

## 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.


mystery science Storylines

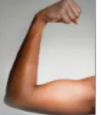



For more NGSS storylines visit  
www.mysteryscience.com/storylines

### 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...
<b>LESSON 1</b> Why do our biceps bulge?		Students construct a model of the human hand to explain how <u>muscles pull on bones to create movement</u> . 4-LS1-1	How do eyes work? How do they help people see? (Leads into Lesson 2)	<b>Lesson 1 Anchor Connection:</b> 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 do owls use to catch their prey?
<b>LESSON 2</b> What do people who are blind see?		Students develop a working model of an eye. They use the model to reason about how <u>light reflects off an object and into the eye, helping an organism process information from the environment</u> . 4-LS1-1, 4-LS1-2, 4-PS4-2	How do some animals see in the dark? (Leads into Lesson 3)	<b>Lesson 2 Anchor Connection:</b> 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?
<b>LESSON 3</b> dark?		Students use their eye model to discover <u>the pupil controls the amount of light let into the eye. In the dark, pupils get larger to let more light in</u> . 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)	<b>Lesson 3 Anchor Connection:</b> 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?
<b>LESSON 4</b> How does your brain control your body?		Students investigate how their own brain works by testing their reflexes. They discover that <u>the brain receives information from the senses, processes the information, and sends signals to the muscles to enable movement</u> . 4-LS1-1, 4-LS1-2		<b>Lesson 4 Anchor Connection:</b> 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:**  
Animal and Plant System Models

**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.

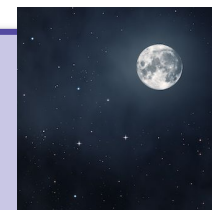
# Moon & Stars: Anchor Layer Storyline

## Night Sky Patterns

1st Grade | NGSS Earth &amp; Space Science

### Anchor Phenomenon: Moon Mysteries

Why does the Moon look so different in different pictures?



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...
<b>LESSON 1</b>  When can you see the full moon?		Students <u>observe and describe the change in the apparent shape of the Moon over time, and use those observations to identify patterns and predict the appearance of the Moon in the future.</u> 1-ESS1-1	Why do we only see stars at night? <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> Photos of the Moon can help us track how the shape of the Moon changes over time. Those same photos can tell us if the photo was taken during the day or the night.	Why can we see the Moon at night and during the day?
<b>LESSON 2</b>  Why do the stars come out at night?		Students <u>use a model to investigate and explain why stars seem to disappear as soon as the Sun comes out each day.</u> 1-ESS1-1	Can stars help us if we don't know where to go at night? <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> Stars are only visible at night because they aren't bright enough to be seen during the day. The Moon is bright enough to be seen during both the night and the day.	Do some stars stay in the same place instead of moving like the Moon does?
<b>LESSON 3</b>  How can stars help you if you get lost?		Students <u>observe how the location of certain stars in the sky can be used to determine the direction they are facing.</u> 1-ESS1-1		<b>Lesson 3 Anchor Connection:</b> The Sun changes what we can see in the sky. This happens in a predictable pattern.	Do we know when we can see the Sun, Moon, and stars?

### Performance Task:

When can we see the Sun, Moon, and stars?

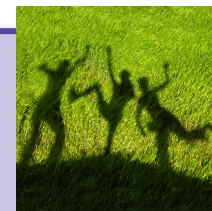
# Spinning Sky: Anchor Layer Storyline

*Sun, Shadows, & Daily Patterns*

1st Grade | NGSS Earth & Space Science

## Anchor Phenomenon: Shadow Secrets

Why do shadows change so much over the course of every day?



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...
<b>LESSON 1</b>  <b>Could a statue's shadow move?</b>		Students <u>observe and describe patterns in the motion of lights and shadows.</u> 1-ESS1-1	How does the Sun make shadows change? <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> Shadows can move when the object making the shadow moves, or when the light source moves. The Sun appears to continually move across the sky every day.	Does the Sun always move in the same ways?
<b>LESSON 2</b>  <b>What does your shadow do when you're not looking?</b>		Students read along with a text <u>to observe and describe the patterns of the apparent movement of the Sun over the course of a day.</u> 1-ESS1-1	In which directions does the Sun move? <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> The height of the Sun in the sky affects the length of shadows. As the Sun rises throughout the morning, shadows get shorter. As the Sun lowers in the afternoon, shadows get longer.	Does the Sun always rise and set in the same directions?
<b>LESSON 3</b>  <b>How can the Sun help you if you're lost?</b>		Students <u>construct a device that models the motion of the Sun and use it to determine direction.</u> 1-ESS1-1	Does the Sun always move the same way every day? <i>(Leads into Lesson 4)</i>	<b>Lesson 3 Anchor Connection:</b> The Sun moves higher when it is in the east, and lower when it is in the west. This means we can determine direction based on which way the Sun and shadows are moving.	Where is the Sun during different times of day?
<b>LESSON 4</b>  <b>Why do you have to go to bed early in the summer?</b>		Students read along with a text <u>to gather observations that are used as evidence to describe patterns in the amount of daylight over the course of a year.</u> 1-ESS1-2		<b>Lesson 4 Anchor Connection:</b> Days get longer and shorter throughout the year, but the Sun is in consistent directions at different times of day. This means we can use the location of the Sun to tell the time of day.	Can we predict how things in the sky will move?

### Performance Task:

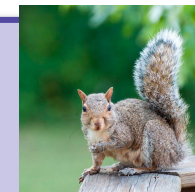
*Where will the Sun be tomorrow?*

# Animal Superpowers: Anchor Layer Storyline

1st Grade | NGSS Life Science

## Anchor Phenomenon: Squirrel Secrets

How do so many different kinds of squirrels live in so many different kinds of places?



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...
<b>LESSON 1</b> How can you help a lost baby animal find its parents?		Students <u>gather observations of the traits of baby animals in order to describe that young animals are similar to their parents.</u> 1-LS3-1	How do animals help their babies? (Leads into Lesson 2)	<b>Lesson 1 Anchor Connection:</b> Parent animals pass their traits to their young. This is true for birds and squirrels.	How do squirrel traits help them survive?
<b>LESSON 2</b> Why do birds have beaks?		Students carry out an investigation to determine the relationship between the <u>structure and function of different types of animal mouths.</u> 1-LS1-1	Do baby birds have the same kind of beak as their parents? (Leads into Lesson 3)	<b>Lesson 2 Anchor Connection:</b> Birds are not the only animals with specialized mouths. Squirrels have special mouths that help them carry food and save it for later.	How do squirrels help their babies stay safe?
<b>LESSON 3</b> Why do baby ducks follow their mother?		Students read along with a text <u>to determine patterns in behavior of parents and offspring that help offspring survive.</u> 1-LS1-2	How do animals hide and stay safe? (Leads into Lesson 4)	<b>Lesson 3 Anchor Connection:</b> While young squirrels can walk and climb, mother squirrels can carry their babies in their mouths in order to move them quickly to safety.	How do squirrels stay safe from other animals?
<b>LESSON 4</b> Why are polar bears white?		Students <u>make observations to construct an explanation of why camouflage is helpful to animals.</u> 1-LS1-1	Why do baby animals look like their parents? (Leads into Lesson 5)	<b>Lesson 4 Anchor Connection:</b> Squirrels are camouflaged in many different environments. This helps them stay safe.	Are baby squirrels camouflaged like their parents?
<b>LESSON 5</b> Why do family members look alike?		Students read along with a text <u>to make observations that young animals are like, but not exactly like, their parents.</u> 1-LS3-1		<b>Lesson 5 Anchor Connection:</b> Young animals look similar to their parents. However, they don't just look similar—they also act similarly.	How do animals take care of their babies?

### Performance Task:

How do animals take care of their babies?



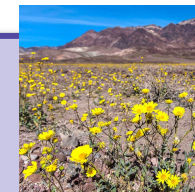
# Plant Adventures: Anchor Layer Storyline

*Plant Growth and Habitats*

2nd Grade | NGSS Life Science

## Anchor Phenomenon: Superbloom

How can fields of flowers grow in such a harsh place?



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...
<b>LESSON 1</b>  How did a tree travel halfway around the world?		Students observe how <u>different types of plants produce different types of seeds</u> in the process of reproduction. 2-LS2-2	What do seeds and plants need to grow? <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> The flowers don't come out of nowhere—they grow from seeds. The seeds for each superbloom come from the previous superbloom.	Why do the seeds sit for so long without growing?
<b>LESSON 2</b>  Could a plant survive without light?		Students <u>conduct an investigation to determine that plants need water and light to grow</u> . 2-LS2-1	How do different plants get the light and water they need? <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> Seeds begin growing when they are exposed to enough water. It is very, very rare for it to rain enough in Death Valley for a superbloom.	What else do the plants need to be able to grow?
<b>LESSON 3</b>  Why do trees grow so tall?		Students <u>observe that plants require light</u> in order to fully grow and be healthy. 2-LS2-1	Why do different plants grow in different places? <i>(Leads into Lesson 4)</i>	<b>Lesson 3 Anchor Connection:</b> The plants also require sunlight to grow and be healthy. Fortunately, Death Valley has an abundance of sunlight.	Why do the flowers eventually dry up and disappear?
<b>LESSON 4</b>  Should you water a cactus?		Students <u>observe that different plants require different amounts of light and water</u> . 2-LS2-1		<b>Lesson 4 Anchor Connection:</b> The flowers eventually dry up from too much sunlight and not enough water. Their seeds are left behind, though, waiting for the next time the rains come.	What other living things need water in Death Valley?

## Performance Task:

*Water and Life in Dry Death Valley*

# Material Magic Anchor Layer Storyline

## Properties & Phases of Matter

2nd Grade | NGSS Physical Science

### Anchor Phenomenon: Melting Metal

What can people wear in order to stay safe in a foundry?



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...
<b>LESSON 1</b>  <b>Why do we wear clothes?</b>		Students <u>investigate the different properties of matter and use those properties to design and build</u> a hat that protects them from the Sun. <b>2-PS1-1, 2-PS1-2, K-2-ETS1-1/2/3</b>	How else can materials keep us safe?  <i>(Leads into Mystery 2)</i>	<b>Mystery 1 Anchor Connection:</b> When designing protective clothing, sometimes rigid materials are needed, such as in the hard hat. Other times, flexible materials are needed.	What other properties do different types of protective clothing need to have?
<b>LESSON 2</b>  <b>Can you really fry an egg on a hot sidewalk?</b>		Students <u>conduct an investigation of different materials in order to determine which are best suited</u> for allowing people to handle hot items. <b>2-PS1-1, 2-PS1-2</b>	How are different materials affected by heat?  <i>(Leads into Mystery 3)</i>	<b>Mystery 2 Anchor Connection:</b> Heat is the biggest danger in a foundry, so all of the protective clothing must be insulating.	Can protective clothing melt?
<b>LESSON 3</b>  <b>Why are so many toys made out of plastic?</b>		Student <u>conduct an investigation of different materials in order to determine</u> which are most and least easily melted. <b>2-PS1-1, 2-PS1-2, 2-PS1-4</b>	How might we use new materials that are invented?  <i>(Leads into Mystery 4)</i>	<b>Mystery 3 Anchor Connection:</b> People in foundries wear helmets and face shields made of plastic, just like many toys. They have to stay back from the heat.	How do the people working in foundries see what they are doing while their face is covered?
<b>LESSON 4</b>  <b>What materials might be invented in the future?</b>		Students <u>design a new invention that takes advantage of the unique properties</u> of a futuristic material. <b>2-PS1-1, 2-PS1-2, K-2-ETS1-1, K-2-ETS1-2</b>	Instead of inventing new materials, how can we use existing materials in new ways?  <i>(Leads into Mystery 5)</i>	<b>Mystery 4 Anchor Connection:</b> Face shields and safety glasses are made with a type of plastic that is transparent but impact-resistant.	How do people make things out of metal in foundries?
<b>LESSON 5</b>  <b>Could you build a house out of paper?</b>		Students <u>construct an evidence-based account</u> of how a structure built of paper can be disassembled and rebuilt in new ways. <b>2-PS1-3</b>	How else can we build things?  <i>(Leads into Mystery 6)</i>	<b>Mystery 5 Anchor Connection:</b> Foundries can recycle metals into raw materials that can be used to make new objects.	Can foundries recycle things other than paper?
<b>LESSON 6</b>  <b>How do you build a city out of mud?</b>		Students <u>investigate the properties of soils, and use their observations as evidence to classify</u> different types of soils. <b>2-PS1-1, 2-PS1-2</b>		<b>Mystery 6 Anchor Connection:</b> People have to wear safety clothing in some situations and because of the properties of the materials they work with.	

### Performance Task:

How do we recycle metal?

# 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...
<b>LESSON 1</b>  How many different kinds of animals are there?		Students examine how scientists <a href="#">organize animals into groups based on their characteristics</a> . 2-LS4-1	Why do different animals live in different places?  <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> 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.	Do the animals in the cave always stay in the cave, or do they go to other places?
<b>LESSON 2</b>  Why would a wild animal visit a playground?		Students <a href="#">record observations of the diversity of life and physical characteristics</a> of two locations. Students then <a href="#">explain how the living and non-living parts of a habitat support the animals that live there</a> . 2-LS4-1	How can we identify types of animals in different habitats?  <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> While the bighorn sheep go somewhere	What type of small mammal lives in the cave?
<b>LESSON 3</b>  Why do frogs say "ribbit"?		Students identify frogs based on their unique calls and use that information to <a href="#">determine the level of biodiversity within multiple habitats</a> . 2-LS4-1	How can we help animals?  <i>(Leads into Lesson 4)</i>	<b>Lesson 3 Anchor Connection:</b> A huge colony of Mexican Free-Tailed Bats lives in the cave.	Where do the bats live in the cave?
<b>LESSON 4</b>  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 <a href="#">design and build a prototype bird feeder that attracts a specific type of bird</a> . 2-LS4-1, K-2-ETS1-1, K-2-ETS1-2, K-2-ETS1-3		<b>Lesson 4 Anchor Connection:</b> The bats hang from the ceiling when they are inside of the cave.	What else lives nearby?

### 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...
<b>LESSON 1</b>  <b>If you floated down a river, where would you end up?</b>		Students develop a model of the Earth's surface and use it to discover an important principle about how rivers work: <a href="#">rivers flow downhill, from high places to low places</a> . 2-ESS2-2, 2-ESS2-3	Do rivers carry anything other than water downhill? (Leads into Lesson 2)	<b>Lesson 1 Anchor Connection:</b> 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?
<b>LESSON 2</b>  <b>Why is there sand at the beach?</b>		Students investigate the effects of rocks tumbling in a river. Based on their observations, they construct an explanation for <a href="#">how erosion takes place</a> . 2-ESS2-2	What happens to the land when water causes erosion? (Leads into Lesson 3)	<b>Lesson 2 Anchor Connection:</b> 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?
<b>LESSON 3</b>  <b>What's strong enough to make a canyon?</b>		Students create a model landform and investigate <a href="#">how some Earth events can occur quickly, while others occur slowly</a> . 2-ESS1-1, 2-ESS2-1	How can we stop erosion? (Leads into Lesson 4)	<b>Lesson 3 Anchor Connection:</b> 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?
<b>LESSON 4</b>  <b>How can you stop a landslide?</b>		Students <a href="#">compare multiple solutions for preventing erosion</a> . 2-ESS2-1, K-2-ETS1-1, K-2-ETS1-2, K-2-ETS1-3		<b>Lesson 4 Anchor Connection:</b> 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...
<b>LESSON 1</b>  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 <a href="#">fossils reveal changes in habitat through time</a> . 3-LS4-1	How do we know what extinct animals looked like? <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> 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?
<b>LESSON 2</b>  How do we know what dinosaurs looked like?		Students learn how <a href="#">we can infer what the outside of an animal looked like by using clues about their skeleton</a> . 3-LS4-1	How do we know how extinct animals moved? <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> 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?
<b>LESSON 3</b>  Can you outrun a dinosaur?		Students learn how <a href="#">fossilized animal tracks can tell us a great deal about the animals that left them</a> . 3-LS4-1	How do modern animals change over time? <i>(Leads into Lesson 4)</i>	<b>Lesson 3 Anchor Connection:</b> 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?
<b>LESSON 4</b>  What kinds of animals might there be in the future?		Students learn how <a href="#">people create new breeds of animals</a> by mating (selecting) individuals with desirable traits. 3-LS3-1, 3-LS4-2		<b>Lesson 4 Anchor Connection:</b> Ancient humans are likely responsible for the fire pits in the cave. The rock under the burned wood was <i>also</i> 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?

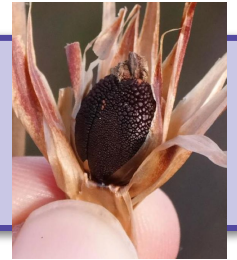
# Power of Flowers: Anchor Layer Storyline

*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...
<b>LESSON 1</b>  Why do plants grow flowers?		Students <a href="#">model the structure and function of flower parts that are responsible for creating seeds.</a> 3-LS1-1	Why are some seeds found in fruit? <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> 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?
<b>LESSON 2</b>  Why do plants give us fruit?		Students <a href="#">explore the function of fruits in plants and practice classification.</a> 3-LS1-1	Why are fruits different from each other? <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> 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?
<b>LESSON 3</b>  Why are some apples red and some green?		Students <a href="#">explore how human beings have developed fruits with specific traits through selection.</a> 3-LS3-1	Can we create new types of fruit with new traits? <i>(Leads into Lesson 4)</i>	<b>Lesson 3 Anchor Connection:</b> 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?
<b>LESSON 4</b>  How could you make the biggest fruit in the world?		Students <a href="#">investigate how human beings have modified plants based on our knowledge of how plants change from generation to generation.</a> 3-LS3-1		<b>Lesson 4 Anchor Connection:</b> 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...
<b>LESSON 1</b>  How could you win a tug-of-war against a bunch of adults?		Students <a href="#">develop a mental model of the nature of forces and motion and use that model to explain the behavior of an elastic jumper.</a> 3-PS2-1	How can we design things that are strong enough to stand up to pushes and pulls? <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> 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?
<b>LESSON 2</b>  What makes bridges so strong?		Students <a href="#">develop and design a bridge to be as strong as possible while working with limited materials.</a> 3-PS2-1, 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3	What happens when things slide past one another? <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> 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?
<b>LESSON 3</b>  How can you go faster down a slide?		Students <a href="#">plan and carry out investigations of the behaviors of different materials as they slide past one another.</a> 3-PS2-1, 3-PS2-2	Is there anything that pushes or pulls on something else without touching it? <i>(Leads into Lesson 4)</i>	<b>Lesson 3 Anchor Connection:</b> 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?
<b>LESSON 4</b>  What can magnets do?		Students <a href="#">investigate the properties of magnets and the fact that they exert forces that act at a distance.</a> 3-PS2-3, 3-PS2-4	How are magnets used to do useful things? <i>(Leads into Lesson 4)</i>	<b>Lesson 4 Anchor Connection:</b> 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?
<b>LESSON 5</b>  How can you unlock a door using a magnet?		Students <a href="#">investigate magnetic attraction and repulsion, and design a magnetic lock in the hands-on activity.</a> 3-PS2-3, 3-PS2-4, 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3		<b>Lesson 5 Anchor Connection:</b> 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?

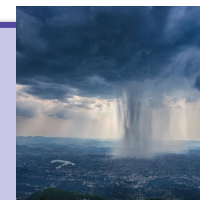
# Stormy Skies: Anchor Layer Storyline






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...
<b>LESSON 1</b>  Where do clouds come from?		Students obtain and combine information that <u>water can change from liquid to gas, but that it is always made of tiny drops. Clouds are made of water that has evaporated.</u> Foundational for 3-ESS2-2	How can we use clouds to predict short-term weather? <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> High temperatures at ground level cause water to evaporate. Less water on the ground means more water in the air which can form clouds.	How can clouds form ice during hot weather?
<b>LESSON 2</b>  How can we predict when it's going to storm?		Students make observations of clouds and <u>develop a tool to make predictions about what kind of short-term weather to expect.</u> 3-ESS2-2	Do we know what the weather will be like in the future? <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> The tallest clouds produce hail. The tops of these clouds are extremely cold even when it is hot on the ground.	How cold does it have to be for water to freeze into ice?
<b>LESSON 3</b>  Where's the best place to build a snow fort?		Students <u>analyze weather data from multiple locations in order to make long-term forecasts of weather conditions.</u> 3-ESS2-2	Why do some places always have the same weather? <i>(Leads into Lesson 4)</i>	<b>Lesson 3 Anchor Connection:</b> 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?
<b>LESSON 4</b>  Why are some places always hot?		Students <u>obtain and combine information to describe the different climate regions of the world.</u> 3-ESS2-1, 3-ESS2-2	How can we reduce the impact of weather hazards, such as strong winds? <i>(Leads into Lesson 5)</i>	<b>Lesson 4 Anchor Connection:</b> The long term climate high in the air is very different than the climate on the ground. On the ground it can be hot or cold; but, high in the air, it is always freezing cold.	How can we help people prevent damage from hailstorms?
<b>LESSON 5</b>  How can you keep a house from blowing away in a windstorm?		Students <u>design and build solutions that reduce the hazards associated with strong winds that could damage buildings.</u> 3-ESS3-1		<b>Lesson 4 Anchor Connection:</b> Winds have a huge impact on weather around the world. They can 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...
<b>LESSON 1</b>  <b>Why do our biceps bulge?</b>		Students construct a model of the human hand to explain how <u>muscles pull on bones to create movement.</u> 4-LS1-1	How do eyes work? How do they help people see? <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> 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?
<b>LESSON 2</b>  <b>What do people who are blind see?</b>		Students develop a working model of an eye. They use the model to reason about how <u>light reflects off an object and into the eye, helping an organism process information from the environment.</u> 4-LS1-1, 4-LS1-2, 4-PS4-2	How do some animals see in the dark? <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> 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?
<b>LESSON 3</b>  <b>How can some animals see in the dark?</b>		Students use their eye model to discover that <u>the pupil controls the amount of light let into the eye. In the dark, pupils get larger to let more light in.</u> 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? <i>(Leads into Lesson 4)</i>	<b>Lesson 3 Anchor Connection:</b> 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?
<b>LESSON 4</b>  <b>How does your brain control your body?</b>		Students investigate how their own brain works by testing their reflexes. They discover that <u>the brain receives information from the senses, processes the information, and sends signals to the muscles to enable movement.</u> 4-LS1-1, 4-LS1-2	—————→	<b>Lesson 4 Anchor Connection:</b> 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:

Animal and Plant System Models

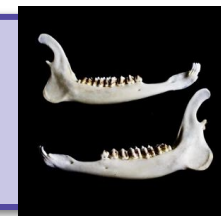
# Birth of Rocks: Anchor Layer Storyline

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...
<b>LESSON 1</b> Could a volcano pop up where you live?		Students use coordinates to <a href="#">develop a map of volcanoes to discover a pattern of where volcanoes exist on Earth.</a> 4-ESS1-1, 4-ESS2-2	Do all volcanoes behave the same way? <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> There were prehistoric volcanoes located in North America, but they are not near the Ashfall Fossil Beds.	How could the volcanoes have killed the rhinos even if they are far away?
<b>LESSON 2</b> Why do some volcanoes explode?		Students investigate the properties of thin and thick lava by attempting to create air bubbles. Students realize that <a href="#">thick lava will cause a volcano to explode, while thin lava will not.</a> 4-ESS1-1	How do mountains and volcanoes change shape? <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> The volcanoes closest to the Ashfall Fossil Beds site erupted thick lava. These eruptions 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?
<b>LESSON 3</b> Will a mountain last forever?		Students make observations of the effects of weathering to discover that <a href="#">rocks will become rounded and break into small pieces when they tumble down a mountain.</a> 4-ESS1-1, 4-ESS2-1	How does land build up? <i>(Leads into Lesson 4)</i>	<b>Lesson 3 Anchor Connection:</b> Pieces of rock fall down nearby mountains and are smoothed as they tumble. Over time these rocks, along with sediments, were carried by a river to the Ashfall Fossil Beds site, piling on top of the rhino fossils.	How did the fossils end up inside of solid rock?
<b>LESSON 4</b> What did your town look like 100 million years ago?		Students <a href="#">use a model of a sedimentary rock formation to identify the evidence supporting the idea that landscapes change over time.</a> 4-ESS1-1	How is land broken down? <i>(Leads into Lesson 4)</i>	<b>Lesson 4 Anchor Connection:</b> As sedimentary rock forms, it can trap and preserve the remains of living things. This is why we can still see ancient fossils in the Ashfall Beds.	How did the rhino fossils become exposed after being buried for so long?
<b>LESSON 5</b> How could you survive a landslide?		Students generate multiple possible solutions to protect homes from a landslide. Students realize that there are <a href="#">many causes for the erosion that causes rocks to fall in landslides.</a> 4-ESS2-1, 4-ESS3-2	—————→	<b>Lesson 5 Anchor Connection:</b> 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?

## Performance Task:

Story of a Rock

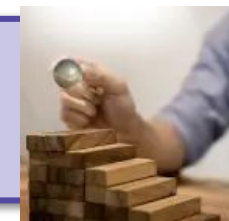
# Energizing Everything: Anchor Layer Storyline

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...
<b>LESSON 1</b>  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 <a href="#">how energy can be stored in materials. Stored energy can be converted to speed.</a> 4-PS3-1, 4-PS3-4	How else can energy be stored?  <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> 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?
<b>LESSON 2</b>  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 <a href="#">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.</a> 4-PS3-1, 4-PS3-3	How does the height of an object relate to the energy that's stored by that object?  <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> 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?
<b>LESSON 3</b>  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. <a href="#">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.</a> 4-PS3-3	How else can energy be transferred from one object to another?  <i>(Leads into Lesson 4)</i>	<b>Lesson 3 Anchor Connection:</b> 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?
<b>LESSON 4</b>  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. <a href="#">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.</a> 4-PS3-4, 3-5-ETS1-1	How can I use energy transfer to make a longer chain reaction machine?  <i>(Leads into Lesson 5)</i>	<b>Lesson 4 Anchor Connection:</b> 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?



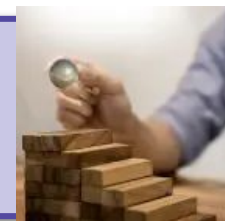
# Energizing Everything: Anchor Layer Storyline

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...
<b>LESSON 5</b>  Can you build a chain reaction machine?		Students continue to build a chain reaction machine — <b>identifying a goal, brainstorming and testing multiple ideas, and determining an optimal solution.</b> The chain reaction machine uses multiple components to transfer energy from one part to the next. <b>4-PS3-4, 3-5-ETS1-2, 3-5-ETS1-3</b>	Is electricity a form of energy? <i>(Leads into Lesson 6)</i>	<b>Lesson 5 Anchor Connection:</b> 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?
<b>LESSON 6</b>  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 <u>electricity can be converted to other forms of energy, such as movement, light, and heat.</u> <b>4-PS3-2, 4-PS3-4</b>	What other forms of energy do we use in our everyday lives? <i>(Leads into Lesson 7)</i>	<b>Lesson 6 Anchor Connection:</b> 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?
<b>LESSON 7</b>  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 <u>heat energy can be turned into motion energy using a turbine.</u> <b>4-PS3-2, 4-PS3-4</b>	Where can we get the energy we need without creating pollution? <i>(Leads into Lesson 8)</i>	<div> <b>Performance Task:</b>  Build a chain reaction machine that turns on a flashlight. </div> <div> Bonus Lesson not included in Anchor Layer </div>	
<b>LESSON 8</b>  Where does energy come from?		Students evaluate the <u>advantages and disadvantages of wind, water, and solar energy to power a town.</u> Students obtain and evaluate information about the needs of each source of energy and analyze and interpret data about the town's resources. <b>4-ESS3-1</b>		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...
<b>LESSON 1</b>  How far can a whisper travel?		Students investigate sound using paper cup telephones. Students figure out that <a href="#">sound is a vibration that can travel through a medium</a> . <b>4-PS4-1, 4-PS4-3</b>	How do sound vibrations travel if we can't see the medium it's traveling through? <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> 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?
<b>LESSON 2</b>  What would happen if you screamed in outer space?		Students construct a model of sound vibrations to explain how <a href="#">air is a medium that sound vibrations travel through</a> . <b>4-PS4-1</b>	Do high and low sounds vibrate the same way? <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> 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?
<b>LESSON 3</b>  Why are some sounds high and some sounds low?		Students make observations of vibrations and sound waves to discover that <a href="#">high pitch sounds vibrate faster and have short wavelengths and low pitch sounds vibrate slower and have long wavelengths</a> . <b>4-PS4-1</b>		<b>Lesson 3 Anchor Connection:</b> 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

### Anchoring 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 Mystery	This Makes Students Wonder...	What Students Figure Out in the Anchor Connection	This Makes Students Wonder...
<b>LESSON 1</b>  How much water is in the world?		Students analyze and interpret data to determine the relative amounts of fresh, salt, and frozen water. Students figure out that <u>most of Earth's water is not fresh and accessible</u> . 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.)?  <i>(Leads into Mystery 2)</i>	<b>Mystery 1 Anchor Connection:</b> 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?
<b>LESSON 2</b>  How much salt is in the ocean?		Students <u>make qualitative and quantitative observations to show that the mass of substances is conserved</u> , even when they go into or out of solution. 5-PS1-2, 5-PS1-3	Where does the water come from to fill/refill aquifers?  <i>(Leads into Mystery 3)</i>	<b>Mystery 2 Anchor Connection:</b> With a lack of freshwater and rain, much of the water in the area simply dried up. This left dry ground behind.	How did plants survive without water on the surface of the ground?
<b>LESSON 3</b>  When you turn on the faucet, where does the water come from?		Students determine the best place to settle a new town by considering various constraints, including the fact that <u>most fresh water comes from underground sources</u> . 5-ESS2-2, 5-ESS3-1	Where does the water come from to fill/refill aquifers?  <i>(Leads into Mystery 4)</i>	<b>Mystery 3 Anchor Connection:</b> In the Dust Bowl region, native grasses were the only plants with deep roots that could access groundwater.	Why are some plants better suited for certain environments than others?
<b>LESSON 4</b>  Can we make it rain?		Students create and use a model of the ocean and sky to investigate how temperature influences evaporation and condensation. Students figure out that <u>higher ocean temperatures lead to more evaporation, thus leading to more rain</u> . 5-ESS2-1	How do ocean temperatures affect the amount of rainfall in an area?  <i>(Leads into Mystery 5)</i>	<b>Mystery 4 Anchor Connection:</b> 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?
<b>LESSON 5</b>  How can you save a town from a hurricane?		Students design budget-limited solutions for a fictional town that suffers from flooding. Students realize that <u>flooding can be caused by hurricanes</u> . Hurricanes are created where ocean temperatures are warm. 5-ESS2-1, 3-5-ETS1, 3-5-ETS2, 3-5-ETS3		<b>Mystery 5 Anchor Connection:</b> 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

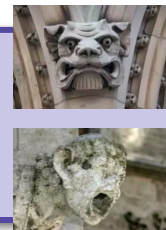
# Chemical Magic Anchor Layer Storyline






## 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...
<b>LESSON 1</b>  <b>Are magic potions real?</b>		Students observe that a salt and vinegar solution will turn a dull penny shiny again indicating that <u>substances can change other substances</u> . 5-PS1-1, 5-PS1-2	What happens to substances when they seem to change and disappear? <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> 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?
<b>LESSON 2</b>  <b>Could you transform something worthless into gold?</b>		Students coat a steel nail in copper by placing it into the solution that dissolved bits of the penny. Students realize that <u>substances can change to become particles too small to be seen, but they still exist</u> . 5-PS1-1, 5-PS1-2	Why was the vinegar so good at changing substances? <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> 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"?
<b>LESSON 3</b>  <b>What would happen if you drank a glass of acid?</b>		Students figure out that <u>acids are very reactive substances</u> . 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? <i>(Leads into Lesson 4)</i>	<b>Lesson 3 Anchor Connection:</b> 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?
<b>LESSON 4</b>  <b>What do fireworks, rubber, and silly putty have in common?</b>		Students combine different substances together to discover that <u>chemical reactions can create new substances</u> . 5-PS1-4	How can we tell if the new substance created by a chemical reaction is a gas? <i>(Leads into Lesson 5)</i>	<b>Lesson 4 Anchor Connection:</b> 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?
<b>LESSON 5</b>  <b>Why do some things explode?</b>		Students investigate and model the reaction between baking soda and vinegar. They figure out that <u>gases are made of particles too small to be seen</u> . 5-PS1-1		<b>Lesson 5 Anchor Connection:</b> 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

What causes the patterns found in star trails?



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...
<b>LESSON 1</b>  <b>Why does the Sun rise and set?</b>		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, <u>students build a model that explains how the Earth's rotation around its own axis causes the Sun to appear to rise and set.</u> 5-ESS1-2	Can the Sun's position in the sky help us tell the time of day? <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> The Earth is rotating, and that rotation is what causes the Sun to <u>appear</u> to move in the sky. The Sun doesn't move—we do!	Why do the stars <u>appear</u> to move in the same pattern as the Sun?
<b>LESSON 2</b>  <b>Who set the first clock?</b>		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. <u>Students realize that the Sun's position in the sky can be used to tell the time of day.</u> 5-ESS1-2	Is the Sun always overhead at noon? <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> Just like the Sun, the stars <u>appear</u> 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 <u>appear</u> to move the same way the Sun does?
<b>LESSON 3</b>  <b>How can the Sun tell you the season?</b>		Students examine photos taken at different times of year and figure out the time of year that each photo was taken. <u>Students discover that the Sun's path changes with the seasons, as does the time of sunrise and sunset.</u> 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? <i>(Leads into Lesson 4)</i>	<b>Lesson 3 Anchor Connection:</b> During the Summer, the length of time that the Sun is visible each <i>day</i> is longer and the length of time the stars are visible each <i>night</i> is shorter. The opposite is true in the winter.	Do the stars change from season to season? If so, why? If not, why not?
<b>LESSON 4</b>  <b>Why do the stars change with the season?</b>		Students build a model of the universe and use it to explain why different stars are visible at different times of year. <u>Using evidence from this model, students make an argument that supports the claim that the Earth orbits the Sun.</u> 5-ESS1-2	The Moon looks different on different nights. Is there a pattern to the Moon's changes? <i>(Leads into Lesson 5)</i>	<b>Lesson 4 Anchor Connection:</b> 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

What causes the patterns found in star trails?



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...
<b>LESSON 5</b>  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. <a href="#">Students notice that the Moon's phases repeat in a predictable pattern.</a> 5-ESS1-2	What other patterns can I see in the night sky?  <i>(Leads into Lesson 6)</i>	<b>Lesson 5 Anchor Connection:</b> 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?
<b>LESSON 6</b>  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. <a href="#">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.</a> 5-ESS1-2	How are the other planets different from Earth?  <i>(Leads into Lesson 7)</i>	<b>Lesson 6 Anchor Connection:</b> 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?
<b>LESSON 7</b>  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. <a href="#">Students analyze and interpret this data to construct an explanation for why the amount of gravity is different on other planets.</a> 5-PS2-1	Could people live on another planet? What would that planet have to be like to support humans?  <i>(Leads into Lesson 8)</i>	<b>Lesson 7 Anchor Connection:</b> 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?
<b>LESSON 8</b>  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, <a href="#">students plan a space mission to a planet with conditions similar to those on Earth.</a> 5-ESS1-1		<b>Lesson 8 Anchor Connection:</b> 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

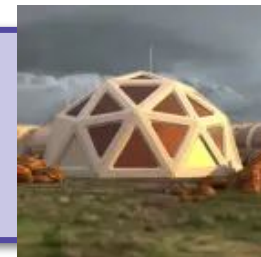
# Web of Life: Anchor Layer Storyline

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...
<b>LESSON 1</b>  Why would a hawk move to New York City?		Students construct models of food chains by linking cards discovering <a href="#">different interrelationships exist between organisms.</a> 5-LS2-1	What do the plants need to eat? <i>(Leads into Lesson 2)</i>	<b>Lesson 1 Anchor Connection:</b> 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?
<b>LESSON 2</b>  What do plants eat?		Students conduct an investigation and interpret data and figure out that <a href="#">water and air account for a plant's weight.</a> 5-LS1-1, 5-LS2-1	What happens to plants when they die? <i>(Leads into Lesson 3)</i>	<b>Lesson 2 Anchor Connection:</b> 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?
<b>LESSON 3</b>  Where do fallen leaves go?		Students conduct an investigation to test how mold grows under different conditions to decompose food. Students realize that <a href="#">decomposers, like mold, break down and consume dead plant material.</a> 5-LS2-1	Is mold the only decomposer? What other kinds of decomposers are there? <i>(Leads into Lesson 4)</i>	<b>Lesson 3 Anchor Connection:</b> 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?

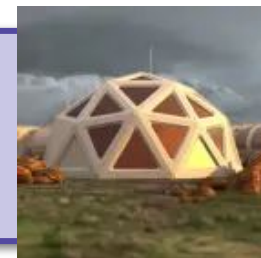
# Web of Life: Anchor Layer Storyline

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...
<b>LESSON 4</b>  Do worms really eat dirt?		Students make observations of worms to realize that <u>worms act as decomposers to eat dead matter in an ecosystem and cycle nutrients into the soil.</u> 5-LS2-1	Is it possible to have too many nutrients in an ecosystem? <i>(Leads into Lesson 5)</i>	<b>Lesson 4 Anchor Connection:</b> Worms help an ecosystem by recycling nutrients back into the soil.	How would adding worms to the Biosphere affect the ecosystem?
<b>LESSON 5</b>  Why do you have to clean a fish tank but not a pond?		Students develop a model of a pond ecosystem and realize that <u>interrelationships exist between decomposers, plants, and animals.</u> 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? <i>(Leads into Lesson 6)</i>	<b>Lesson 5 Anchor Connection:</b> 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?
<b>LESSON 6</b>  Why did the dinosaurs go extinct?		Students develop a model of a dinosaur food web. Students realize that <u>blocking the sun's energy would have disastrous effects on the organisms that rely on this energy</u> in the food web and cause the extinction of some entire species. 5-PS3-1		<b>Lesson 6 Anchor Connection:</b> 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 2nd-5th grade units. New  
storylines are being released for 1st grade units in the  
2021-22 school year.