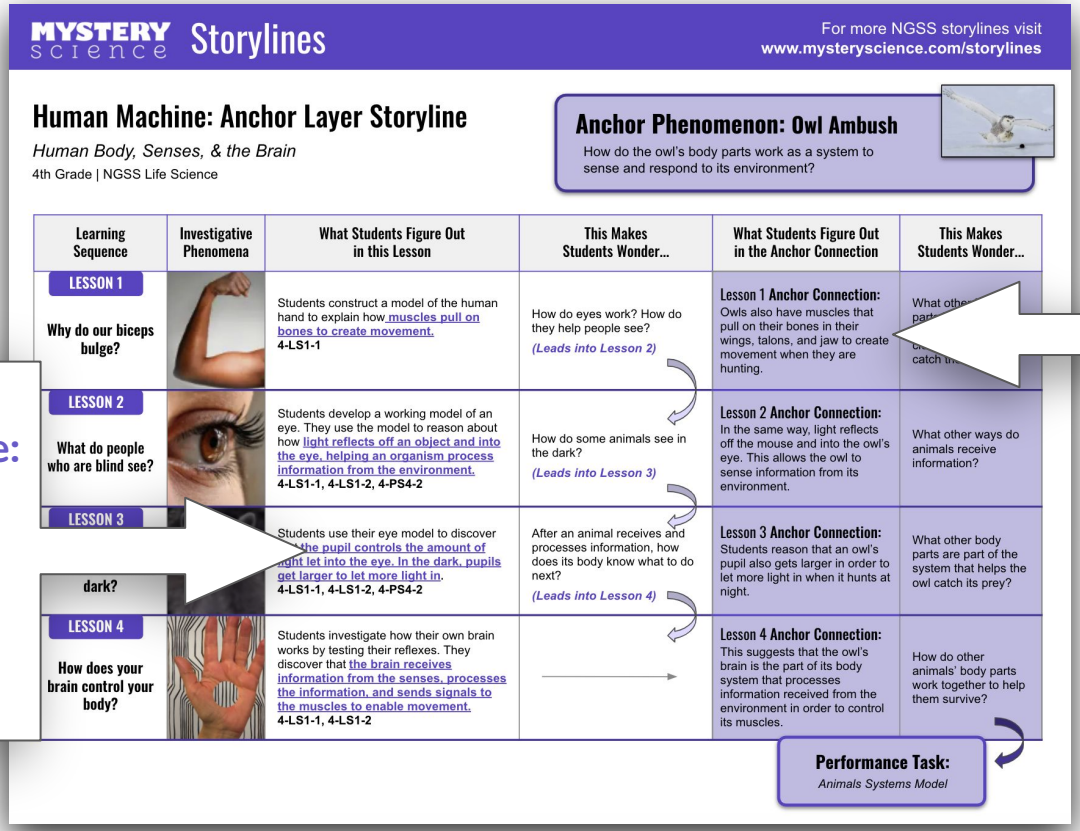
Mystery Science Storylines

The unit storylines show how each investigation leads to a new question which leads to a new investigation which leads to a new question, etc.

Investigative Storyline: Each investigative lesson leads to a question that leads to the next lesson.

Anchor Storyline: Students revisit the anchor phenomenon after each lesson and revise their ideas.



MYSTERY science Storylines

For more NGSS storylines visit
www.mysteryscience.com/storylines

Human Machine: Anchor Layer Storyline

Human Body, Senses, & the Brain

4th Grade | NGSS Life Science

Anchor Phenomenon: Owl Ambush

How do the owl's body parts work as a system to sense and respond to its environment?

Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 Why do our biceps bulge?		Students construct a model of the human hand to explain how muscles pull on bones to create movement. 4-LS1-1	How do eyes work? How do they help people see? *(Leads into Lesson 2)*	**Lesson 1 Anchor Connection:** Owls also have muscles that pull on their bones in their wings, talons, and jaw to create movement when they are hunting.	What othe... part... ... catch th...
LESSON 2 What do people who are blind see?		Students develop a working model of an eye. They use the model to reason about how light reflects off an object and into the eye, helping an organism process information from the environment. 4-LS1-1, 4-LS1-2, 4-PS4-2	How do some animals see in the dark? *(Leads into Lesson 3)*	**Lesson 2 Anchor Connection:** In the same way, light reflects off the mouse and into the owl's eye. This allows the owl to sense information from its environment.	What other ways do animals receive information?
LESSON 3 dark?		Students use their eye model to discover ... the pupil controls the amount of ...ght let into the eye. In the dark, pupils get larger to let more light in. 4-LS1-1, 4-LS1-2, 4-PS4-2	After an animal receives and processes information, how does its body know what to do next? *(Leads into Lesson 4)*	**Lesson 3 Anchor Connection:** Students reason that an owl's pupil also gets larger in order to let more light in when it hunts at night.	What other body parts are part of the system that helps the owl catch its prey?
LESSON 4 How does your brain control your body?		Students investigate how their own brain works by testing their reflexes. They discover that the brain receives information from the senses, processes the information, and sends signals to the muscles to enable movement. 4-LS1-1, 4-LS1-2		**Lesson 4 Anchor Connection:** This suggests that the owl's brain is the part of its body system that processes information received from the environment in order to control its muscles.	How do other animals' body parts work together to help them survive?

Performance Task:
Animals Systems Model

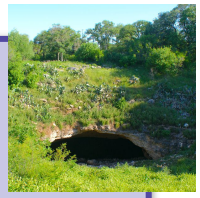
Animal Adventures: Anchor Layer Storyline

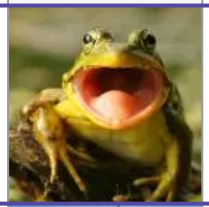
Animal Biodiversity and Habitats

2nd Grade | NGSS Life Science

Anchor Phenomenon: Bracken Cave

What type of animal lives in Bracken Cave?



Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 **How many different kinds of animals are there?**		Students examine how scientists organize animals into groups based on their characteristics. **2-LS4-1**	How else can we identify types of animals? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** The animal in the cave has the characteristics of a mammal. Even though the cave is filled with a huge amount of poo, the mammal inside is very small.	What type of small mammal lives in the cave?
LESSON 2 **Why do frogs say "ribbit"?**		Students identify frogs based on their unique calls and use that information to determine the level of biodiversity within multiple habitats. **2-LS4-1**	How can we help animals? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** A huge colony of Mexican Free-Tailed Bats lives in the cave.	Where do the bats live in the cave?
LESSON 3 **How could you get more birds to visit a bird feeder?**		Students investigate which kinds of birds are likely to visit a bird feeder based on what they eat and design and build a prototype bird feeder that attracts a specific type of bird. **2-LS4-1, K-2-ETS1-1, K-2-ETS1-2, K-2-ETS1-3**		**Lesson 3 Anchor Connection:** The bats hang from the ceiling when they are inside of the cave.	What other kinds of places do bats live?

Performance Task:

Where else do bats live?

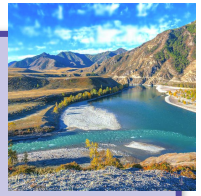
Work of Water: Anchor Layer Storyline

Mapping, Earth's Surface Features, & Erosion

2nd Grade | NGSS Earth & Space Science

Anchor Phenomenon: Strange River

Why do these rivers look so different from one another?



Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 **If you floated down a river, where would you end up?**		Students develop a model of the Earth's surface and use it to discover an important principle about how rivers work: rivers flow downhill, from high places to low places. **2-ESS2-2, 2-ESS2-3**	Do rivers carry anything other than water downhill? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** Even though the rivers look very different, they have a great deal in common. They both start in mountains, and they both flow out to the sea.	Is the Strange River brown all the way up at its source, or does it change color downstream?
LESSON 2 **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 how erosion takes place. **2-ESS2-2**	What happens to the land when water causes erosion? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** The water for both rivers starts the same color. Something must be changing the color of the Strange River farther downstream.	What is causing the Strange River to change color?
LESSON 3 **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-ESS1-1, 2-ESS2-1**	How can we stop erosion? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** The Strange River flows through an area with brown sand and rocks. When the sand and rocks erode into the river, it changes the river's color.	How can we stop erosion?
LESSON 4 **How can you stop a landslide?**		Students compare multiple solutions for preventing erosion. **2-ESS2-1, K-2-ETS1-1, K-2-ETS1-2, K-2-ETS1-3**		**Lesson 4 Anchor Connection:** All rivers can change color if enough sand and rocks erode into them. This is something that all rivers have in common.	What other rivers flow into the Missouri River?

Performance Task:

What is the shortest river?

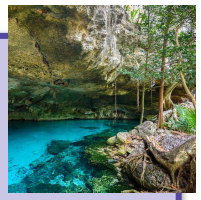
Animals Through Time: Anchor Layer Storyline

Fossil Evidence & Habitat Change

3rd Grade | NGSS Life Science

Anchor Phenomenon: Watery Cave

How can a water-filled cave contain animal footprints, ancient fire pits, and bear skeletons?



Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 **Where can you find whales in the desert?**		Students explore the idea that the rock under our feet sometimes contains fossils, and investigate how these fossils reveal changes in habitat through time. **3-LS4-1**	How do we know what extinct animals looked like? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** The cave was not always full of water. There was a time in the distant past when animals could have gone into and out of the cave without swimming.	Did the bones in the cave come from an animal that lived on land or in the water?
LESSON 2 **How do we know what dinosaurs looked like?**		Students learn how we can infer what the outside of an animal looked like by using clues about their skeleton. **3-LS4-1**	How do we know how extinct animals moved? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** The skull in the cave likely belonged to an animal that ate plants and other animals, and the animal likely had furry skin.	Were the shapes in the ground made by animals in the cave?
LESSON 3 **Can you outrun a dinosaur?**		Students learn how fossilized animal tracks can tell us a great deal about the animals that left them. **3-LS4-1**	How do modern animals change over time? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** The footprints were likely formed by an animal walking in the cave when it was wet but not full of water.	Did humans cause any of these things to end up in the cave?
LESSON 4 **What kinds of animals might there be in the future?**		Students learn how people create new breeds of animals by mating (selecting) individuals with desirable traits. **3-LS3-1, 3-LS4-2**		**Lesson 4 Anchor Connection:** Ancient humans are likely responsible for the fire pits in the cave. The rock under the burned wood was *also* burned, so the fires took place in specific spots in the cave.	Are people still changing the cave today? If so, how?

Performance Task:

How are you a part of the watery cave's story?

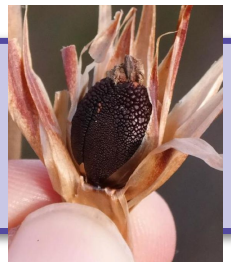
Power of Flowers: Anchor Layer Storyline

Plant Life Cycle & Heredity

3rd Grade | NGSS Life Science

Anchor Phenomenon:
Stinky Seeds

Who is burying the stinky seeds?



Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 **Why do plants grow flowers?**		Students model the structure and function of flower parts that are responsible for creating seeds. **3-LS1-1**	Why are some seeds found in fruit? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** Flowers are responsible for producing seeds. The silver arrow reed produces flowers at the tips of its stems that make the stinky seeds.	Do any animals like the stinky seeds?
LESSON 2 **Why do plants give us fruit?**		Students explore the function of fruits in plants and practice classification. **3-LS1-1**	Why are fruits different from each other? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** The seeds are actually a type of fruit, but the dung beetle can't eat them because the outer coating is so hard.	Why do the dung beetles collect the seeds if they can't eat them?
LESSON 3 **Why are some apples red and some green?**		Students explore how human beings have developed fruits with specific traits through selection. **3-LS3-1**	Can we create new types of fruit with new traits? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** Just like humans, dung beetles like foods with certain tastes and smells. The traits of the seeds confuse the beetles into thinking they are food.	What happens to the seeds that are buried?
LESSON 4 **How could you make the biggest fruit in the world?**		Students investigate how human beings have modified plants based on our knowledge of how plants change from generation to generation. **3-LS3-1**		**Lesson 4 Anchor Connection:** Burying the seeds helps new plants grow. If the beetles continue to choose the smelliest seeds and bury them, the new plants will produce seeds that are stinkier and stinkier.	Are the beetles and the stinky seeds good for each other?

Performance Task:
Stinky Life Cycles

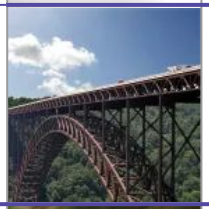
Invisible Forces: Anchor Layer Storyline

Forces and Interactions

3rd Grade | NGSS Physical Science

Anchor Phenomenon: Ice Board

How does an ice board work?

Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 **How could you win a tug-of-war against a bunch of adults?**		Students develop a mental model of the nature of forces and motion and use that model to explain the behavior of an elastic jumper. **3-PS2-1**	How can we design things that are strong enough to stand up to pushes and pulls? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** The person riding the ice board applies pushes and pulls to the ice board to work against the wind and make the board move.	How is the person riding the board able to keep holding it?
LESSON 2 **What makes bridges so strong?**		Students develop and design a bridge to be as strong as possible while working with limited materials. **3-PS2-1, 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3**	What happens when things slide past one another? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** Certain materials on the ice board help the person riding it to push or pull in certain ways to make it move.	How is the ice board able to move so fast?
LESSON 3 **How can you go faster down a slide?**		Students plan and carry out investigations of the behaviors of different materials as they slide past one another. **3-PS2-1, 3-PS2-2**	Is there anything that pushes or pulls on something else without touching it? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** For the ice board to work, it needs to have very high friction in some places, and very low friction in others.	Could the ice board be used to take a long trip?
LESSON 4 **What can magnets do?**		Students investigate the properties of magnets and the fact that they exert forces that act at a distance. **3-PS2-3, 3-PS2-4**	How are magnets used to do useful things? ***(Leads into Lesson 4)***	**Lesson 4 Anchor Connection:** Compasses are able to work because they rely on long-distance magnetic forces.	Could a compass be used on the ice board to know where you're going?
LESSON 5 **How can you unlock a door using a magnet?**		Students investigate magnetic attraction and repulsion, and design a magnetic lock in the hands-on activity. **3-PS2-3, 3-PS2-4, 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3**	→	**Lesson 5 Anchor Connection:** Designing a mount that will hold a compass in an easily visible spot will make navigation easier for the ice board rider.	How might an even more advanced ice board look that would be usable for longer voyages?

Performance Task:

Can we design a new ice board?

Stormy Skies: Anchor Layer Storyline

Weather and Climate

3rd Grade | NGSS Earth Science

Anchor Phenomenon:
Summer Ice Storm

How can icy hail fall from the sky when it's hot outside?

Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 **Where do clouds come from?**		Students obtain and combine information that water can change from liquid to gas, but that it is always made of tiny drops. Clouds are made of water that has evaporated. **Foundational for 3-ESS2-2**	How can we use clouds to predict the weather? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** High temperatures at ground level cause water to evaporate, but not disappear. Less water on the ground means more water in the air, and water in the air can form clouds.	How can clouds form ice during hot weather?
LESSON 2 **How can we predict when it's going to storm?**		Students make observations of clouds and develop a tool to make predictions about what kind of weather might happen next. **3-ESS2-2**	Why do some places always have such consistent weather? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** The tallest clouds produce hail. The tops of these clouds are extremely cold even when it is hot on the ground.	Is it always cold high up in the sky?
LESSON 3 **Why are some places always hot?**		Students obtain and combine information to describe the different climate regions of the world. **3-ESS2-1, 3-ESS2-2**	How can we reduce the impact of weather hazards, such as strong winds? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** The long term climate high in the air is very different than the climate down on the ground. On the ground you can have cold winters and hot summers; high in the air, it is always freezing cold.	How can we help people prevent damage from hailstorms?
LESSON 4 **How can you keep a house from blowing away in a windstorm?**		Students design and build solutions that reduce the hazards associated with strong winds that could damage buildings. **3-ESS3-1**		**Lesson 4 Anchor Connection:** Winds have a huge impact on weather around the world. They can change how clouds form and be hazardous to buildings that people use.	How can we use our knowledge of weather to help people be safe?

Performance Task:

Can we predict when it's going to hail?

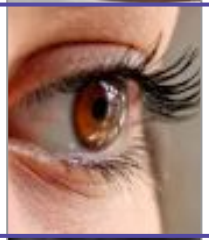
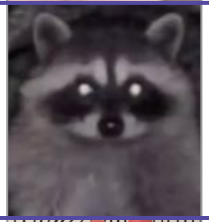
Human Machine: Anchor Layer Storyline

Human Body, Senses, & the Brain

4th Grade | NGSS Life Science

Anchor Phenomenon: Owl Ambush

How do the owl's body parts work as a system to sense and respond to its environment?

Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 **Why do our biceps bulge?**		Students construct a model of the human hand to explain how muscles pull on bones to create movement. **4-LS1-1**	How do eyes work? How do they help people see? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** Owls also have muscles that pull on their bones in their wings, talons, and jaw to create movement when they are hunting.	What other body parts help an owl fly toward prey and close its claws to catch the prey?
LESSON 2 **What do people who are blind see?**		Students develop a working model of an eye. They use the model to reason about how light reflects off an object and into the eye, helping an organism process information from the environment. **4-LS1-1, 4-LS1-2, 4-PS4-2**	How do some animals see in the dark? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** In the same way, light reflects off the mouse and into the owl's eye. This allows the owl to sense information from its environment.	What other ways do animals receive information?
LESSON 3 **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 more light in. **4-LS1-1, 4-LS1-2, 4-PS4-2**	After an animal receives and processes information, how does its body know what to do next? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** Students reason that an owl's pupil also gets larger in order to let more light in when it hunts at night.	What other body parts are part of the system that helps the owl catch its prey?
LESSON 4 **How does your brain control your body?**		Students investigate how their own brain works by testing their reflexes. They discover that the brain receives information from the senses, processes the information, and sends signals to the muscles to enable movement. **4-LS1-1, 4-LS1-2**	→	**Lesson 4 Anchor Connection:** This suggests that the owl's brain is the part of its body system that processes information received from the environment in order to control its muscles.	How do other animals' body parts work together to help them survive?

Performance Task:
Animals Systems Model

Birth of Rocks: Anchor Layer Storyline

Rock Cycle & Earth's Processes

4th Grade | NGSS Earth Science

Anchor Phenomenon:
Ashfall Fossil Beds

How did the animals die at the Ashfall Fossil Beds?
Why did it take people so long to discover them?

Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 **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-ESS1-1, 4-ESS2-2**	Do all volcanoes behave the same way? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** There were prehistoric volcanoes located in North America, but they are not near the Ashfall Fossil Beds site.	How could the volcanoes have killed the rhinos even if they are far away?
LESSON 2 **Why do some volcanoes explode?**		Students investigate the properties of thin and thick lava by attempting to create air bubbles. Students realize that thick lava will cause a volcano to explode, while thin lava will not. **4-ESS1-1**	How do mountains and volcanoes change shape? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** The volcanoes located closest to the Ashfall Fossil Beds site contained thick lava. Volcanoes containing thick lava create huge explosions and the ash could have made it all the way to Nebraska.	If ash fell on top of the rhinos, how did the bones end up so far underground, underneath other rocks?
LESSON 3 **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-ESS1-1, 4-ESS2-1**	Does land change quickly or slowly? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** Pieces of rock fall down nearby mountains and are smoothed as they tumble. Over time these rocks, along with sediments, were carried by a nearby river to the Ashfall Fossil Beds site, piling on top of the rhino fossils.	How did the rhino fossils become exposed after being buried for so long?
LESSON 4 **How could you survive a landslide?**		Students generate multiple possible solutions to protect homes from a landslide. Students realize that there are many causes for the erosion that causes rocks to fall in landslides. **4-ESS2-1, 4-ESS3-2**		**Lesson 4 Anchor Connection:** Years of heavy rain could have eroded the earth on the hillside of the farm, eventually exposing the rhino jaw fossil.	How can we figure out where a rock comes from based on where we found it?

Performance Task:
Story of a Rock

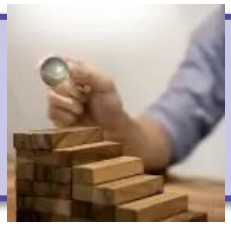
Energizing Everything: Anchor Layer Storyline

Energy, Motion, & Electricity — ***Page 1 of 2***

4th Grade | NGSS Physical Science

Anchor Phenomenon: Rube Goldberg Machine

What makes a chain reaction keep going?



Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 **How is your body similar to a car?**		Students learn about stored energy and about the relationship between motion and energy. Students build models of an amusement park ride and discover how energy can be stored in materials. Stored energy can be converted to speed. **4-PS3-1, 4-PS3-4**	How else can energy be stored? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** Throughout this Anchor Layer, students revisit a video of a complex chain reaction machine. In the first anchor connection, student realize that the chain reaction machine needs stored energy to keep going.	Where is energy stored in the chain reaction machine?
LESSON 2 **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 object collide. **4-PS3-1, 4-PS3-3**	How does the height of an object relate to the energy that's stored by that object? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** A chain reaction machine can use height to store energy. When an object rolls or falls or swings from a high place to a low place, its energy of motion comes from its height.	How is energy transferred from one step of the chain reaction machine to the next?
LESSON 3 **Why is the first hill of a roller coaster always the highest?**		Using a model roller coaster, students conduct an investigation to determine that a hill's height determines the amount of energy stored in a marble at the top of the hill. Students figure out that the greater the height of an object, the more energy it stores and the faster it will move when released or dropped. **4-PS3-3**	How else can energy be transferred from one object to another? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** Students gain a deeper understanding of how energy is transferred in collisions. They observe how the speed of a moving object affects the speed of the object it hits.	How can the chain reaction machine store enough energy to get through all the steps?
LESSON 4 **Could you knock down a building using only dominoes?**		Students experiment with ways to store and release energy, creating the beginning of a chain reaction machine with a lever and a ramp. Students figure out that a domino standing on end is storing energy, only requiring a small amount of energy (a tiny push) to release the stored energy. **4-PS3-4, 3-5-ETS1-1**	How can I use energy transfer to make a longer chain reaction machine? ***(Leads into Lesson 5)***	**Lesson 4 Anchor Connection:** Students realize that each step of a chain reaction machine involves triggering the release of stored energy in the next step.	How many different ways can a chain reaction machine store and transfer energy?

Energizing Everything: Anchor Layer Storyline

*Energy, Motion, & Electricity — **Part 2 of 2***

4th Grade | NGSS Physical Science

Anchor Phenomenon: Rube Goldberg Machine

What makes a Rube Goldberg machine go?

Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 5 **Can you build a chain reaction machine?**		Students continue to build a chain reaction machine — **identifying a goal, brainstorming and testing multiple ideas, and determining an optimal solution.** The chain reaction machine uses multiple components to transfer energy from one part to the next. **4-PS3-4, 3-5-ETS1-2, 3-5-ETS1-2, 3-5-ETS1-3**	Is electricity a form of energy? ***(Leads into Lesson 6)***	**Lesson 5 Anchor Connection:** Students consider how to add steps to an existing chain reaction machine, reasoning about how energy is stored and how that stored energy can be released.	Are there other forms of energy the chain reaction machine in the video could use?
LESSON 6 **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 converted to other forms of energy, such as movement, light, and heat. **4-PS3-2, 4-PS3-4**	What other forms of energy do we use in our everyday lives? ***(Leads into Lesson 7)***	**Lesson 6 Anchor Connection:** Students consider all the ways that the Rube Goldberg/chain reaction machine converts energy from one form to another, including electricity as a form of energy.	Can I build a Rube Goldberg/chain reaction machine that uses electricity?
LESSON 7 **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 turned into motion energy using a turbine. **4-PS3-2, 4-PS3-4**	Where can we get the energy we need without creating pollution? ***(Leads into Lesson 8)***	***Bonus Lesson not included in Anchor Layer***	**Performance Task:** *Build a chain reaction machine that turns on a flashlight.*
LESSON 8 **Where does energy come from?**		Students evaluate the advantages and disadvantages of wind, water, and solar energy to power a town. Students obtain and evaluate information about the needs of each source of energy and analyze and interpret data about the town's resources. **4-ESS3-1**		***Bonus Lesson not included in Anchor Layer***	

Waves of Sound: Anchor Layer Storyline

Sound, Waves, & Communication

4th Grade | NGSS Physical Science

Anchor Phenomenon:
Cymatics Music Video

How did the patterns on the devices change to make sound waves visible?

Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 **How far can a whisper travel?**		Students investigate sound using paper cup telephones. Students figure out that sound is a vibration that can travel through a medium. **4-PS4-1, 4-PS4-3**	How do sound vibrations travel if we can't see the medium it's traveling through? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** The sound vibrates the metal plate and changes the pattern as the sound changes. The plate is vibrating the most where there is less powder and vibrating the least in places where the powder is collecting.	Do sound vibrations also travel through liquids?
LESSON 2 **What would happen if you screamed in outer space?**		Students construct a model of sound vibrations to explain how air is a medium that sound vibrations travel through. **4-PS4-1**	Do high and low sounds vibrate the same way? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** The sound vibrations travel through water from the edge of the dish towards the center; in the same way the vibrations travel through air.	Why do some mediums show sound vibrations better than others?
LESSON 3 **Why are some sounds high and some sounds low?**		Students make observations of vibrations and sound waves to discover that high pitch sounds vibrate faster and have short wavelengths and low pitch sounds vibrate slower and have long wavelengths. **4-PS4-1**		**Lesson 3 Anchor Connection:** The pattern of flames on the Ruben's Tube changes when the pitch of the sound changes. The pattern of flames shows the wavelength of the sounds made.	Is it easier to 'see' high pitch or low pitch sounds?

Performance Task:
Sound Wave Watcher

Watery Planet: Anchor Layer Storyline

Water Cycle & Earth's Systems

5th Grade | NGSS Earth Science

Anchor Phenomenon: Dust Bowl

How did interactions between land, air, water, and living things cause the Dust Bowl?

Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 **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 and accessible. **5-ESS2-2**	If there aren't bodies of freshwater nearby, where does the water come from to support life & human activity (farming, bathing, etc.)? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** The region where the Dust Bowl happened did not have large bodies of freshwater nor did it have significant rainfall.	How did a lack of fresh water and rain contribute to the Dust Bowl?
LESSON 2 **When you turn on the faucet, where does the water come from?**		Students learn that most people get their fresh water from underground sources. Students determine the best place to settle a new town by considering features of the landscape and the characteristics of the plants that thrive there. **5-ESS2-2, 5-ESS3-1**	Where does the water come from to fill/refill aquifers? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** Plants with deep roots can access underground water sources. In the Dust Bowl region, the native grasses had deep roots.	Why are some plants better suited for certain environments than others?
LESSON 3 **Can we make it rain?**		Students create a model of the ocean and sky to investigate how temperature influences evaporation and condensation. Students figure out that higher ocean temperatures lead to more evaporation, thus leading to more rain. **5-ESS2-1**	How do ocean temperatures affect the amount of rainfall in an area? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** Students reason that a severe drought led to dry soil and dying plants. Without the plants' roots, there was nothing to hold the soil in place.	How does the amount of rainfall in an area impact the soil of that area?
LESSON 4 **How can you save a town from a hurricane?**		Students define the problem that a town needs protection from flooding. They design solutions within a budget using different types of flood protection. Students realize that flooding is caused by severe rainfall generated by hurricanes. Hurricanes are created where ocean temperatures are warm. **5-ESS2-1, 3-5-ETS1, 3-5-ETS2, 3-5-ETS3**		**Lesson 4 Anchor Connection:** This investigation suggests that changes in ocean temperatures impact rainfall patterns. When the ocean temperatures cool, rainfall can decrease, causing droughts.	What interaction between air, water, land, and living things do you think had the biggest contribution to causing the Dust Bowl?

Performance Task:

Drought Protection Kits

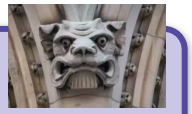
Chemical Magic Anchor Layer Storyline

Chemical Reactions & Properties of Matter

5th Grade | NGSS Physical Science

Anchor Phenomenon: Gargoyles

What causes stone gargoyles to disappear over time?



Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 **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-PS1-1, 5-PS1-2**	What happens to substances when they seem to change and disappear? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** Another substance may have caused the gargoyles to disappear over time.	What type of substance could cause the pieces of the gargoyles to disappear over time?
LESSON 2 **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-PS1-1, 5-PS1-2**	Why was the vinegar so good at changing substances? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** The stone from the gargoyles could have been dissolved by another substance.	If another substance changed the gargoyles, what happened to the pieces that "disappeared"?
LESSON 3 **What would happen if you drank a glass of acid?**		Students figure out that acids are very reactive substances. Students investigate reactions between different substances to determine how known acids react with other materials. **5-PS1-1**	Besides acids, will all substances react with each other to create new substances? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** Findings from this investigation suggest that an acid (acid rain) could have reacted with the gargoyle stone.	What effects could acid rain have on a stone gargoyle when they come in contact with one another?
LESSON 4 **What do fireworks, rubber, and silly putty have in common?**		Students combine different substances together to discover that chemical reactions can create new substances. **5-PS1-4**	How can we tell if the new substance created by a chemical reaction is a gas? ***(Leads into Lesson 5)***	**Lesson 4 Anchor Connection:** Evidence suggests that the acid rain and stone (calcium carbonate) can react to create new substances.	What evidence can we see to know if a chemical reaction takes place between acid rain and a stone gargoyle?
LESSON 5 **Why do some things explode?**		Students investigate and model the reaction between baking soda and vinegar. They figure out that gases are made of particles too small to be seen. **5-PS1-1**	→	**Lesson 5 Anchor Connection:** This experiment suggests that one of the substances created in the reaction between acid rain and stone (calcium carbonate) was a gas that expanded into the atmosphere.	If parts of the gargoyle didn't "disappear," where did any new substances created from a chemical reaction between acid rain and the stone go?

Performance Task:
Final Alchemist Argument

Spaceship Earth: Anchor Layer Storyline

Sun, Moon, Stars, & Planets — ***Page 1 of 2***

5th Grade | NGSS Space Science

Anchor Phenomenon: Star Trails

How can you use patterns in the movement of the Sun, Moon, and stars to tell time?

Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 **Why does the Sun rise and set?**		Students model the rotation of the Earth and investigate why the Sun looks like it's moving across the sky. Using evidence they gathered in the investigation, students build a model that explains how the Earth's rotation around its own axis causes the Sun to appear to rise and set. **5-ESS1-2**	Can the Sun's position in the sky help us tell the time of day? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** The Earth is rotating, and that rotation is what causes the Sun to appear to move in the sky. The Sun doesn't move—we do!	Why do the stars appear to move in the same pattern as the Sun?
LESSON 2 **Who set the first clock?**		Students make a shadow clock (sundial) and investigate how the direction and length of shadows change with the position of the light shining on the sundial. Students realize that the Sun's position in the sky can be used to tell the time of day. **5-ESS1-2**	Is the Sun always overhead at noon? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** Just like the Sun, the stars appear to rise in the east and set in the west due to the Earth's rotation. The stars don't move—we do!	Do the stars always appear to move the same way the Sun does?
LESSON 3 **How can the Sun tell you the season?**		Students examine photos taken at different times of year and figure out the time of year that each photo was taken. Students discover that the Sun's path changes with the seasons, as does the time of sunrise and sunset. The Sun is always highest in the sky at noon, but that height changes with the season. **5-ESS1-2**	Does anything else in the sky change with the seasons? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** During the Summer, the length of time that the Sun is visible each *day* is longer and the length of time the stars are visible each *night* is shorter. The opposite is true in the winter.	Do the stars change from season to season? If so, why? If not, why not?
LESSON 4 **Why do the stars change with the season?**		Students build a model of the universe and use it to explain why different stars are visible at different times of year. Using evidence from this model, students make an argument that supports the claim that the Earth orbits the Sun. **5-ESS1-2**	The Moon looks different on different nights. Is there a pattern to the Moon's changes? ***(Leads into Lesson 5)***	**Lesson 4 Anchor Connection:** While many stars do change from season to season, the stars near the North Star don't. This is because the North Pole is aimed very close to the North Star, and this part of the night sky is visible throughout the year.	Is there anything else in the sky that we can use to tell time? What about the Moon?

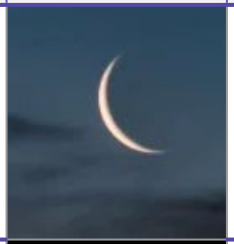
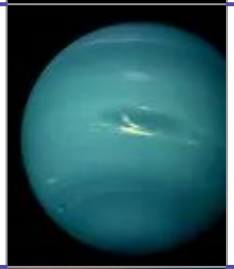
Spaceship Earth: Anchor Layer Storyline

Sun, Moon, Stars, & Planets — ***Page 2 of 2***

5th Grade | NGSS Space Science

Anchor Phenomenon: Star Trails

How can you use patterns in the movement of the Sun, Moon, and stars to tell time?

Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 5 **How does the Moon change shape?**		Students use a physical model of the Sun and Moon to investigate how the Moon's phase relates to its position relative to the Sun. Students notice that the Moon's phases repeat in a predictable pattern. **5-ESS1-2**	What other patterns can I see in the night sky? *(Leads into Lesson 6)*	**Lesson 5 Anchor Connection:** The full Moon rises at sunset and sets at sunrise. Just as the Sun is always highest in the sky in the middle of the day, the Moon is always highest in the sky in the middle of the night.	We've talked about the Sun, the Moon, and the stars. Can I see other planets in the sky?
LESSON 6 **What are the wandering stars?**		Students learn that planets look like stars, but don't move like them. The apparent movement of planets is caused by both the Earth's spin and the planets' movement around the Sun. Students use a model of the solar system to learn the order of the planets and their relative distance from the sun, and each other. **5-ESS1-2**	How are the other planets different from Earth? *(Leads into Lesson 7)*	**Lesson 6 Anchor Connection:** Some planets orbit the Sun in less time than it takes the Earth; some take more time. The length of a year is different on different planets.	What else is different about keeping track of time on other planets?
LESSON 7 **Why is gravity different on other planets?**		Using mathematics and computational thinking, students calculate how high they could jump on planets and moons that have stronger or weaker gravity than Earth. Students analyze and interpret this data to construct an explanation for why the amount of gravity is different on other planets. **5-PS2-1**	Could people live on another planet? What would that planet have to be like to support humans? *(Leads into Lesson 8)*	**Lesson 7 Anchor Connection:** Students realize how different it is on other planets, laying the foundation for understanding that basic units of time are determined by where we are—on a spinning planet orbiting a star we call the Sun.	How could we use patterns in the sky to keep track of the time of day or night on another planet?
LESSON 8 **Could there be life on other planets?**		Students discover that the Earth is in the "Goldilocks Zone" — a distance from the Sun with the right amount of light and heat for life to exist. Students evaluate other solar systems, comparing their stars to our Sun. Based on their analysis, students plan a space mission to a planet with conditions similar to those on Earth. **5-ESS1-1**		**Lesson 8 Anchor Connection:** Students realize that our units of time are based on astronomy — the patterns we observe in the sky. The length of a day and a year depend on the planet where you live.	Using what I know about patterns in the sky, how can I make a clock that will tell the time with what I can see in the night sky?

Performance Task:
Invent a Night-Sky Clock

Web of Life: Anchor Layer Storyline

Ecosystems and the Food Web — ***Page 1 of 2***

5th Grade | NGSS Life Science

Anchor Phenomenon:
Biosphere 2

What combination of organisms can sustain an ecosystem on Mars?

Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 1 **Why would a hawk move to New York City?**		Students construct models of food chains by linking cards discovering different interrelationships exist between organisms. **5-LS2-1**	What do the plants need to eat? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** All living things need a food source in order to grow, and are all part of a food chain.	Does every living thing in my ecosystem have something to eat?
LESSON 2 **What do plants eat?**		Students conduct an investigation and interpret data and figure out that water and air account for a plant's weight. **5-LS1-1, 5-LS2-1**	What happens to plants when they die? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** All living things in a food chain can trace their energy source backwards to plants.	What would happen to my ecosystem if the plants don't have what they need?
LESSON 3 **Where do fallen leaves go?**		Students conduct an investigation to test how mold grows under different conditions to decompose food. Students realize that decomposers, like mold, break down and consume dead plant material. **5-LS2-1**	Is mold the only decomposer? What other kinds of decomposers are there? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** Decomposers play an important role in the ecosystem and can always be found in a healthy ecosystem.	How could we get rid of dead plants and animals inside the Biosphere?

Web of Life: Anchor Layer Storyline

Ecosystems and the Food Web — ***Page 2 of 2***

5th Grade | NGSS Life Science

Anchor Phenomenon:
Biosphere 2

What combination of organisms can sustain an ecosystem on Mars?

Learning Sequence	Investigative Phenomena	What Students Figure Out in this Lesson	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
LESSON 4 **Do worms really eat dirt?**		Students make observations of worms to realize that worms act as decomposers to eat dead matter in an ecosystem and cycle nutrients into the soil. **5-LS2-1**	Is it possible to have too many nutrients in an ecosystem? ***(Leads into Lesson 5)***	**Lesson 4 Anchor Connection:** Worms help an ecosystem by recycling nutrients back into the soil.	How would adding worms to the Biosphere affect the ecosystem?
LESSON 5 **Why do you have to clean a fish tank but not a pond?**		Students develop a model of a pond ecosystem and realize that interrelationships exist between decomposers, plants, and animals. Students discover that each organism must be in balance for the pond ecosystem to function. **5-LS2-1**	What would happen if we removed one piece of an ecosystem? ***(Leads into Lesson 6)***	**Lesson 5 Anchor Connection:** Ecosystems can become toxic if there is too much carbon dioxide and not enough plants or decomposers to recycle it.	Which is more similar to a Biosphere: a pond or a fish tank? Why?
LESSON 6 **Why did the dinosaurs go extinct?**		Students develop a model of a dinosaur food web. Students realize that blocking the sun's energy would have disastrous effects on the organisms that rely on this energy in the food web and cause the extinction of some entire species. **5-PS3-1**		**Lesson 6 Anchor Connection:** Energy from the sun is the original energy source for entire ecosystems.	What could cause the Biosphere ecosystem to collapse?

Performance Task:
Ecosystem Model & Argument

Additional storylines in development.

Turn on “Anchor Layer” in your account settings to access Anchor Storylines for all 3rd-5th grade units. New storylines are being released for 2nd grade units in the 2020-21 school year.