day it is.	Students observe **patterns** in the **change** of shadow length and position throughout the day. They use shadow **patterns** to determine what time of day it is, without the use of a clock.
Lesson 3 How can the Sun tell you the season?	5-ESS1-2	Seasonal Changes & Shadow Length	The sun's path changes with the seasons. Summer days are longer and warmer, because the Sun follows a higher path across the sky. Winter days are shorter and colder, because the Sun follows a low path across the sky. In the summer, shadows are shorter because the Sun is high. In the winter, they are longer because the Sun is low. **DCIs: ESS1.B**	Students **analyze and interpret data** from photographs taken during different seasons and times of day, to determine how the sun's path affects Earth's surface. Students use **evidence** from the photos-- such as weather, shadow length, and sunrise/sunset time-- to **construct an argument** as to which season it is.	Students observe the **pattern** of seasons **caused** by the sun's path. The unique characteristics of each season are **caused** by the sun's position in the sky. Each season repeats each year.

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[Spaceship Earth](https://mysteryscience.com) (8-16 weeks)

Sun, Moon, Stars & Planets

Grade 5 Mystery Science & NGSS Alignment - Earth & Space Science (ESS)

Grade 5 Space Science	Performance Expectations	Focus	Disciplinary Core Ideas (DCIs) (Lesson Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Lesson 4 Why do the stars change with the seasons?	5-ESS1-2	Seasonal Patterns & Earth's Orbit	The night sky is full of stars that are grouped into constellations. The stars are seasonal, which means we only see certain stars depending on the season. As the Earth orbits around the sun, its position in the universe changes and we see different parts of the night sky. The seasonal patterns of the constellations repeat each year. **DCIs: ESS1.B**	Students **develop a model** of the universe, in order to **construct an explanation** for why we see different stars during different seasons. Using **evidence** from their **model**, students make an **argument** that supports the claim that the Earth orbits around the sun.	Students observe the seasonal **pattern** of stars. They note the **change** of constellations that are visible in the night sky, based on the season. This pattern is used as evidence to argue that Earth is orbiting the Sun, and we only see a part of the night sky at a time.
Lesson 5 How does the Moon change shape?	5-ESS1-2	Moon Phases, Lunar Cycle	If you look up at the night sky and see the Moon, then do it again a week later- it will be a different shape! But the Moon isn't actually changing shape, it's always a sphere. The Moon orbits Earth. When the sun is shining on the side of the Moon that faces Earth, it's a bright, round, full moon. When the sun is shining on the side of the Moon that faces away from Earth, the Moon looks dark--it's a new moon. The Moon's phases are a pattern that go in a very certain order. Just like other sky patterns we've learned about, the cycle of the Moon is used to measure time. A full cycle takes about 28 days, or about a month, to repeat! **DCIs: ESS1.B**	Students **develop a model** of the sun and moon to **carry out an investigation** of the Moon's orbit and the different moon phases. Through this investigation, they **obtain information** about how the Moon goes through each phase. Then, they **communicate this information** by constructing an explanation about what causes the Moon's phases for someone who doesn't already know.	Students consider the phases of the Moon as a **pattern**. They learn that the orbit of the Moon around Earth **causes** each different phase. The phases repeat in the same order every 14 days, and then reverse in the same order for another 14 days. The total orbit of the Moon around the Earth takes 28 days, and then the **pattern** repeats.
✨**New!**✨ Lesson 6 How can the Sun help us explore other planets?	5-ESS1-1	Solar System & Sun Brightness	Exploring other planets in our solar system can be challenging for humans, but we can use technology to help us get there. Solar-powered rovers can use the Sun's energy and explore those planets for us. But how does the Sun's apparent brightness vary with distance? Will a solar-powered rover work equally well at all distances from the Sun? **DCIs: ESS1.A**	Students **develop a model** of our solar system and use a flashlight as a model of the Sun. They use this model system to evaluate how bright or dim the Sun appears from different distances. Students then **use this evidence to engage in an argument** and justify their choice of which planet would be best to visit using a solar-powered rover.	Students use a scale model of our solar system to gain an understanding of the immense **scale** of distance between the planets.

(continued)

Spaceship Earth (8-16 weeks)

Sun, Moon, Stars & Planets

Grade 5 Mystery Science & NGSS Alignment - Earth & Space Science (ESS)

Grade 5 Space Science	Performance Expectations	Focus	Disciplinary Core Ideas (DCIs) (Lesson Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Lesson 7 Why is gravity different on other planets?	5-PS2-1	Gravity	When we walk on the Earth, we know gravity is the invisible force that pulls us down. Humans have also walked on the Moon so we know the Moon has gravity too. But the Moon has less gravity than the Earth. Gravity is a property of every planet and moon in our Solar System. Students discover that the amount of gravity depends on how massive a planet is. Unlike magnetism, gravity is a force that pulls on all objects. It always pulls them "down", meaning towards the center of the planet. **DCIs: PS2.B**	Students **use mathematics and computational thinking** to calculate how high they could jump on planets and moons in our Solar System. They **analyze and interpret this data** to construct an explanation for why the amount of gravity is different on other planets.	Students observe the **pattern** that the more massive a planet is, the more gravity it has. Students figure out that the amount of gravity a planet has (**cause**) will impact the height that they are able to jump (**effect**).
Lesson 8 Could there be life on other planets?	5-ESS1-1	Star Brightness & Habitable Planets	Earth is the only planet in our solar system in the "Goldilocks Zone" -- a distance from the Sun with the right amount of light and heat for life to exist. But we have discovered thousands of exoplanets - planets outside our solar system. These exoplanets, and the stars they orbit, range greatly in their distances from Earth. Could any of these exoplanets be in the "Goldilocks Zone"? Students evaluate star brightness, temperature, and distance from our solar system to plan an exoplanet space mission. As they imagine looking back at Earth from the surface of the exoplanet, they will come to realize that our Sun only appears larger and brighter than other stars because it is so close to Earth. **DCIs: ESS1.A**	Students **obtain, evaluate, and communicate** information about temperature and light conditions that a planet must have for humans to survive. Students then **use this evidence to engage in an argument** and justify their choice for an exoplanet space mission. Students consider what our Sun looks like when viewed from the surface of the far-away exoplanet.	Students consider how the conditions of the Sun and planets in our solar system can be extended to learn about other similar, but separate **systems** (other solar systems). Through this, students start to build an understanding of the **scale** of our solar system and beyond.

Chemical Magic (5-10 weeks)

Chemical Reactions & Properties of Matter

Grade 5 Mystery Science & NGSS Alignment - Physical Science (PS)

In this unit, students investigate the properties of matter by dissolving everyday chemicals to make solutions and by exploring simple yet surprising chemical reactions. Through these investigations, students begin to build conceptual models for the particulate nature of matter.

Grade 5 Life Science	Performance Expectations	Focus	Disciplinary Core Ideas (DCIs) (Lesson Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Lesson 1 Are magic potions real?	5-PS1-1 5-PS1-2	Chemistry & Conservation of Matter	The alchemists were a historic group of people who experimented with mixing different substances together to make a potion. They wondered if their potions could transform materials. **DCIs: *Foundational PS1.A and PS1.B***	Students **plan and carry out an investigation** to see which solution will turn a dull penny into a shiny penny. Students **develop a conceptual model** in order to **construct an explanation** for their test results. They revise their conceptual **model** as they develop a more sophisticated understanding of particles.	Students observe the **effect** of solutions on a dull penny. Students explore that substances undergo **change**.
Lesson 2 Could you transform something worthless into gold?	5-PS1-1 5-PS1-2	Dissolving & Particulate Nature of Matter	The alchemists were on a quest to transform ordinary metal into gold, so that they could become rich. To do this, the alchemists observed and investigated the many materials around them--the substances which things are made of. They discovered that substances are able to change form, and that some substances may even *appear* to vanish, almost like magic. **DCIs: *Foundational PS1.A and PS1.B***	Students **carry out an investigation** to determine what happens when they place a steel object in the same solution that turned their pennies shiny in Lesson 1. Students **construct an explanation** by **developing a conceptual model** to show how the solution affects the steel nail.	This lesson lays the foundation for an understanding of **conservation of matter** by considering that the copper from the penny did not disappear, but only dissolved into the solution. Students consider the variety of **scale** within natural objects. They understand that there are extremely small, to small to see, copper particles dissolved in their solution.
Lesson 3 What would happen if you drank a glass of acid?	5-PS1-3	Acids, Reactions & Properties of Matter	The alchemists discovered acids--a set of substances that is extremely *reactive* (undergoes chemical changes easily). A chemical *reaction* happens when different substances are mixed and it causes some kind of change. We can tell a chemical change is happening by observing indications such as fizzing, a color change, or dissolving. **DCIs: PS1.A**	Students **conduct an investigation** to discover if a reaction occurs when mixing two substances. **Analyzing the data**, students determine which substances react with acid. Next, students decide how to test unknown liquids to see if they are acids.	Students consider the **cause and effect** relationship when combining chemicals to produce reactions. Students consider that combining two chemicals may result in a **change** in the substance.

(continued)

Chemical Magic (5-10 weeks)

Chemical Reactions & Properties of Matter

Grade 5 Mystery Science & NGSS Alignment - Physical Science (PS)

Grade 5 Physical Science	Performance Expectations	Focus	Disciplinary Core Ideas (DCIs) (Lesson Conceptual Flow)	Scientific & Engineering Practices (SEPs)	Crosscutting Concepts (CCC)
Lesson 4 What do fireworks, rubber, and Silly Putty have in common?	5-PS1-4	Chemical Reactions	The alchemists were not successful in finding an easy way to make gold, but all of their observations and experimenting with substances turned out to be hugely important. For example, when acids react with other substances, they form entirely new substances. The new substance will have different properties from the original substances. Some of these properties are useful. Chemical reactions are how we get new substances and discover new properties! **DCIs: PS1.B**	Students **conduct an investigation** to see which chemicals, when combined, result in a chemical reaction. They **construct an explanation** to share which chemicals reacted and formed a new substance with a goo consistency. In Part 2 of the activity, students make their own goo by mixing the two chemicals which formed a goo-like substance in Part 1.	Students consider the **cause and effect** relationship between chemicals that are combined to form new substances. Students consider that combining two chemicals may result in a **change** when a substance with unique properties is created.
Lesson 5 Why do some things explode?	5-PS1-1	Gases & Particle Models	Not all explosions are big and fiery, they can be small too! The alchemists were the first to discover these small explosions. They noticed small bubbles forming when some substances and objects were placed in an acid. The substance, gas, was hard to capture--it would escape the container, or make it burst. Gases can be visible or invisible and are made up of many tiny particles that you can't see. All explosions are caused by a buildup of gas moving outward that bursts the container they are in. **DCIs: PS1.A**	Students **conduct an investigation** to see what happens when baking soda and vinegar react inside a closed ziplock bag. They **develop a particle model** to explain their results--that gas particles are created and move outward, causing the ziplock bag to expand or even burst.	Students consider that combining two chemicals may result in a **change** when a substance with unique properties is created. Students understand that particles are very small, to small to see, compared to other natural objects.