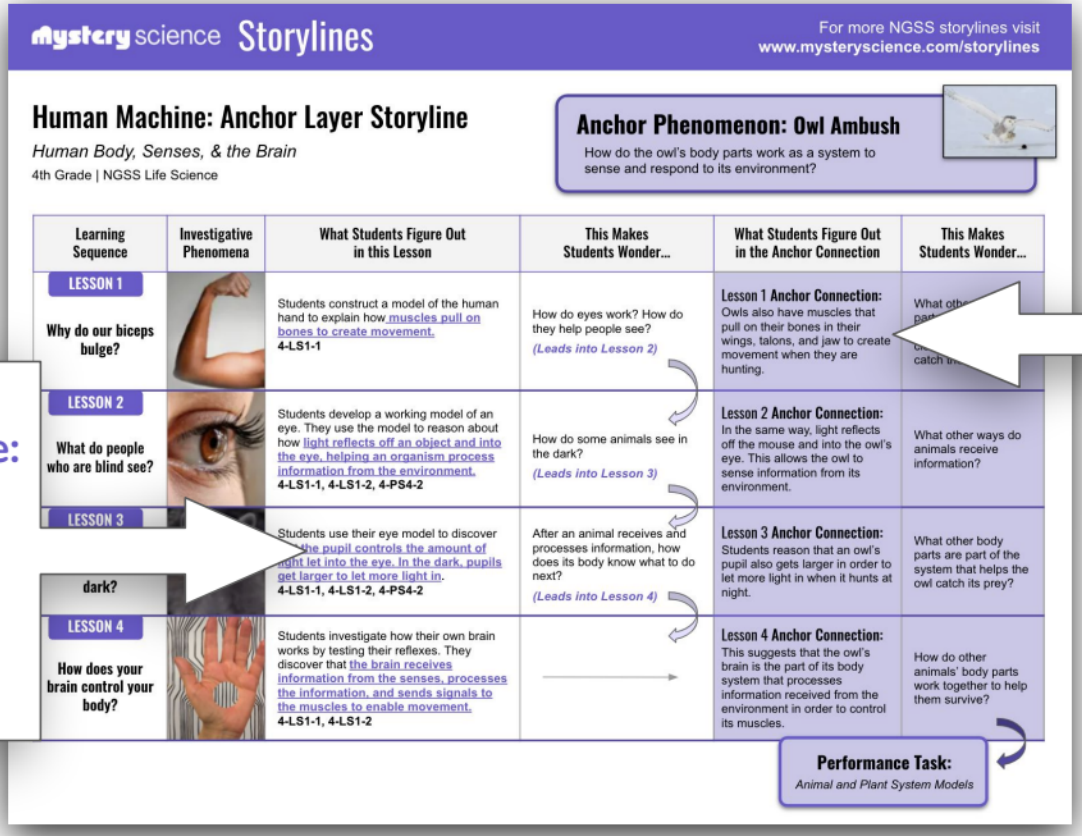
Mystery Science Storylines

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.

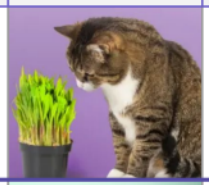
Plant Secrets: Anchor Layer Storyline

Plant Needs

Kindergarten | NGSS Life Science

Anchor Phenomenon: Powerful Plants

Why do plants grow onto other things?

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 plants alive?**		Students gather observations plants in order to identify their needs as living things. **K-LS1-1**	Why do plants grow onto other things? *(Leads into Lesson 2)*	**Lesson 1 Anchor Connection:** Plants may not seem like it, but they are living things with needs.	How can we take care of plants?
LESSON 2 **How do plants and trees grow?**		Students conduct an experiment in order to determine the needs of plants. **K-LS1-1**	Do animals need plants? *(Leads into Lesson 3)*	**Lesson 2 Anchor Connection:** Plants will grow in ways that help them meet their needs. Many plants will grow on top of other things in order to get more light.	How can we help plants and animals meet their needs?
LESSON 3 **Why would you want an old log in your backyard?**		Students gather observations of how different living things have different needs, and humans have an impact on the environment. **K-ESS3-3**		**Lesson 3 Anchor Connection:** People have an impact on the plants and animals around them. Sometimes we want to grow as many plants as possible, but sometimes plants grow too much.	What can we do if a plant is growing too much?

Performance Task:

How can we clear a bunch of kudzu?

Sunny Skies: Anchor Layer Storyline

Sunlight & Warmth

Kindergarten | NGSS Physical Science

Anchor Phenomenon: Solar Sizzle

How can we use sunlight to cook food?

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 walk barefoot across hot pavement without burning your feet?**		Students gather observations of the effect of sunlight on Earth's surface, and design structures that reduce the warming effect of sunlight. **K-PS3-1, K-PS3-2, K-2-ETS1-1**	Can we change where sunlight shines, instead of blocking it? *(Leads into Lesson 2)*	**Lesson 1 Anchor Connection:** Sunlight causes objects to warm up. If you gather enough sunlight, you can even use it too cook food.	If the heat comes from the Sun, why is the pot hot on the bottom and not the top?
LESSON 2 **How could you warm up a frozen playground?**		Students experiment with different materials to influence the ways that sunlight warms Earth's surface.. **K-PS3-2, K-2-ETS1-1, K-2-ETS1-3**	What happens to objects that are in the shade? *(Leads into Lesson 3)*	**Lesson 2 Anchor Connection:** Light can change direction by reflecting off of other objects. Solar cookers use mirrors to reflect sunlight onto pots to cook food.	What happens if the solar cooker is in the shade?
LESSON 3 **Why does it get cold in winter?**		Students gather observations of the effect of sunlight on objects on Earth's surface. **K-PS3-1**		**Lesson 3 Anchor Connection:** If objects are in the shade, they won't get hot. Solar cookers have to be in full Sun to work correctly.	Will solar cookers work anywhere?

Performance Task:

What's the weather like for the arctic foxes?

Circle of Seasons: Anchor Layer Storyline

Weather Patterns

Kindergarten | NGSS Earth and Space Science

Anchor Phenomenon: Furry Foxes

Why do these foxes change so much throughout the year?

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 do you know what to wear for the weather?**		Students gather observations of daily weather patterns. **K-ESS2-1**	How does the weather change so much each year? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** The foxes have more puffy fur when the weather is cold, and less puffy fur when the weather is hot. This is similar to how people change their clothes in different weather.	How do the foxes know what the weather will be like each year?
LESSON 2 **What will the weather be like on your birthday?**		Students gather observations of seasonal weather and identify seasonal weather patterns. **K-ESS2-1**	What do animals do at different times of year? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** The foxes have fur that changes between seasons. The puffy fur falls out each spring, and it grows back each fall.	Why do the foxes change in the same way every year?
LESSON 3 **Why do birds lay eggs in the spring?**		Students observe how the behavior of animals is different in different seasons, and make a model of how birds can change their environment to meet their needs. **K-ESS2-1, K-ESS2-2**		**Lesson 3 Anchor Connection:** The seasons change in a predictable pattern every year. This is why the fox's fur changes in a predictable pattern, too.	Which kind of weather do the foxes have the most?

Performance Task:

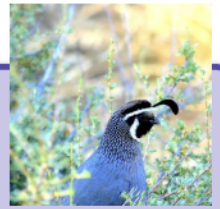
What's the weather like for the arctic foxes?

Animal Secrets: Anchor Layer Storyline

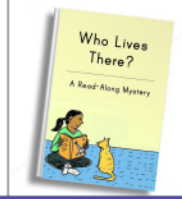
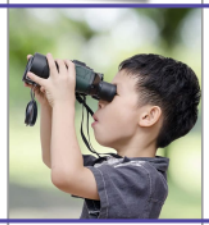
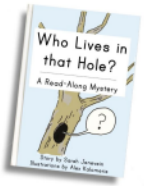
Animal Needs

Kindergarten | NGSS Life Science

Anchor Phenomenon: Animal Homes



Why do different animals live in such different 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...
LESSON 1 **Why do woodpeckers peck wood?**		Students observe animal behaviors and work to discover a pattern: all animals seek food in order to survive. **K-LS1-1**	Why do different animals live in different places? *(Leads into Lesson 2)*	**Lesson 1 Anchor Connection:** All animals require food to survive. No matter where an animal lives, it must be able to find food.	Why do different animals live in different places?
LESSON 2 **Where do animals live?**		Students make observations of the relationship between the needs of animals and where they live. **K-ESS3-1**	How do animals stay safe where they live? *(Leads into Lesson 3)*	**Lesson 2 Anchor Connection:** Different animals seek very different types of places to live. Some live up in trees, some live on the ground, and some live underground.	How do animals stay safe where they live?
LESSON 3 **How can you find animals in the woods?**		Students observe different animal behaviors and identify a pattern: all animals seek safety in order to survive. **K-LS1-1**	How do animals make their homes? *(Leads into Lesson 3)*	**Lesson 3 Anchor Connection:** In addition to food, many animals also require some form of shelter. Some animals find their shelters, others make shelters.	How do animals make their homes?
LESSON 4 **How do animals make their homes in the forest?**		Students observe how animals modify their environment in order to meet their needs. **K-ESS2-2**		**Lesson 4 Anchor Connection:** In addition to food, many animals also require some form of shelter. Some animals find their shelters, others make shelters.	What's the best place for different kinds of animals?

Performance Task:

Why do different animals live in different places?

Plant Superpowers: Anchor Layer Storyline

Plant Traits and Offspring

1st Grade | NGSS Life Science

Anchor Phenomenon: Unidentified Floating Objects

What are these giant things floating in the water?

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 **What will a baby plant look like when it grows up?**		Students observe and identify the pattern that baby plants have characteristics that resemble their adult plants. **1-LS3-1**	Can we build things that look like plants? *(Leads into Lesson 2)*	**Lesson 1 Anchor Connection:** If we look closely at the unidentified floating objects, we see that they have many characteristics in common with the leaves of other plants. This is because the giant floating objects are leaves!	What does the bottom of a giant lily leaf look like?
LESSON 2 **Why don't trees blow down in the wind?**		Students use the characteristics of trees as inspiration to design and construct an improved umbrella. **1-LS1-1, K-2-ETS1-1**	Where do plants grow best? *(Leads into Lesson 3)*	**Lesson 2 Anchor Connection:** The giant lily leaves are able to support themselves, in part, due to a strong set of veins that act like the ribs of an umbrella.	Where do giant lilies grow best?
LESSON 3 **What do sunflowers do when you're not looking?**		Students observe that plants are more likely to grow and survive when their needs are met. **1-LS1-1**		**Lesson 3 Anchor Connection:** The giant lily leaves gather lots and lots of sunlight. These plants live in bright locations around the world.	What are the tiniest water lilies?

Performance Task:

What are the tiniest water lily leaves?

Lights & Sounds Anchor Layer Storyline

Light, Sound, & Communication

1st Grade | NGSS Physical Science

Anchor Phenomenon: Everglades Adventure

How can animals make themselves heard and seen in the darkness of night?

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 do they make silly sounds in cartoons?**		Students investigate the cause and effect relationship between vibrations and sounds. **1-PS4-1**	Why do things only make sounds sometimes? ***(Leads into Mystery 2)***	**Mystery 1 Anchor Connection:** All objects that make sound do so by vibrating. This is true for everything, from the sounds we hear in cartoons to the sounds of alligators in wetlands.	How do the alligators make sound?
LESSON 2 **Where do sounds come from?**		Students read along and gather observations about the connection between vibrations and the sounds that come from musical instruments. **1-PS4-1**	How do we see through things? ***(Leads into Mystery 3)***	**Mystery 2 Anchor Connection:** Some vibrations can only be heard, but some can be seen. By observing the entire alligator's body, we can see that it is completely vibrating.	What other kinds of living things are there in the Everglades?
LESSON 3 **What if there were no windows?**		Students classify materials based on their properties and use those properties to design and create works of art. **1-PS4-3**	Can we still see transparent things when there is no light? ***(Leads into Mystery 4)***	**Mystery 3 Anchor Connection:** Some animals in the Everglades are silent, but they can somehow be seen when it is totally dark at night.	How do we see the light from fireflies?
LESSON 4 **Can you see in the dark?**		Students read along and gather observations in order to explain that objects are only visible when illuminated. **1-PS4-2**	Can we use light that we see to send a message? ***(Leads into Mystery 5)***	**Mystery 4 Anchor Connection:** In order to see objects, they must be illuminated. For most living things, we need external light to see them. Fireflies make their own light!	Why do the fireflies glow?
LESSON 5 **How could you send a secret message to someone far away?**		Students design and create a means of communication via colored light. **1-PS4-4**	How can you send a message to someone when you can't see them? ***(Leads into Mystery 6)***	**Mystery 5 Anchor Connection:** Alligators use sound and fireflies use light to communicate. This is just like humans: we use light and sound to communicate, too!	Why do animals make sounds and light?
LESSON 6 **How do boats find their way in the fog?**		Students read along and observe different ways in which light and sound can be used to communicate over a distance. **1-PS4-4**		**Mystery 6 Anchor Connection:** In a review of the unit, students see how animals use light and sound to communicate, just like humans do.	What's it like in the Everglades at night?

Performance Task:

What do we see and hear in the Everglades at night?

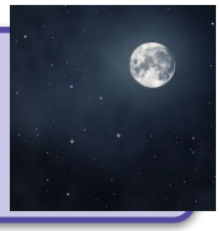
Moon & Stars: Anchor Layer Storyline

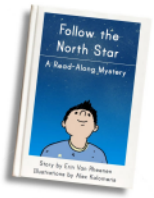
Night Sky Patterns

1st Grade | NGSS Earth & 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...
LESSON 1 **When can you see the full moon?**		Students 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. **1-ESS1-1**	Why do we only see stars at night? *(Leads into Lesson 2)*	**Lesson 1 Anchor Connection:** 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?
LESSON 2 **Why do the stars come out at night?**		Students use a model to investigate and explain why stars seem to disappear as soon as the Sun comes out each day. **1-ESS1-1**	Can stars help us if we don't know where to go at night? *(Leads into Lesson 3)*	**Lesson 2 Anchor Connection:** 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?
LESSON 3 **How can stars help you if you get lost?**		Students observe how the location of certain stars in the sky can be used to determine the direction they are facing. **1-ESS1-1**		**Lesson 3 Anchor Connection:** 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?

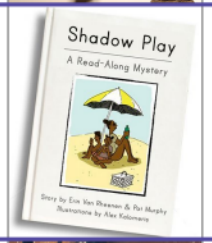
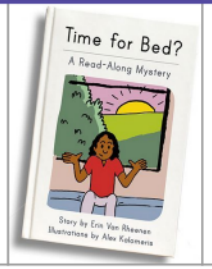
Sun & Shadows: Anchor Layer Storyline

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...
LESSON 1 **Could a statue's shadow move?**		Students observe and describe patterns in the motion of lights and shadows. **1-ESS1-1**	How does the Sun make shadows change? *(Leads into Lesson 2)*	**Lesson 1 Anchor Connection:** 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?
LESSON 2 **What does your shadow do when you're not looking?**		Students read along with a text to observe and describe the patterns of the apparent movement of the Sun over the course of a day. **1-ESS1-1**	In which directions does the Sun move? *(Leads into Lesson 3)*	**Lesson 2 Anchor Connection:** 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?
LESSON 3 **How can the Sun help you if you're lost?**		Students construct a device that models the motion of the Sun and use it to determine direction. **1-ESS1-1**	Does the Sun always move the same way every day? *(Leads into Lesson 4)*	**Lesson 3 Anchor Connection:** 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?
LESSON 4 **Why do you have to go to bed early in the summer?**		Students read along with a text to gather observations that are used as evidence to describe patterns in the amount of daylight over the course of a year. **1-ESS1-2**		**Lesson 4 Anchor Connection:** 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?

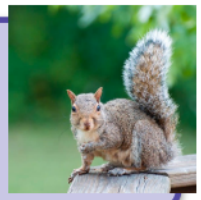
Performance Task:
Where will the Sun be tomorrow?

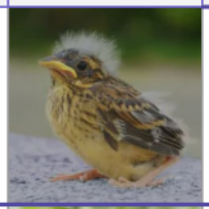
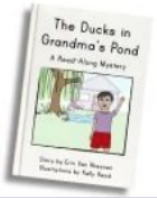
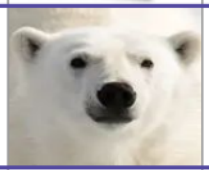
Animal Superpowers: Anchor Layer Storyline

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...
LESSON 1 **How can you help a lost baby animal find its parents?**		Students gather observations of the traits of baby animals in order to describe that young animals are similar to their parents. **1-LS3-1**	How do animals help their babies? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** Parent animals pass their traits to their young. This is true for birds and squirrels.	How do squirrel traits help them survive?
LESSON 2 **Why do birds have beaks?**		Students carry out an investigation to determine the relationship between the structure and function of different types of animal mouths. **1-LS1-1**	Do baby birds have the same kind of beak as their parents? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** 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?
LESSON 3 **Why do baby ducks follow their mother?**		Students read along with a text to determine patterns in behavior of parents and offspring that help offspring survive. **1-LS1-2**	How do animals hide and stay safe? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** 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?
LESSON 4 **Why are polar bears white?**		Students make observations to construct an explanation of why camouflage is helpful to animals. **1-LS1-1**	Why do baby animals look like their parents? ***(Leads into Lesson 5)***	**Lesson 4 Anchor Connection:** Squirrels are camouflaged in many different environments. This helps them stay safe.	Are baby squirrels camouflaged like their parents?
LESSON 5 **Why do family members look alike?**		Students read along with a text to make observations that young animals are like, but not exactly like, their parents. **1-LS3-1**		**Lesson 5 Anchor Connection:** 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?

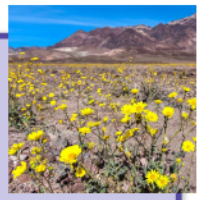
Plant Adventures: Anchor Layer Storyline

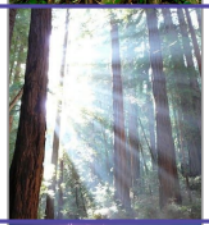
Plant Growth and Habitats

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...
LESSON 1 **How did a tree travel halfway around the world?**		Students observe how different types of plants produce different types of seeds in the process of reproduction. **2-LS2-2**	What do seeds and plants need to grow? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** 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?
LESSON 2 **Why do seeds have so many different shapes?**		Students observe that plants come in many forms, but they all have certain need space and water in order to grow. **K-2-ETS1-2, 2-LS2-2**	How do different plants get the light and water they need? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** 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?
LESSON 3 **Could a plant survive without light?**		Students observe that plants require light in order to fully grow and be healthy. **2-LS2-1**	Why do different kinds of plants grow in different places? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** 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?
LESSON 4 **How much water should you give a plant?**		Students observe that different plants require different amounts of light and water. **2-LS2-1**		**Lesson 4 Anchor Connection:** 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...
LESSON 1 **Why do we wear clothes?**		Students investigate the different properties of matter and use those properties to design and build a hat that protects them from the Sun. **2-PS1-1, 2-PS1-2, K-2-ETS1-1/2/3**	How else can materials keep us safe? *(Leads into Mystery 2)*	**Mystery 1 Anchor Connection:** 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?
LESSON 2 **Can you really fry an egg on a hot sidewalk?**		Students conduct an investigation of different materials in order to determine which are best suited for allowing people to handle hot items. **2-PS1-1, 2-PS1-2**	How are different materials affected by heat? *(Leads into Mystery 3)*	**Mystery 2 Anchor Connection:** Heat is the biggest danger in a foundry, so all of the protective clothing must be insulating.	Can protective clothing melt?
LESSON 3 **Why are so many toys made out of plastic?**		Students conduct an investigation of different materials in order to determine which are most and least easily melted. **2-PS1-1, 2-PS1-2, 2-PS1-4**	How might we use new materials that are invented? *(Leads into Mystery 4)*	**Mystery 3 Anchor Connection:** 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?
LESSON 4 **What materials might be invented in the future?**		Students design a new invention that takes advantage of the unique properties of a futuristic material. **2-PS1-1, 2-PS1-2, K-2-ETS1-1, K-2-ETS1-2**	Instead of inventing new materials, how can we use existing materials in new ways? *(Leads into Mystery 5)*	**Mystery 4 Anchor Connection:** 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?
LESSON 5 **Could you build a house out of paper?**		Students construct an evidence-based account of how a structure built of paper can be disassembled and rebuilt in new ways. **2-PS1-3**	How else can we build things? *(Leads into Mystery 6)*	**Mystery 5 Anchor Connection:** Foundries can recycle metals into raw materials that can be used to make new objects.	Can we make buildings with different materials?
LESSON 6 **How do you build a city out of mud?**		Students investigate the properties of soils, and use their observations as evidence to classify different types of soils. **2-PS1-1, 2-PS1-2**	→	**Mystery 6 Anchor Connection:** People have to wear safety clothing in some situations and because of the properties of the materials they work with.	Can foundries help us reuse things?

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...
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**	Why do different animals live in different places? *(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.	Do the animals in the cave always stay in the cave, or do they go to other places?
LESSON 2 **Why would a wild animal visit a playground?**		Students record observations of the diversity of life and physical characteristics of two locations. Students then explain how the living and non-living parts of a habitat support the animals that live there. **2-LS4-1**	How can we identify types of animals in different habitats? *(Leads into Lesson 3)*	**Lesson 2 Anchor Connection:** While the bighorn sheep travel during the day in search of food, the bats travel at night in search of food.	What type of small mammal lives in the cave?
LESSON 3 **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 4)*	**Lesson 3 Anchor Connection:** A huge colony of Mexican Free-Tailed Bats lives in the cave.	Where do the bats live in the cave?
LESSON 4 **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 4 Anchor Connection:** The bats hang from the ceiling when they are inside of the cave.	What else lives nearby?

Performance Task:

Where else do bats live?

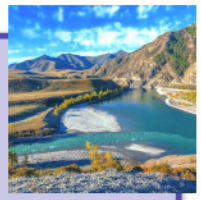
Work of Water: Anchor Layer Storyline

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...
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?

Fates of Traits Anchor Layer Storyline

Animal Groups & Survival

3rd Grade | NGSS Life Science

Anchoring Phenomenon: Animals Around Us

How can tiny ants be one of the most successful and common animals on Earth?

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...
LESSON 1 **How could you make the biggest fruit in the world?**		Students explore how similarities between plants give insight to how those plants are related to one another and how they change over time. **3-LS3-1**	How do animals change over time? ***(Leads into Mystery 2)***	**Mystery 1 Anchor Connection:** Different kinds of ants use different kinds of plants around the world as sources of food. This helps them to survive.	How are ants different from one another?
LESSON 2 **What kinds of animals might there be in the future?**		Students explore how different characteristics of animals can be selected for, which changes those characteristics over time. **3-LS3-1**	Do other animals ever cause each other to change? ***(Leads into Mystery 3)***	**Mystery 2 Anchor Connection:** Different ants within a colony have different traits that make them better at doing different jobs. This helps them to survive.	How can ants survive if they are all so small?
LESSON 3 **Can selection happen without people?**		Student model how environmental changes can lead to changes in the characteristics of groups of animals. **3-LS4-3, 3-LS3-1, 3-LS4-2**	What can animals do to help them survive? ***(Leads into Mystery 4)***	**Mystery 3 Anchor Connection:** Almost all ants live in colonies with huge numbers of individual ants. This helps them to survive.	What do ants do to work together in groups?
LESSON 4 **Why do dogs wag their tail?**		Students gather observations of a variety of animals to see how their behavior supports their survival. **3-LS2-1**	Do animals ever change if their environment changes? ***(Leads into Mystery 5)***	**Mystery 4 Anchor Connection:** Ants work together in their colonies to do many different things to help them survive in the different places that they live. This helps them to survive.	Are scientists still studying ants?
LESSON 5 **How long can people (and animals) survive in outer space?**		Students model how environmental changes can lead to changes within the characteristics of individuals. **3-LS3-2**		**Mystery 5 Anchor Connection:** Ants are such incredible survivors that scientists are still trying to understand all of the different things that they do. This includes conducting experiments in space!	What happens when ants compete with other ants?

Performance Task:

Why do ants live in colonies?

Circle of Life: Anchor Layer Storyline

Life Cycles

3rd Grade | NGSS Life Science

Anchor Phenomenon: Saguaro Cycles

Why do bats stick their heads into the flowers of these cacti?

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 life like an alligator's life?**		Students develop a model of animal life cycles in order to identify similarities across all types of animals. **3-LS1-1**	How can we affect an animal's life cycle? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** Bats must eat in order to grow during their life cycle. The bats are eating when they stick their heads in the flowers.	What other cycles do the bats go through?
LESSON 2 **What's the best way to get rid of mosquitoes?**		Students evaluate the merits of various solutions to an environmental issue and then design their own solutions. **3-LS4-3, 3-LS4-4, 3-5-ETS1-2**	What do insects do for plants? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** A bat's life cycle may last many years, but they also go through daily cycles of resting and being awake. Bats are nocturnal.	Do the cacti go through cycles?
LESSON 3 **Why do plants grow flowers?**		Students model the structure and function of flower parts that are responsible for creating seeds. **3-LS1-1**	Why do plants grow flowers? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** Saguaros grow new flowers every spring. This cycle repeats every year.	What happens to the saguaros flowers after the spring?
LESSON 4 **Why do plants give us fruit?**		Students explore the function of fruits in plants and practice classification. **3-LS1-1**	How do seeds turn into new plants? ***(Leads into Lesson 5)***	**Lesson 4 Anchor Connection:** Saguaro flowers turn into saguaro fruit. This cycle repeats every year.	What happens to the saguaro fruit after the summer?
LESSON 5 **Why are there so many different kinds of flowers?**		Students use a model life cycle to predict how environmental changes will affect a population of organisms. **3-LS1-1**		**Lesson 5 Anchor Connection:** The bats pollinate the cacti and help them progress through their life cycle.	What does the entire saguaro life cycle look like?

Performance Task:

Why are some saguaros so tiny?

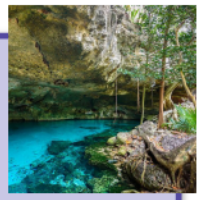
Animals Through Time: Anchor Layer Storyline

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 fires could have happened inside the cave.	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 comparing their fossil bones with modern animals. **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 meat. It also walked on all fours. It likely entered the cave when the cave was dry.	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**		**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.	Is the cave still changing today?

Performance Task:

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

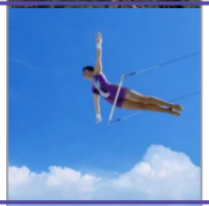
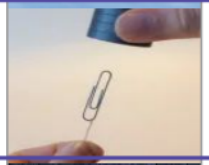
Invisible Forces: Anchor Layer Storyline

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 high can you swing on a flying trapeze?**		Students make observations and take measurements of the motion of model trapeze, and use that data to predict the motion of a real trapeze. **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?

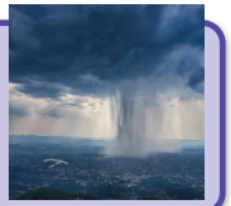
Stormy Skies: Anchor Layer Storyline

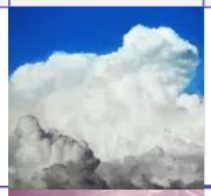
Weather and Climate

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 short-term weather? ***(Leads into Lesson 2)***	**Lesson 1 Anchor Connection:** Warm temperatures at ground level causes water to evaporate. This leads to water in the air in the form of 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 short-term weather to expect. **3-ESS2-2**	Do we know what the weather will be like in the future? ***(Leads into Lesson 3)***	**Lesson 2 Anchor Connection:** The tallest clouds tend to cause storms. The tops of those tall storm clouds are very high in the sky, where it is very cold.	How cold does it have to be for water to freeze into ice?
LESSON 3 **Where's the best place to build a snow fort?**		Students analyze weather data from multiple locations in order to make long-term forecasts of weather conditions. **3-ESS2-2**	Why do some places always have the same weather? ***(Leads into Lesson 4)***	**Lesson 3 Anchor Connection:** The tops of the tallest clouds are cold enough to freeze water into ice, even when it is hot on the ground. This is where hailstones form.	Is it always cold high up in the sky?
LESSON 4 **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 5)***	**Lesson 4 Anchor Connection:** 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?
LESSON 5 **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 5 Anchor Connection:** Weather affects people around the world. The more we understand severe weather, such as hailstorms, the more we can help keep people safe.	How can we use our knowledge of weather to help people be safe?

Performance Task:

Can we predict when it's going to hail?

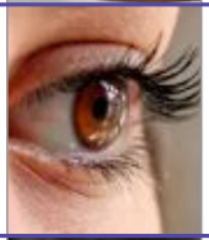
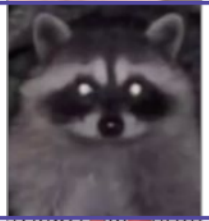
Human Machine: Anchor Layer Storyline

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:

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...
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. **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.	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 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?
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**	How does land build up? *(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 river to the Ashfall Fossil Beds site, piling on top of the rhino fossils.	How did the fossils end up inside of solid rock?
LESSON 4 **What did your town look like 100 million years ago?**		Students use a model of a sedimentary rock formation to identify the evidence supporting the idea that landscapes change over time. **4-ESS1-1**	How is land broken down? *(Leads into Lesson 4)*	**Lesson 4 Anchor Connection:** 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?
LESSON 5 **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 5 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?

Performance Task:
Story of a Rock

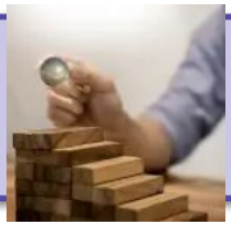
Energizing Everything: Anchor Layer Storyline

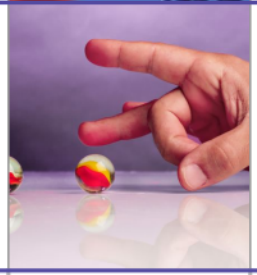
Energy, Motion, & Electricity — ***Page 1 of 2***

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, students 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 speed of an object relate to the energy of an 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 **How can marbles save the world?**		Students ask questions and make predictions about how far a marble will launch over a jump after colliding with other objects. IStudents investigate how energy transfers when objects collide. **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?

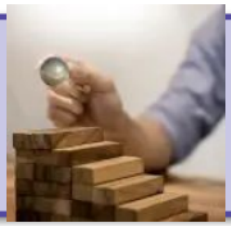
Energizing Everything: Anchor Layer Storyline

*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)*	**Performance Task:** *Build a chain reaction machine that turns on a flashlight.* *Bonus Lesson not included in Anchor Layer*	
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 do you send a secret code?**		Students generate codes in order to transfer information over a distance. **4-PS4-3, 3-5-ETS1-3**	What is sound? *(Leads into Lesson 2)*	**Lesson 1 Anchor Connection:** The speaker and metal plate both vibrate and make sounds when they receive an electrical signal. The electrical signal carries the sound as a code.	Why do vibrating objects make sounds?
LESSON 2 **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 3)*	**Lesson 2 Anchor Connection:** The metal plate makes sound when it vibrates, 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 3 **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 3 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 4 **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 4 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

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...
LESSON 1 **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 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 Mystery 2)*	**Mystery 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 **How much salt is in the ocean?**		Students make qualitative and quantitative observations to show that the mass of substances is conserved, 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? *(Leads into Mystery 3)*	**Mystery 2 Anchor Connection:** 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?
LESSON 3 **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 most fresh water comes from underground sources. **5-ESS2-2, 5-ESS3-1**	Where does the water come from to fill/refill aquifers? *(Leads into Mystery 4)*	**Mystery 3 Anchor Connection:** 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?
LESSON 4 **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 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 Mystery 5)*	**Mystery 4 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 5 **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 flooding can be caused by hurricanes. Hurricanes are created where ocean temperatures are warm. **5-ESS2-1, 3-5-ETS1, 3-5-ETS2, 3-5-ETS3**		**Mystery 5 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

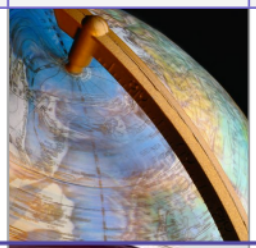
Spaceship Earth: Anchor Layer Storyline

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

5th Grade | NGSS Space Science

Anchor Phenomenon: Star Trails

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...
LESSON 1 **How fast does the Earth spin?**		Students model the rotation of the Earth and investigate why the Sun looks like it's moving across the sky. Using evidence they gathered in the investigation, students build a model that explains how the Earth's rotation around its own axis causes the Sun to appear to rise and set. **5-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?

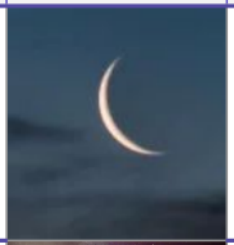
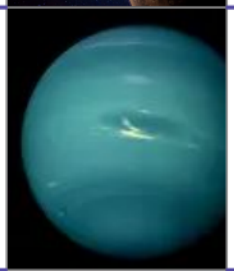
Spaceship Earth: Anchor Layer Storyline

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

5th Grade | NGSS Space Science

Anchor Phenomenon: Star Trails

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...
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 **How can the Sun help us explore other planets?**		Students create a model of the solar system in order to investigate the relative brightness of the Sun as viewed from other planets. **5-ESS1-1**	How are the other planets different from Earth? *(Leads into Lesson 7)*	**Lesson 6 Anchor Connection:** All planets rotate at varying rates. This causes objects in the sky to *appear* to move, and causes the transitions between day and night over time.	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 happens if one of the living things in an ecosystem becomes overgrown? ***(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.	What happens if one living thing becomes overgrown in an ecosystem?
LESSON 6 **How can we protect Earth's environments?**		Students obtain and combine science ideas in order to help a community respond to and prevent harmful algal blooms. **5-ESS3-1**	What would happen if we removed one piece of an ecosystem? ***(Leads into Lesson 7)***	**Lesson 6 Anchor Connection:** All living things require water. Maintaining a clean water supply in a biosphere is very important.	Which is more similar to a Biosphere: a pond or a fish tank? Why?
LESSON 7 **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 7 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 the Anchor Layer in your account settings to access Anchor Storylines for our 1st, 2nd, 3rd, 4th, and 5th grade units. We are currently releasing Anchor Layers for kindergarten on a rolling basis!