Tips for Families

Kindergarten

Overview for Families

What is *PhD Science Texas*?

PhD Science® *Texas* is a knowledge-building, phenomenon-driven curriculum. An anchor phenomenon, which is an observable event that can be explained or predicted, gives students a real-world context for their learning. Students explore these compelling phenomena through observation, questioning, modeling, and investigation. The year will be divided into three units of study called modules, some of which are followed by additional Spotlight Lessons. Each module weaves a coherent storyline of science concepts that helps students make sense of the phenomena they are exploring. Spotlight Lessons have the same structure as modules, but they are shorter and highlight additional key concepts that satisfy Texas Essential Knowledge and Skills for Kindergarten. In both modules and Spotlight Lessons, students apply their knowledge to a new authentic situation or problem.

What will my student do in class?

Students will work, think, and experiment just like scientists do. Science will not be about memorizing facts or reading from a textbook. Instead, the science curriculum will involve hands-on investigations that allow students to develop a deep understanding of science concepts. As students uncover information about the anchor phenomenon, they will ask questions, discover evidence, generate new ideas, and come up with explanations and solutions.

Throughout each module, the questions students generate about the phenomenon will be recorded on a driving question board. The driving question board is a chart we will use to organize our questions and guide our learning. We will also create an anchor model and anchor chart to visually express our ideas. These tools help us see how different concepts fit together and how our understanding of the phenomenon is deepening.

Each module has opportunities for students to use the engineering design process, apply what they have learned to solve real-world problems, and present their ideas. For example, in a module on weather, students design a shelter that provides shade to help archeologists stay cool.

Discussion and debate will be part of many lessons, as students state their claims, defend their claims with evidence, and ask questions about others' claims. At the end of each module, students will participate in a Socratic Seminar that focuses on the importance of questioning. During the seminar, students will be presented with a rigorous question that encourages them to think critically and apply their learning from the module.

What will a lesson look like?

If you stop by the classroom during science instruction, you will not see students answering questions from a textbook or listening to a lecture. Instead, you will find students in small groups discussing ideas, doing experiments, or reporting their findings. *PhD Science Texas* lessons are designed so students can drive their own learning. Students uncover key concepts by actively engaging in science and engineering practices. They read high-quality, age-appropriate books that spark curiosity, introduce phenomena, and support the development of scientific understandings. Further, students document their learning in a Science Logbook, which allows them to review, reflect, and track how their knowledge has progressed.

How is science connected to other disciplines?

All *PhD Science Texas* modules make connections across scientific fields and academic disciplines. The curriculum highlights connections to math, literacy, and social studies so students can practice using the interdisciplinary approach necessary for real-world tasks. For example, while collecting weather data in one module, students practice math skills such as counting and using numbers to identify patterns. Students also connect their new knowledge to geography by comparing the weather at Mesa Verde National Park with their local weather. In addition to cross-curricular connections, all modules include lessons devoted to the application of concepts. In these lessons, students apply science and engineering practices to solve an authentic problem.

How can I help?

With each module you will receive a Family Tip Sheet that outlines the module concepts and includes ideas on how you can support your student at home. The goal of these suggestions is to help students see science everywhere and not just at school. Talking about science, watching science videos, or visiting a museum, park, or zoo are all ways to support your student's learning. For more information about what you can do to help facilitate your student's understanding of science, visit National Science Teaching Association's Tips for Busy Parents website at https://www.nsta.org/tips-busy-parents.

Is there homework?

PhD Science Texas modules have informal homework assignments to reinforce learning and connect students' understandings to their everyday lives. These assignments often include ideas to discuss with adults at home or questions that prompt a simple exploration. Students are encouraged to report their findings to the class.

How are students assessed?

Student learning is assessed in informal and formal ways. Through questions and classwork, students are informally assessed. Formal tasks to measure learning include a Science Challenge or an Engineering Challenge, an End-of-Module Assessment, and a Socratic Seminar. For Spotlight Lessons, students' understanding of science concepts is evaluated in an End-of-Spotlight Assessment or Engineering Challenge. The balance of ongoing and cumulative assessment allows instruction to be adjusted throughout the module to ensure that students are progressing.

What will my student study in Kindergarten?

MODULE 1

WEATHER

Essential Question: How did the cliff dwellings at Mesa Verde protect people from the weather?

SPOTLIGHT LESSONS ON **Magnets**

Essential Question: How could someone make a toy car roll back and forth without touching it?

MODULE 2

LIFE

Essential Question: How is Mara different from the Wonderland of Rocks?

MODULE 3

LIGHT

Essential Question: How do puppeteers use light to tell stories during wayang shows?

SPOTLIGHT LESSONS ON THE **Sky**

Essential Question: When can we observe bats at Congress Avenue Bridge?

Level K • Module 1

Weather with Spotlight Lessons on Magnets

Lesson Overview

Your student is learning how the cliff dwellings at Mesa Verde protected the Ancestral Pueblo people from weather. Students use local weather data to see how weather affects people and their surroundings. In Spotlight Lessons on Magnets, students explore how pushes and pulls cause objects to move and how magnets attract and repel objects with certain properties.

Classroom activities for this module include the following:

- Observing and describing parts of weather (e.g., temperature, wind, precipitation)
- Creating a model shelter to protect archaeologists from weather
- Analyzing weather data to compare local weather to weather at Mesa Verde
- Identifying and describing severe weather to understand how communities can prepare for and respond to severe weather
- Observing and describing how magnets interact with other objects

Conversation Starters

Support your student's learning with these talking points:

- Talk about the weather.
- Compare local weather to weather in a location you have visited or want to visit.
- Point out ways people protect themselves from weather.
- Discuss how weather influences daily life.
- Discuss how objects at home or in the community move because of pushes and pulls.

Activities

Have fun with these related activities at home:

- Read or watch a weather forecast and plan an activity appropriate for the day's weather.
- Encourage your student to keep a weather journal by using drawings, words, or photographs to record the weather.
- Use tools such as a thermometer, rain gauge, or wind sock to gather data about the weather.
- Have a scavenger hunt at home to find magnets (e.g., refrigerator magnets, can openers).

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module, such as weather patterns, severe weather warnings, the cliff dwellings at Mesa Verde, and shelter.

Learn more about the cliff dwellings of the Ancestral Pueblo people and Mesa Verde National Park at https://www.nps.gov/meve/index.htm.

Find current and past weather data at https://www.wunderground.com/.

Level K • Module 2

Life

Lesson Overview

Your student is learning how living things differ in separate areas of the Mojave Desert to understand why different environments have different plants and animals.

Classroom activities for this module include the following:

- Comparing the plants in different parts of the desert to see how the plants get the water and sunlight they need
- Investigating what bean plants need to live and grow
- Observing and learning about different animals in the desert
- Studying how humans lived in the Mojave Desert and how they used natural resources to get what they needed

Conversation Starters

Support your student's learning with these talking points:

- Discuss familiar plants and animals including houseplants and pets. Point out plant and animal parts. Talk about how the parts help the animals or plants get what they need to live.
- Point out plants or animals in unexpected places, and talk about how they might get what they need to live.
- Talk about the ways you use natural resources in daily life. For example, point out what foods you eat, or talk about things around the home that are made of wood or metal.

Activities

Have fun with these related activities at home:

- Visit a park or botanical garden to observe different plants. Point out how the plants have different needs for water and light.
- Safely observe and record evidence of animals getting what they need to live. For example, take pictures of a bird visiting a feeder or a squirrel eating an acorn.
- Research a favorite animal to find out what it eats.

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module, such as deserts, desert plants and animals, and oases.

Learn more about life in the Mojave Desert by visiting https://www.nps.gov/jotr/index.htm.

Level K • Module 3

Light with Spotlight Lessons on the Sky

Lesson Overview

Your student is learning about wayang puppet shows to understand how light interacts with objects and how it affects what people see. In Spotlight Lessons on the Sky, students learn how people can predict when bats will appear around the Congress Avenue Bridge in Austin, Texas, by changes in the time of day and the season.

Classroom activities for this module include the following:

- Observing models to explore when objects are visible
- Investigating how light interacts with different objects to form and change shadows
- Investigating different materials to see how light interacts with them
- Observing the Sun, Moon, and stars to identify how patterns differ between day and night
- Analyzing data to describe how weather changes throughout the year

Conversation Starters

Support your student's learning with these talking points:

- Point out and discuss different light sources inside and outside the home.
- Look for shadows around the home, and talk about the objects, surfaces, and light sources that interact to form the shadows.
- Notice and compare how light travels through different materials, such as different curtains or different fabrics.
- Observe the sky at different times of day and night, and discuss how the Sun, Moon, and stars appear to move across the sky.

Activities

Have fun with these related activities at home:

- Safely explore creating different shadows with a flashlight or other light source.
- Play with light and darkness by turning off various lights at different times of day. Record observations of what can be seen.
- Go outside at different times of day to observe shadows. If it is dark outside, notice light sources too.
- Put on a shadow puppet show by using your hands or other materials.
- Look at pictures taken at different times of the year and describe the weather or season.

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module, such as wayang shadow puppetry, Rjukan (a town in Norway shaded by mountains), shadows, lighthouses, bats in Texas, and seasons.

Find out more about the Sun, Moon, and stars at the NASA Science Space Place: https://spaceplace.nasa.gov/.

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Tips for Families

Level 1

Overview for Families

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Each module has opportunities for students to use the engineering design process, apply what they have learned to solve real-world problems, and present their ideas. For example, in a module on survival, students draw inspiration from animals with protective body parts such as shells and scales, and they design a covering that protects scientists from prickly pond plants.

Discussion and debate will be part of many lessons, as students state their claims, defend their claims with evidence, and ask questions about others' claims. At the end of each module, students will participate in a Socratic Seminar that focuses on the importance of questioning. During the seminar, students will be presented with a rigorous question that encourages them to think critically and apply their learning from the module.

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How is science connected to other disciplines?

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What will my student study in Level 1?

MODULE 1

PUSHES AND PULLS

Essential Question: How do tugboats move cargo ships through a harbor?

SPOTLIGHT LESSONS ON **Weather Conditions**

Essential Question: How can weather data help us make daily choices?

MODULE 2

ENVIRONMENTS

Essential Question: Why are gopher tortoises disappearing?

SPOTLIGHT LESSONS ON **Water**

Essential Question: How do humans depend on natural sources of water?

MODULE 3

SURVIVAL

Essential Question: How do pond plants and pond animals survive in their environment?

SPOTLIGHT LESSONS ON **Earth Materials**

Essential Question: How do people in Mata Ortiz make pottery?

Level 1 • Module 1

Pushes and Pulls with Spotlight Lessons on Weather Conditions

Lesson Overview

Your student is learning how tugboats use pushes and pulls to move cargo ships through a harbor. In Spotlight Lessons on Weather Conditions, students explore characteristics of weather, patterns of seasons, and the effects of weather on daily choices.

Classroom activities for this module include the following:

- Modeling the effects of pushes and pulls on an object's motion
- Recording observations of pushes and pulls
- Investigating stronger and weaker pushes and pulls
- Taking apart an object and identifying it as a system made up of parts
- Creating a model cushion that helps a tugboat stop close to a dock
- Observing and recording weather data
- Analyzing weather data to describe patterns in seasonal weather

Conversation Starters

Support your student's learning with these talking points:

- Discuss the ways pushes and pulls move objects at home or in the community.
- Compare local weather to a different location.
- Discuss how weather influences daily choices.
- Point out patterns of the seasons, such as order of occurrence and changes in the natural world.

Activities

Have fun with these related activities at home:

- Demonstrate pushes and pulls. Use household items, and have your student identify the ways pushes and pulls affect an object's motion.
- Keep a daily weather journal. Have your student use words, drawings, or photographs to record the weather.
- Create a seasons booklet. Have your student draw a season on each page. Then tell them to list activities for each season.

ADDITIONAL RESOURCES

Tugboat by Michael Garland

Pond by Jim LaMarche

Visit your local library or use an online library to explore topics related to the module, such as tugboats, cargo ships, bicycles, weather, and seasonal weather patterns.

Visit an online image library such as Wikimedia Commons and explore a diagram of a tugboat https://commons.wikimedia.org/.

Level 1 • Module 2

Environments with Spotlight Lessons on Water

Lesson Overview

Your student is learning about life in a longleaf pine forest to understand that when one kind of living thing makes changes to its environment to get what it needs, those changes can affect other living things. In Spotlight Lessons on Water, students explore how humans depend on natural sources of water and determine ways to protect and conserve natural sources of water.

Classroom activities for this module include the following:

- Investigating how plants and animals can change their environment
- Exploring changes humans made to longleaf pine forests
- Designing and creating a flowerpot that does not hurt the environment
- Comparing the properties of water bodies
- Investigating how the properties of natural sources of water can change
- Exploring ways to protect water and keep it safe to use

Conversation Starters

Support your student's learning with these talking points:

- Talk about the kinds of plants and animals in your local area and how they change their environment to get what they need.
- Discuss ways that people have changed the environment in your local area.
- Talk about natural sources of water or water bodies near you and how they are used.
- Talk about ways that you use water at home.

Activities

Have fun with these related activities at home:

- Research an animal that builds a shelter. Discuss ways that the animal changes its environment when it creates a shelter.
- Help your student take photos of or sketch ways that animals in your neighborhood change the environment.
- Visit a nearby water body to observe and describe its properties.
- Create a chart of water use at home.

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module, such as longleaf pine forests, gopher tortoises, natural sources of water, and ways to protect and conserve water.

Learn more about longleaf pine forests at https://www.nclongleaf.org/llPineForests.html.

Learn more about how to protect sources of water at https://www.epa.gov/sourcewaterprotection/how-can-you-help-protect-source-water.

Level 1 • Module 3

Survival with Spotlight Lessons on Earth Materials

Lesson Overview

Your student is studying life in a pond environment to learn how plants and animals use their body parts to survive. In Spotlight Lessons on Earth Materials, students explore how humans use natural resources, such as rocks, soil, and water, in the process of making pottery.

Classroom activities for this module include the following:

- Modeling plant and animal body parts and their functions
- Using knowledge of animal body parts to design protective coverings
- Observing how plants and animals use their body parts to interact with living and nonliving things in their environment
- Identifying and describing animal parent behaviors that help offspring survive
- Investigating the effects of heat on objects and materials

Conversation Starters

Support your student's learning with these talking points:

- Talk about the different plants and animals found in your local area.
- Discuss how plants and animals use their body parts to help them survive.
- Discuss examples of animals eating plants or eating other animals in local environments.
- Discuss the use of heat in making pottery and in everyday life, such as cooking food.

Activities

Have fun with these related activities at home:

- Help your student take photos of or sketch plants and animals near your home.
- Check out field guides from the library to help identify local plants and animals.
- Visit a pond or other natural area to observe the plants and animals that live there.
- Observe plants or animals living in aquariums or terrariums.
- Observe and describe nearby soil.

ADDITIONAL RESOURCES

Over and Under the Pond by Kate Messner and Christopher Silas Neal

The Pot That Juan Built by Nancy Andrews-Goebel and David Diaz

Visit your local library or use an online library to explore related topics, such as pond plants and animals, life cycles of animals, how animal parents care for their young, and parts of plants and animals.

Explore ancient Casas Grandes pottery at the Royal Ontario Museum website (http://phdsci.link/2088).

Tips for Families

Level 2

Overview for Families

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Each module has opportunities for students to use the engineering design process, apply what they have learned to solve real-world problems, and present their ideas. For example, in a module on matter, students use their knowledge of materials and the properties of materials to design a shelter that provides protection from rain.

Discussion and debate will be part of many lessons, as students state their claims, defend their claims with evidence, and ask questions about others' claims. At the end of each module, students will participate in a Socratic Seminar that focuses on the importance of questioning. During the seminar, students will be presented with a rigorous question that encourages them to think critically and apply their learning from the module.

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What will my student study in Level 2?

MODULE 1

MATTER

Essential Question: Why do different kinds of birds use certain materials to build their nests?

SPOTLIGHT LESSONS ON **Weather Events**

Essential Question: How can severe weather affect a city?

MODULE 2

SOUND

Essential Question: How does the Recycled Orchestra make music?

SPOTLIGHT LESSONS ON **Objects in the Sky**

Essential Question: What helps sea turtle hatchlings get to the ocean?

MODULE 3

PLANTS

Essential Question: How did local plants recover after the eruption of Mount St. Helens?

SPOTLIGHT LESSONS ON **Living Things and Their Environments**

Essential Question: How can many different kinds of animals live in Big Thicket National Preserve?

Level 2 • Module 1

Matter with Spotlight Lessons on Weather Events

Lesson Overview

Your student is studying the materials birds use to build nests and how the properties of matter make materials suited to specific purposes. Students learn that some objects may change shape or motion when pushed or pulled. In Spotlight Lessons on Weather Events, students explore the ways people use data to predict weather. They will investigate how people are able to prepare for and protect themselves from hurricanes.

Classroom activities for this module include the following:

- Investigating objects and materials to compare and classify them by their different properties
- Conducting an investigation about how pushes and pulls change an object's motion
- Building a rain shelter by using human-made and natural objects suitable for the purpose
- Graphing and analyzing data to describe changes in temperature and precipitation
- Using models to investigate how wind and water move land materials

Conversation Starters

Support your student's learning with these talking points:

- Describe an object by its properties (e.g., texture, flexibility), and have your student guess the object.
- Point out how objects such as building blocks can be combined and assembled, and then recombined and reassembled.
- Discuss how the motion of objects can change because of the strength of a push (e.g., pushing a swing or rolling a toy car).
- Talk about how you prepare for severe weather.

Activities

Have fun with these related activities at home:

- Invite your student to cook or bake with you, and talk about the properties of different ingredients.
- Visit a park or zoo to observe animal homes. Ask your student to describe how the materials used are suitable for the animal home.
- Safely explore melting and freezing at home with different liquids, such as water and juice.
- Use tools such as a thermometer, rain gauge, or wind sock to gather and record weather data.

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module, such as animal architects, bird nest building, building materials, erosion, and severe weather events.

Find current and past weather data at https://www.wunderground.com/.

Level 2 • Module 2

Sound with Spotlight Lessons on Objects in the Sky

Lesson Overview

Your student is studying how the Recycled Orchestra of Cateura makes musical instruments out of discarded objects to understand how vibrating objects produce sound and that sound makes objects vibrate. In Spotlight Lessons on Objects in the Sky, students explore the Sun, Moon, and stars as they explain how sea turtle hatchlings find the ocean at night.

Classroom activities for this module include the following:

- Investigating how instruments and common objects make sound
- Exploring the effects of sound on objects
- Building a device that uses sound to help a teacher communicate during recess
- Observing the Sun, Moon, and stars by using images taken by powerful telescopes
- Investigating objects that reflect light

Conversation Starters

Support your student's learning with these talking points:

- Listen to music with your student and talk about how instruments make different sounds.
- Point out devices that communicate through sound, light, and color, such as traffic signals showing when it is safe to cross a street.
- Discuss what materials people can reuse to make objects around the home.
- Shine a flashlight on different objects. Discuss whether certain objects reflect light.

Activities

Have fun with these related activities at home:

- Use common objects around the home to create sound. Have your student explain what causes the sound.
- Play a game. One person makes a sound out of sight in another room. A second person listens and guesses how the sound was made.
- Find out about local recycling, and create a collection station to use at home.
- Observe the appearance of the Moon and stars in the night sky for several days or weeks.

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module, such as sound, music, reusing and repurposing objects, sea turtles, the Sun and the Moon, astronomy, and light.

Watch a video of the Recycled Orchestra of Cateura: https://www.kennedy-center.org/video/education/music-world/the-cateura-orchestra-of-recycled-instruments/.

Find out more about the Sun, Moon, and stars at the NASA Science Space Place website: https://spaceplace.nasa.gov/.

Level 2 • Module 3

Plants with Spotlight Lessons on Living Things and Their Environments

Lesson Overview

Your student is learning how plants recovered in the Mount St. Helens area after the volcanic eruption in 1980. Students investigate plant growth and model how plants depend on certain interactions for pollination and seed travel. In Spotlight Lessons on Living Things and Their Environments, students explore environments in Big Thicket National Preserve and learn how animals are suited to meet their needs for survival in an environment.

Classroom activities for this module include the following:

- Planning and conducting an investigation about how different amounts of light or water affect plant growth
- Creating a tool to model pollinating a flower
- Developing a model that shows how seeds can travel to new places
- Creating food chain models and identifying producers and consumers
- Observing and describing how animals use body parts and behaviors to meet needs
- Modeling how animals change during their life cycle and meet their needs as they grow

Conversation Starters

Support your student's learning with these talking points:

- Compare local plants and animals with those in a place you have visited or would like to visit.
- Discuss the needs of houseplants.
- Discuss how pets are fed and how they may have different needs for food or water.

Activities

Have fun with these related activities at home:

- Use a field guide from your local library to identify plants in your area.
- Plant a seed such as a lima bean and watch it grow. Keep a journal of the plant's growth by using drawings, labels, and measurements.
- Visit a park or a zoo to take photos or sketch the different animals and the ways they behave. Look for animals working together in groups.

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module, such as plants and pollination, seed travel, animals and animal behaviors, food chains, and life cycles of animals.

Learn more about Mount St. Helens at https://www.usgs.gov/volcanoes/mount-st.-helens and https://www.usda.gov/media/blog/2020/05/18/past-present-and-future-research-mount-st-helens.

Learn more about the plants and animals of Big Thicket National Preserve at https://www.nps.gov/bith/index.htm.

Tips for Families

Level 3

Overview for Families

What is *PhD Science Texas*?

PhD Science® *Texas* is a knowledge-building, phenomenon-driven curriculum. An anchor phenomenon, which is an observable event that can be explained or predicted, gives students a real-world context for their learning. Students explore these compelling phenomena through observation, questioning, modeling, and investigation. The year will be divided into three units of study called modules, some of which are followed by additional Spotlight Lessons. Each module weaves a coherent storyline of science concepts that helps students make sense of the phenomena they are exploring. Spotlight Lessons have the same structure as modules, but they are shorter and highlight additional key concepts that satisfy Texas Essential Knowledge and Skills for Level 3. In both modules and Spotlight Lessons, students apply their knowledge to a new authentic situation or problem.

What will my student do in class?

Students will work, think, and experiment just like scientists do. Science will not be about memorizing facts or reading from a textbook. Instead, the science curriculum will involve hands-on investigations that allow students to develop a deep understanding of science concepts. As students uncover information about the anchor phenomenon, they will ask questions, discover evidence, generate new ideas, and come up with solutions.

Throughout each module, the questions students generate about the phenomenon will be recorded on a driving question board. The driving question board is a chart we will use to organize our questions and guide our learning. We will also create an anchor model and anchor chart to visually express our ideas. These tools help us see how different concepts fit together and how our understanding of the phenomenon is deepening.

Each module has opportunities for students to use the engineering design process, apply what they have learned to solve real-world problems, and present their ideas. For example, in a module on Earth changes, students develop a shoreline protection system to slow or prevent water from changing land along a shoreline.

Discussion and debate will be part of many lessons, as students state their claims, defend their claims with evidence, and ask questions about others' claims. At the end of each module, students will participate in a Socratic Seminar that focuses on the importance of questioning. During the seminar, students will be presented with a rigorous question that encourages them to think critically and apply their learning from the module.

What will a lesson look like?

If you stop by the classroom during science instruction, you will not see students answering questions from a textbook or listening to a lecture. Instead, you will find students in small groups discussing ideas, doing experiments, or reporting their findings. *PhD Science Texas* lessons are designed so students can drive their own learning. Students uncover key concepts by actively engaging in science and engineering practices. They read high-quality, age-appropriate books that spark curiosity, introduce phenomena, and support the development of scientific understanding. Further, students document their learning in a Science Logbook, which allows them to review, reflect, and track how their knowledge has progressed.

How is science connected to other disciplines?

All *PhD Science Texas* modules make connections across scientific fields and academic disciplines. The curriculum highlights connections to math, literacy, and social studies so students can practice using the interdisciplinary approach necessary for real-world tasks. For example, in a module about forces and motion, students listen to a historical audio recording of the first Moon landing and read a book about the Apollo 11 mission to begin to understand how the motion of objects in space and on Earth compare. In addition to cross-curricular connections, all modules include lessons devoted to the application of concepts. In these lessons, students apply science and engineering practices to solve an authentic problem.

How can I help?

With each module you will receive a Family Tip Sheet that outlines the module concepts and includes ideas on how you can support your student at home. The goal of these suggestions is to help students see science everywhere and not just at school. Talking about science, watching science videos, or visiting a museum, park, or zoo are all ways to support your student's learning. For more information about what you can do to help facilitate your student's understanding of science, visit the National Science Teaching Association's Tips for Busy Parents website at https://www.nsta.org/tips-busy-parents.

Is there homework?

PhD Science Texas modules have informal homework assignments to reinforce learning and connect students' understandings to their everyday lives. These assignments often include ideas to discuss with adults at home or questions that prompt a simple exploration. Students are encouraged to report their findings to the class.

How are students assessed?

Student learning is assessed in informal and formal ways. Through questions and classwork, students are informally assessed. Formal tasks to measure learning include a Science Challenge or an Engineering Challenge, an End-of-Module Assessment, and a Socratic Seminar for each module. For Spotlight Lessons, students' understanding of science concepts is evaluated in an End-of-Spotlight Assessment or Engineering Challenge. The balance of ongoing and cumulative assessment allows instruction to be adjusted throughout the module to ensure that students are progressing.

What will my student study in Level 3?

MODULE 1

EARTH CHANGES

Essential Question: How can the island of Surtsey change shape over time?

SPOTLIGHT LESSONS ON **Changes in Matter**

Essential Question: How are used objects turned into new objects during the recycling process?

MODULE 2

SURVIVAL AND CHANGE

Essential Question: How do butterflies survive over time in a changing environment?

MODULE 3

FORCES AND MOTION

Essential Question: Why do objects move differently in space than they do on Earth?

SPOTLIGHT LESSONS ON THE **Solar System**

Essential Question: How can we explain a solar eclipse?

Level 3 • Module 1

Earth Changes with Spotlight Lessons on Changes in Matter

Lesson Overview

Your student is investigating the changing shape of land on the island of Surtsey to learn about how natural events change land over time. In the Spotlight Lessons on Changes in Matter, students explore properties of matter and changes in matter by designing a process to recycle used crayons.

Classroom activities for this module include the following:

- Investigating soil formation and weathering of rocks
- Observing landforms to describe their shape
- Observing and investigating how wind and water interact with land
- Developing, building, and testing a solution to protect the Montauk Point Lighthouse
- Comparing Earth events to describe them as happening slowly or quickly
- Investigating solids, liquids, and gases and observing their properties

Conversation Starters

Support your student's learning with these talking points:

- Point out and discuss the natural features of land in your community.
- Talk about the natural land features of places that you have visited or would like to visit.
- Discuss how wind, water, and human activities change the land in your area.
- Discuss recycling processes in your area.
- Talk about the properties of different solids, liquids, and gases around the home.

Activities

Have fun with these related activities at home:

- Start a rock collection. Use a field guide from your library to identify the rocks.
- Visit a landform near you. Have your student draw the landform and label its observable properties.
- Use national park websites to research landforms in different places.
- Safely explore freezing and then melting liquids, such as water, juice, and milk, and letting them melt.

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module, such as the island of Surtsey, landforms, volcanic eruptions, landslides, soil formation, and ways humans use and conserve natural resources.

Learn more about volcanoes by visiting https://www.nps.gov/havo/learn/nature/volcanoes.htm.

Level 3 • Module 2

Survival and Change

Lesson Overview

Your student is learning how butterflies survive over time in a changing environment. Students will apply this understanding to other animals and plants that have survived or become extinct.

Classroom activities for this lesson include:

- Gathering information about once-living organisms and their past environments by studying fossils, including butterfly fossils
- Observing, measuring, and comparing weather conditions in their present-day environment, including temperature, precipitation, and wind direction
- Observing caterpillars in an artificial habitat to learn about what organisms need from their habitats to survive and what characteristics help them survive
- Exploring the effects of seasonal and long-term environmental changes to explain why these changes may cause some organisms to survive, move, or die
- Writing a letter to community leaders to explain threats to monarch butterflies and to propose a solution to support monarchs' survival

Conversation Starters

Support your student's learning with these talking points:

- Talk about how animals and plants in your area are suited to their habitats.
- Discuss how organisms in a habitat are a part of food chains.
- Discuss how animals and plants are suited to survive different seasons.
- Point out changes happening in your community, such as construction. Discuss the effects of these changes on animal habitats.

Activities

Have fun with these related activities at home:

- Help your student keep a nature journal, where they record observations about nature.
- Plant a butterfly bush (*Buddleja davidii*) and observe the butterflies that visit.
- Visit a natural history museum to explore fossils and timelines of Earth's past.
- Draw or take photos of organisms at a local park or wildlife sanctuary.
- Research an animal. Describe the environment and weather conditions where it lives.

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module, such as environmental changes, local fossils, animal migrations, butterflies, and life cycles of different organisms.

Learn about monarch butterfly migration at https://journeynorth.org/monarchs.

Explore the Florissant Fossil Beds National Monument at https://www.nps.gov/flfo/index.htm.

Level 3 • Module 3

Forces and Motion with Spotlight Lessons on the Solar System

Lesson Overview

Your student is learning about an object's motion on Earth and in space to understand how forces can change the object's motion. In the Spotlight Lessons on the Solar System, students model and describe objects in the Solar System as they investigate a solar eclipse.

Classroom activities for this module include:

- Observing and describing the motion of a soccer ball on Earth and in space
- Making and testing predictions about how an object will move
- Investigating how the forces acting on an object can affect the object's motion
- Investigating magnetic and electric forces
- Using magnets to solve a problem astronauts have
- Gathering information to describe what happens during a solar eclipse
- Investigating which objects in space can cause a solar eclipse

Conversation Starters

Support your student's learning with these talking points:

- Discuss forces and motion in everyday life. Ask questions such as the following: Why does a bike move faster while going downhill?
- Talk about how forces affect the motion of a ball in different sports.
- Ask students how their daily activities might be different on the International Space Station.
- Observe the night sky and talk about which objects in the sky are close to Earth.

Activities

Have fun with these related activities at home:

- Look for magnets in the home to explore how magnets are used in everyday objects.
- Watch a sporting event, and encourage your student to describe the motion of objects they observe and how forces affect the motion.
- Find examples of objects that move in different ways, such swinging, bouncing, or spinning.
- Research facts about a favorite planet.
- Identify examples of light, sound, and thermal energy around the home.

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module such as motion, forces, solar eclipses, and the Solar System.

To learn more about living and working in space, visit https://www.nasa.gov/audience/forstudents/k-4/more_to_explore/Living-Working-In-Space.html.

To learn about the International Space Station, visit https://solc.gsfc.nasa.gov/modules/newkz3/index.html.

Tips for Families

Level 4

Overview for Families

What is *PhD Science Texas*?

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What will my student do in class?

Students will work, think, and experiment just like scientists do. Science will not be about memorizing facts or reading from a textbook. Instead, the science curriculum will involve hands-on investigations that allow students to develop a deep understanding of science concepts. As students uncover information about the anchor phenomenon, they will ask questions, discover evidence, generate new ideas, and come up with solutions.

Throughout each module, the questions students generate about the phenomenon will be recorded on a driving question board. The driving question board is a chart we will use to organize our questions and guide our learning. We will also create an anchor model and anchor chart to visually express our ideas. These tools help us see how different concepts fit together and how our understanding of the phenomenon is deepening.

Each module has opportunities for students to use the engineering design process, apply what they have learned to solve real-world problems, and present their ideas. For example, in a module on energy, students design their own light-generating device.

Discussion and debate will be part of many lessons, as students state their claims, defend their claims with evidence, and ask questions about others' claims. At the end of each module, students will participate in a Socratic Seminar that focuses on the importance of questioning. During the seminar, students will be presented with a rigorous question that encourages them to think critically and apply their learning from the module.

What will a lesson look like?

If you stop by the classroom during science instruction, you will not see students answering questions from a textbook or listening to a lecture. Instead, you will find students in small groups discussing ideas, doing experiments, or reporting their findings. *PhD Science Texas* lessons are designed so students can drive their own learning. Students uncover key concepts by actively engaging in science and engineering practices. They read high-quality, age-appropriate books that spark curiosity, introduce phenomena, and support the development of scientific understandings. Further, students document their learning in a Science Logbook, which allows them to review, reflect, and track how their knowledge has progressed.

How is science connected to other disciplines?

All *PhD Science Texas* modules make connections across scientific fields and academic disciplines. The curriculum highlights connections to math, literacy, and social studies so students can practice using the interdisciplinary approach necessary for real-world tasks. For example, in a module about Earth's features, students read historical accounts of the exploration of the Grand Canyon and use world maps to better understand where different land features are located. In addition to cross-curricular connections, all modules include lessons devoted to the application of concepts. In these lessons, students apply science and engineering practices to solve an authentic problem.

How can I help?

With each module you will receive a Family Tip Sheet that outlines the module concepts and includes ideas on how you can support your student at home. The goal of these suggestions is to help students see science everywhere and not just at school. Talking about science, watching science videos, or visiting a museum, park, or zoo are all ways to support your student's learning. For more information about what you can do to help facilitate your student's understanding of science, visit the National Science Teaching Association's Tips for Busy Parents website at https://www.nsta.org/tips-busy-parents.

Is there homework?

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How are students assessed?

Student learning is assessed in informal and formal ways. Through questions and classwork, students are informally assessed. Formal tasks to measure learning include a Science Challenge or Engineering Challenge, an End-of-Module Assessment, and a Socratic Seminar. For Spotlight Lessons, students' understanding of science concepts is evaluated in an End-of-Spotlight Assessment or Engineering Challenge. The balance of ongoing and cumulative assessment allows instruction to be adjusted throughout the module to ensure that students are progressing.

What will my student study in Level 4?

MODULE 1

EARTH FEATURES

Essential Question: How did the Grand Canyon's features form?

SPOTLIGHT LESSONS ON **Mixtures and Solutions**

Essential Question: How can pollution be removed from water bodies?

MODULE 2

ENERGY

Essential Question: How do windmills change wind to light?

SPOTLIGHT LESSONS ON **Earth and Space**

Essential Question: How can patterns in nature be used to make predictions?

MODULE 3

PLANTS IN THE ENVIRONMENT

Essential Question: Why are some plants in Big Thicket National Preserve carnivorous?

Level 4 • Module 1

Earth Features with Spotlight Lessons on Mixtures and Solutions

Lesson Overview

Your student is learning how the Grand Canyon's features formed and how Earth's features change because of natural processes and human activities. In Spotlight Lessons on Mixtures and Solutions, students learn about water pollution to explore how matter is described and classified by its physical properties.

Classroom activities for this module include the following:

- Describing past environments from observations of fossils in rock layers
- Investigating how weathering, erosion, and deposition change Earth's surface
- Studying dams to learn how humans harness energy and change Earth's features
- Classifying materials by state of matter, mass, magnetism, density relative to water, and whether they are soluble in water

Conversation Starters

Support your student's learning with these talking points:

- Talk about land and water features in your area or in places you have visited.
- Notice how the landscape changes after natural events, such as a rainstorm, and look for evidence of weathering or erosion.
- Discuss ways that people change the landscape to meet needs for transportation or homes.
- Classify objects at home by their properties.

Activities

Have fun with these related activities at home:

- Start a rock collection, and use a field guide to help classify the rocks.
- On a walk or drive, have your student describe land and water features observed.
- Research a dam, landform, or water feature. Visit and take photos or sketch details. If you visit a dam, discuss its purpose.
- Investigate materials at home to see if they are water soluble or whether they float or sink in water.

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module, such as renewable and nonrenewable resources, the Colorado River, national parks, and materials' properties.

See short videos about the Grand Canyon at https://www.nps.gov/grca/learn/photosmultimedia/grand-canyon-in-depth.htm.

Learn more about fossils at the Grand Canyon at https://www.nps.gov/grca/learn/nature/fossils.htm.

See short videos about water pollution at https://marinedebris.noaa.gov/discover-issue/trash-talk.

Level 4 • Module 2

Energy

Lesson Overview

Your student is learning how windmills change wind to light to understand how energy can be transformed and transferred. Students participate in a variety of investigations to explore how energy can travel, change form, and cause changes to objects and to parts of a system.

Classroom activities for this module include the following:

- Observing and classifying energy at different energy stations
- Investigating speed, forces, and collisions to show energy transfer
- Exploring and modeling how energy transfers and transforms in different systems
- Investigating circuits, conductors, and insulators of energy
- Building a simple generator to observe how a windmill transforms energy
- Creating a device with materials from the classroom to harness energy

Conversation Starters

Support your student's learning with these talking points:

- Talk about energy in the community. Discuss how it is produced and delivered to homes, schools, and businesses.
- Discuss how energy is used in different rooms of the home or at different times of day.
- Classify energy found and used in the home into categories, such as sound, heat, or light energy.
- Discuss conductors and insulators found in the home, such as the parts of cooking utensils, oven mitts, and pots or pans.

Activities

Have fun with these related activities at home:

- Use objects found in the home to safely demonstrate transfer of energy.
- Safely take apart a flashlight or other small object that uses energy. Observe the parts and research how energy makes the object work.
- Observe the relationship between speed and energy, such as how wind speed affects a pinwheel or flag.
- Make a list of ways to conserve energy, such as turning off lights or using public transportation. Choose an idea to try for a week.

ADDITIONAL RESOURCES

The Boy Who Harnessed the Wind by William Kamkwamba and Bryan Mealer

Visit your local library or use an online library to explore topics related to the module, such as windmills and wind turbines, the country of Malawi, and different energy systems, circuits, and machines.

Learn more about energy topics at https://www.eia.gov/kids/.

Explore games and articles about energy at https://climatekids.nasa.gov/menu/energy/.

Level 4 • Module 3

Plants in the Environment

Lesson Overview

Your student is learning how the carnivorous plants of Big Thicket National Preserve survive. Students use the classroom's carnivorous plant terrarium, historic weather data, and radish seedlings to study the relationship between plants and the environment.

Classroom activities for this module include the following:

- Analyze the characteristics of plant parents and their offspring
- Model how the structures of plants help them survive in different environments
- Compare historical weather data and climates to identify a plant's needs
- Observe a water cycle model to learn how water moves through the environment
- Interpret plant growth data to determine what resources plants need to survive
- Identify the roles of producers, consumers, and decomposers in the environment

Conversation Starters

Support your student's learning with these talking points:

- Talk about the plants and animals in your area or places you've visited.
- Discuss similarities and differences in the characteristics of local plants and animals.
- Compare your current weather to the weather during each season or to places you have been.
- Discuss what resources humans use from their environment compared with what plants use.
- Notice what types of plants and animals are a part of your diet.

Activities

Have fun with these related activities at home:

- On a walk or drive, discuss the roles of the plants and animals you see in their environment.
- Grow a plant at home or observe a plant that lives nearby. Record how the plant changes over time.
- Put water in two dishes. Place one dish in an area that receives sunlight and the other in the shade. Check on the dishes once per day and discuss any observations.
- Plan a visit to a local town or state park.

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module, such as carnivorous plants, inherited traits, acquired traits, climate, water cycle, decomposers, producers, consumers, and food webs.

Explore the plants and animals of Big Thicket National Preserve at https://www.nps.gov/bith/index.htm.

Learn more about your area by reading about your local state park at https://tpwd.texas.gov/state-parks/parks-map.

Tips for Families

Level 5

Overview for Families

What is *PhD Science Texas*?

PhD Science® *Texas* is a knowledge-building, phenomenon-driven curriculum. An anchor phenomenon, which is an observable event that can be explained or predicted, gives students a real-world context for their learning. Students explore these compelling phenomena through observation, questioning, modeling, and investigation. The year will be divided into three units of study called modules, some of which are followed by additional Spotlight Lessons. Each module weaves a coherent storyline of science concepts that helps students make sense of the phenomena they are exploring. Spotlight Lessons have the same structure as modules, but they are shorter and highlight additional key concepts that satisfy Texas Essential Knowledge and Skills for Level 5. In both modules and Spotlight Lessons, students apply their knowledge to a new authentic situation or problem.

What will my student do in class?

Students will work, think, and experiment just like scientists do. Science will not be about memorizing facts or reading from a textbook. Instead, the science curriculum will involve hands-on investigations that allow students to develop a deep understanding of science concepts. As students uncover information about the anchor phenomenon, they will ask questions, discover evidence, generate new ideas, and come up with explanations and solutions.

Throughout each module, the questions students generate about the phenomenon will be recorded on a driving question board. The driving question board is a chart we will use to organize our questions and guide our learning. We will also create an anchor model and anchor chart to visually express our ideas. These tools help us see how different concepts fit together and how our understanding of the phenomenon is deepening.

Each module has opportunities for students to use the engineering design process, apply what they have learned to solve real-world problems, and present their ideas. For example, in a module on ecosystems, students research and propose solutions to reduce the impact of invasive species on an ecosystem.

Discussion and debate will be part of many lessons, as students state their claims, defend their claims with evidence, and ask questions about others' claims. At the end of each module, students will participate in a Socratic Seminar that focuses on the importance of questioning. During the seminar, students will be presented with a rigorous question that encourages them to think critically and apply their learning from the module.

What will a lesson look like?

If you stop by the classroom during science instruction, you will not see students answering questions from a textbook or listening to a lecture. Instead, you will find students in small groups discussing ideas, doing experiments, or reporting their findings. *PhD Science Texas* lessons are designed so students can drive their own learning. Students uncover key concepts by actively engaging in science and engineering practices. They read high-quality, age-appropriate books that spark curiosity, introduce phenomena, and support the development of scientific understandings. Further, students document their learning in a Science Logbook, which allows them to review, reflect, and track how their knowledge has progressed.

How is science connected to other disciplines?

All *PhD Science Texas* modules make connections across scientific fields and academic disciplines. The curriculum highlights connections to math, literacy, and social studies so students can practice using the interdisciplinary approach necessary for real-world tasks. For example, in a module about Earth processes, students learn about the formation of different landforms and natural resources in the Chihuahuan Desert. Students use math to compare methods of water conservation and use maps to understand the landscape of the desert and to compare landforms in other areas of the world. In addition to cross-curricular connections, all modules include lessons devoted to the application of concepts. In these lessons, students apply science and engineering practices to solve an authentic problem.

How can I help?

With each module you will receive a Family Tip Sheet that outlines the module concepts and includes ideas on how you can support your student at home. The goal of these suggestions is to help students see science everywhere and not just at school. Talking about science, watching science videos, or visiting a museum, park, or zoo are all ways to support your student's learning. For more information about what you can do to help facilitate your student's understanding of science, visit the National Science Teaching Association's Tips for Busy Parents website at https://www.nsta.org/tips-busy-parents.

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Student learning is assessed in informal and formal ways. Through questions and classwork, students are informally assessed. Formal tasks to measure learning include a Science Challenge or an Engineering Challenge, an End-of-Module Assessment, and a Socratic Seminar. For Spotlight Lessons, students' understanding of science concepts is evaluated in an End-of-Spotlight Assessment or Engineering Challenge. The balance of ongoing and cumulative assessment allows instruction to be adjusted throughout the module to ensure that students are progressing.

What will my student study in Level 5?

MODULE 1

EARTH PROCESSES

Essential Question: What can the landscape of the Chihuahuan Desert reveal about changes to Earth's surface?

SPOTLIGHT LESSONS ON **Physical Properties of Matter**

Essential Question: How can we use the properties of pollution to clean up the environment?

MODULE 2

ECOSYSTEMS

Essential Question: How can trees support so much life?

MODULE 3

SUN, EARTH, AND MOON SYSTEM

Essential Question: How can we explain our observations of the Sun, the Moon, and stars from Earth?

SPOTLIGHT LESSONS AND A CAPSTONE PROJECT ON **Forces, Motion, and Energy**

Essential Question: How does a light rail train system work?

Level 5 • Module 1

Earth Processes with Spotlight Lessons on Physical Properties of Matter

Lesson Overview

Your student is learning how Earth processes shape the landscape of the Chihuahuan Desert. Students investigate how Earth's surface has changed over time and gather clues about the past revealed in natural materials. In Spotlight Lessons on Physical Properties of Matter, students explore properties of matter through the phenomenon of pollution. Students observe substances, classify them by properties, and investigate properties that remain in some mixtures.

Classroom activities for this module include the following:

- Modeling and describing water particles and the interaction between the Sun and ocean in the water cycle
- Using Earth materials to model and investigate the formation of landforms, including valleys, canyons, deltas, and sand dunes
- Researching the formation of sedimentary rocks and fossil fuels
- Designing and testing solutions for water conservation
- Analyzing a density column to compare the densities of different substances

Conversation Starters

Support your student's learning with these talking points:

- Discuss the role of weather in the water cycle.
- Compare local landforms with landforms at a familiar location. Predict how wind, water, and ice may continue to shape the landscape.
- Point out exposed rock layers, such as at a road cut, and wonder about their history.
- Discuss natural resources and solutions for conservation used in everyday life.

Activities

Have fun with these related activities at home:

- Use online mapping services to create a scavenger hunt that includes local landforms.
- Use a field guide to find and identify sedimentary rocks in the local environment.
- Research different sources of energy used in your home and community.
- Identify the physical properties of various materials around the home, and compare the materials by using their properties.

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module such as the water cycle, landforms, sedimentary rocks and fossil fuels, the Chihuahuan Desert, mixtures and solutions, pollution, and natural resource conservation.

Learn more about the Chihuahuan Desert ecoregion at https://www.nps.gov/im/chdn/ecoregion.htm.

Discover Texas geology at https://txpub.usgs.gov/txgeology/.

Level 5 • Module 2

Ecosystems

Lesson Overview

Your student is discovering how ecosystems work by studying how the plants and animals around a mangrove tree interact.

Classroom activities for this module include:

- Planning and conducting an investigation to determine the source of plant matter
- Modeling how matter cycles among plants, animals, decomposers, and the environment
- Modeling the flow of energy through an ecosystem
- Identifying and explaining how instinctual and learned behavior traits help animals survive in their environment
- Developing ways to reduce the impact of the emerald ash borer on ecosystems

Conversation Starters

Support your student's learning with these talking points:

- Talk about the plants and animals in your community and how they form an ecosystem.
- Discuss how you use the energy from your food. Work together to trace the energy in your food back to the Sun.
- Discuss how humans affect the plant and animal life in your community.

Activities

Have fun with these related activities at home:

- Observe a tree, and look for the ways it supports other organisms around it.
- Create a food web featuring local organisms.
- Research invasive species in your area. Find out what local agencies or conservation groups are doing to help minimize damage to ecosystems by invasive species.
- Participate in a park cleanup, and talk about why it is important to maintain shared green spaces.

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module, such as trees, invasive species, the water cycle, food webs, and properties of soils.

Learn more about mangroves at https://ocean.si.edu/ocean-life/plants-algae/mangroves.

Visit the mangroves in Everglades National Park at https://www.nps.gov/ever/learn/nature/mangroves.htm.

Level 5 • Module 3

Sun, Earth, and Moon System with Capstone Project on Forces, Motion, and Energy

Lesson Overview

Your student is learning why the Sun, Moon, and stars appear as they do from Earth. Students develop and refine models from the perspectives of Earth and of space to explain their views of celestial objects. In a Capstone Project on forces, motion, and energy, students explore forces and energy forms used by a light rail system and design an accessible transit solution.

Classroom activities for this module include:

- Investigating how the angle and direction of a light source affect shadows
- Modeling the rotation of Earth on its axis in the Earth–Sun system
- Analyzing moonrise and moonset times and modeling the Moon's orbit around Earth
- Analyzing star maps from different times of year
- Investigating how forces of different strengths affect the speed of a model train
- Developing a circuit to model the flow of electricity through a light rail system

Conversation Starters

Support your student's learning with these talking points:

- Discuss how observations of the sky elsewhere compare with observations from your location.
- Imagine you are lost without a map. What landmarks could you use to get back home?
- Discuss the advantages and disadvantages of exploring outer space.
- Talk about energy indicators in your home.

Activities

Have fun with these related activities at home:

- Observe shadows on a sunny day. Explain what can make shadows look different.
- Look for moving objects in the night sky, and identify whether they are human-made or natural.
- Observe the Moon's shape and location in the sky at the same time for several days. Explain why the Moon's shape and location change.

ADDITIONAL RESOURCES

Visit your local library or use an online library to explore topics related to the module such as Earth, the Sun, the Moon, stars, electricity, and light rail systems.

Explore different activities related to space at https://www.jpl.nasa.gov/edu/learn/.

Explore gravity and orbit simulations at https://phet.colorado.edu/en/simulations/gravity-and-orbits.