



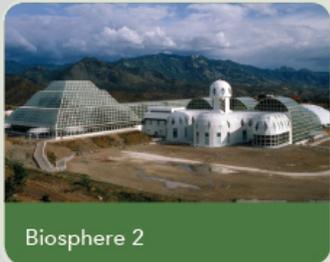
SCIENCE
TECHBOOK

Grade 6 Unit Outlines

Unit Storyline

In this unit, students are presented with NOAA data depicting how the land and ocean temperature has changed between 1981-2010. Student questions about the causes of the changes displayed in the data, drive their learning in the first concept where they evaluate a climate change model depicting a larger change in global temperatures than predicted by natural forces. Students build upon their understanding of the causes of climate change by investigating the impact of climate change on organisms, specifically the monarch butterfly. The impact of organisms, including humans, and their actions on the environment and the role it plays in climate change is presented with primary source data related to cattle populations. Students communicate their understanding of the interdependent relationship of organisms and climate change when designing a solution to reduce the impact of cow's methane production on the environment.

Anchor Phenomena: Measuring Climate Change



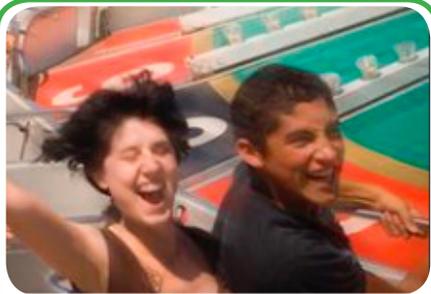
Quick Code:
ca6005s

Students will learn about Biosphere 2, a series of buildings in which scientists enclosed various organisms to determine what resources and conditions humans would need to live on Mars. Students will examine the systems needed for survival and their interactions.

Unit Project Preview: Martian Biosphere

Students will consider the elements and systems needed for a successful human habitat on another planet.

Concepts



1.1 Body Systems



1.2 The Cell as a System



1.3 Earth's Interacting Systems

Investigative Phenomena

1.1 Thrill Rides



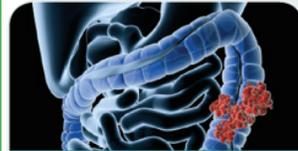
Activity 2
Ask Questions
Thrill Rides



Quick Code:
ca6010s

Living things are organized into systems and subsystems that work together to maintain life.

1.2 Colon Cancer



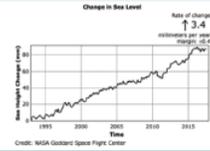
Activity 2
Ask Questions
Colon Cancer



Quick Code:
ca6044s

Even at a smaller scale, living things can be organized into systems and subsystems. The effects can be devastating when part of the system malfunctions.

1.3 Change in Global Sea Level



Activity 2
Ask Questions
Change in Global Sea Level



Quick Code:
ca6066s

Earth's systems interact by transferring matter and energy.

Unit Project: Martian Biosphere

Students will determine what Earth systems need to be included in a Martian habitat and how those systems contribute to survival in the Martian habitat.

Unit Performance Assessment (CAST-Like): Systems Analysis

Students analyze data from two natural systems to evaluate cause-and-effect relationships related to the flow of water, evaluate each of the two systems using systems models, and draw comparisons between the two systems.



Optional Project Based Learning Pathway

HOW DO I RESIST?: Students investigate a common challenge faced by many communities around the world: antibiotic resistance of bacteria. Working in teams, students design an app to inform the school and community of this dangerous, health-threatening trend.

Unit Storyline

In this unit, students are presented with examples of how weather is not the same across regions of Earth, including California, and how weather patterns cycle with the seasons. Students gather evidence of the impact on the energy and water cycle to solve the investigative phenomenon of decrease in the water level in Lake Mead. Students are presented with a farm family from Central Valley of California and the impact of lack of precipitation has on their ability to grow crops. Throughout the concept, students interpret data related to regional temperature, cold and warm fronts, and rainfall in various locations in California. Students summarize their learning for the unit by examining a satellite photo of California and explain how landforms impact weather patterns and how the weather impacts vegetation across the state.

Anchor Phenomena: What's Today's Weather



What's Today's Weather?



Quick Code:
ca6251s

Students will learn how energy transformation, the water cycle, and atmospheric properties play a role in California's weather patterns.

Unit Project Preview: Weather Patterns in California

Students will begin thinking about how landforms impact weather for a region.

Concepts



2.1 Energy Transfer in the Water Cycle



2.2 Weather Patterns

Investigative Phenomena

2.1 Lake Mead



Activity 2
Ask Questions
Lake Mead



Quick Code:
ca6255s

In this activity, students will watch a video and use their observations of beakers left overnight to describe possible causes of cycling of water through Earth's systems.

2.2 Farming in the Desert



Quick Code:
ca6811s

In this activity, students will watch a video about farming in southern California and begin to identify cause-and-effect relationships related to weather and conditions necessary for farming in two different regions of California.

Unit Project: Weather Patterns in California

Students will analyze the connections among geography, landforms, and the resulting weather and climate in the United States overall and in California.

Unit Performance Assessment (CAST-Like): El Niño in California

In this activity, students analyze and interpret text and data related to an El Niño event and its effects on California's weather. They also analyze and interpret a weather map of California to identify the phenomenon represented and construct an argument to explain their answer based on evidence gathered through the activity.



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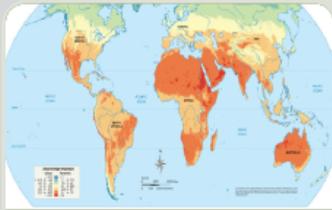
Optional Project Based Learning Pathway

HOW DO I RESIST?: Students investigate a common challenge faced by many communities around the world: antibiotic resistance of bacteria. Working in teams, students design an app to inform the school and community of this dangerous, health-threatening trend.

Unit Storyline

In this unit, students look for patterns in annual average temperatures across the globe and are expected to uncover why regions in the tropics experience higher average temperatures than the poles. Students are also asked to initiate their thinking on how these patterns in temperature have an impact on living things. In each concept of the unit, students investigate different regions with immoderate temperatures such as the desert, arctic tundra and tropical waters. Students model how the transfer of energy from the sun, global winds, and ocean currents impacts the climate in regions of the world. After establishing the why regions have differences in climate, students construct explanations on the impact of regional climates on the biodiversity of organisms able to survive and thrive in specific regions, such as the potato, first cultivated in the southern part of Peru and the northern part of Bolivia, and the caribou in the arctic. Students apply the core ideas of the unit by returning to the world map and indicating where bananas would be successful as a crop. Students conduct research and propose solutions on how to modify or develop a technology tool to help a food, of their choosing, grow in a region with less than ideal climate.

Anchor Phenomena: Annual Average Temperature



Annual Average Temperature



Quick Code:
ca6505s

Students will learn about the causes for different climate regions and the impact that these regions have on living things.

Unit Project Preview: Engineering a Better Banana

Students will begin to think of the factors that may impact the growth patterns of fruit.

Concepts



3.1 Creating Climate Regions



3.2 Environmental & Genetic Influences



3.3 Reproductive Success



3.4 Heredity

Investigative Phenomena

3.1 Desert Precipitation



Activity 2
Ask Questions
Deserts



Quick Code:
ca6510s

As students watch, pause frequently to let them write in a notebook to describe what they see and to make predictions about what they think will happen next.

3.2 Growth of Caribou in Arctic



Activity 2
Ask Questions
Caribou on Thin Ice



Quick Code:
ca6533s

In the video segment Caribou on Thin Ice, students get a glimpse of the migration of the caribou in the Arctic biome.

3.3 Sea Turtle Reproduction



Activity 2
Ask Questions
Nests and Hatchlings



Quick Code:
ca6556s

Use the video segment Nests and Hatchlings to introduce the concept of animal and plant reproduction.

3.4 Potato Biodiversity



Activity 2
Ask Questions
Maintaining Potato Biodiversity



Quick Code:
ca6578s

Have students watch the video segment Let's Investigate Maintaining Potato Biodiversity.

Unit Project: Engineering a Better Banana

Students will connect trait selection with the engineering of desirable traits in food and link these ideas with the climates where fruit is usually grown.

Unit Performance Assessment (CAST-Like): Can the Meltwater Stonefly Survive?

In this activity, students investigate the relationships between the environment and the survival of the meltwater stonefly.



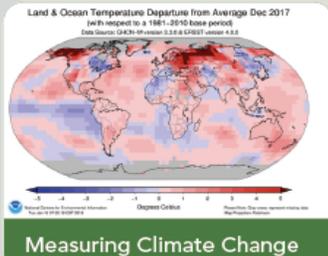
Optional Project Based Learning Pathway

HOW DO I RESIST?: Students investigate a common challenge faced by many communities around the world: antibiotic resistance of bacteria. Working in teams, students design an app to inform the school and community of this dangerous, health-threatening trend.

Unit Storyline

In this unit, students are presented with NOAA data depicting how the land and ocean temperature has changed between 1981-2010. Student questions about the causes of the changes displayed in the data, drive their learning in the first concept where they evaluate a climate change model depicting a larger change in global temperatures than predicted by natural forces. Students build upon their understanding of the causes of climate change by investigating the impact of climate change on organisms, specifically the monarch butterfly. The impact of organisms, including humans, and their actions on the environment and the role it plays in climate change is presented with primary source data related to cattle populations. Students communicate their understanding of the interdependent relationship of organisms and climate change when designing a solution to reduce the impact of cow's methane production on the environment.

Anchor Phenomena: Measuring Climate Change



Quick Code:
ca6751s

Students will learn about Biosphere 2, a series of buildings in which scientists enclosed various organisms to determine what resources and conditions humans would need to live on Mars. Students will examine the systems needed for survival and their interactions.

Unit Project Preview: Cow Pollution

Students will brainstorm solutions to reduce the impact of cows' methane production.

Concepts



4.1 Causes of Climate Change



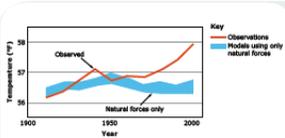
4.2 Climate Change Impacts Organisms



4.3 Reducing Human Environmental Impacts-

Investigative Phenomena

4.1 Climate Change Models



Activity 2
Ask Questions
Climate Change Models



Quick Code:
ca6755s

Students should interpret the graph
Climate Change Models.

4.2 Monarch Butterfly Migration



Activity 2
Ask Questions
Migration Journey of the Monarch
Butterfly



Quick Code:
ca6782s

In this concept, students will consider
how the environment plays a role in
animal behaviors such as migration
and hibernation.

4.3 Cattle Population in the US



Activity 2
Ask Questions
Cattle Population in the
United States



Quick Code:
ca6804s

In this unit Have students begin to
think about why there is a need for
so many cattle, and what challenges
farmers face in raising these cattle.

Unit Project: Cow Pollution

Students consider how cows influence atmospheric chemistry and design a solution to reduce their impact. They work in small groups to develop and modify their designs.

Unit Performance Assessment (CAST-Like): Silvopasture

In this activity, students analyze the effects of combining pasture and trees for raising livestock and design strategies to limit the impact of grazing on the environment.



Optional Project Based Learning Pathway

HOW DO I RESIST?: Students investigate a common challenge faced by many communities around the world: antibiotic resistance of bacteria. Working in teams, students design an app to inform the school and community of this dangerous, health-threatening trend.



SCIENCE
TECHBOOK

Grade 7 Unit Outlines

Unit Storyline

In this unit, students investigate real-world applications of how particles of matter can be rearranged to make materials used for various purposes, including prosthetic legs. Throughout the unit, students are introduced to some outrageous and unique materials, and their real-world applications, to drive their questions on the properties of matter. Students begin to break down the structure of materials with states of matter, specifically the unique properties of dry ice. Liquid Nitrogen serves as a catalyst into how changes in energy impact the behavior of materials. Students end the unit with a more familiar phenomenon, an everyday match, to begin thinking about how the interaction of materials can cause particles to rearrange to create new compounds. Students complete the unit by returning to the prosthetic leg example, and select their own material to research and communicate the properties of the material and the appropriate applications for the material.

Anchor Phenomena: Particles for Performance



Particles for Performance



Quick Code:
ca7006s

Students will apply what they learned about particles of matter and how they interact with each other to design new and useful forms of matter, such as prosthetic legs.

Unit Project Preview: Engineered Materials for Better Living

Students will consider how invented and modified materials have improved their lives.

Concepts



1.1 Particles in States of Matter



1.2 Energy and Changing States



1.3 The Composition of Matter

Investigative Phenomena

1.1 Dry Ice



Activity 2
Ask Questions
Dry Ice



Quick Code:
ca7010s

In this activity, students will use prior knowledge and ask questions to contrast the three states of matter commonly found on Earth.

1.2 Liquid Nitrogen



Activity 2
Ask Questions
Liquid Nitrogen



Quick Code:
ca7034s

In this activity, students will apply previous knowledge of phases of matter to develop questions about what happens to liquid nitrogen when thermal energy is added to the substance.

1.3 Chemical Changes



Activity 2
Ask Questions
Chemical Changes



Quick Code:
ca7053s

In this activity, students will record observations when a match is burned and generate questions regarding the creation of new substances.

Unit Project: Engineered Materials for Better Living

Students will research the structure, properties, applications, and invention of a material developed by scientists and engineers and connect its structure to its properties and uses.

Unit Performance Assessment (CAST-Like): Look Around You

In this activity, students will construct models to distinguish matter forming living and nonliving things and use their knowledge of how atoms are combined with one another in various ways.



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Optional Project Based Learning Pathway

FARMING TO FEED THE EARTH: In this unit, students focus on composting and sustainable farming as partial solutions to global hunger. Students design effective organic composting techniques to increase crop yield.

Unit Storyline

In this unit, students make high level connections related to large and small scale systems of energy flow at the beach. In the first concept, wildfires provide the context for students to think about the physical and chemical changes that occur to the environment during a wildfire. Large scale organisms, like the sequoia trees, allow students to ground their thinking as they dive into how energy and matter plays a role in the growth of the great trees. Students lift away Earth's crust to investigate how energy is transferred through the rock cycle, as they are presented with an extreme phenomenon of the most active volcano on Earth. Students summarize their big picture connections of how matter and energy is cycled to construct an explanation of how energy from waves and humans impact the rock cycle on the beach.

Anchor Phenomena: Matter and Energy at the Beach



Students will learn how energy flows and matter cycles through rocks and all living things and why these processes are so important to life on Earth.

Unit Project Preview: The Importance of Beaches

Students will begin to think about information they should collect to report on how human activities impact energy flow at the beach.

Concepts



2.1 How Matter Can Change



2.2 Matter and Energy in Living Systems



2.3 Formation of Rocks

Investigative Phenomena

2.1 Dry Ice



Activity 2
Ask Questions
Wine Country Fires in California



Quick Code:
ca7258e

Students will gather information from media to analyze and interpret data to provide evidence for burning as a chemical change.

2.2 The Largest Tree in the World



Activity 2
Ask Questions
The Largest Tree in the World



Quick Code:
ca7275s

In this activity, students will gather information from a video to construct an explanation of how trees obtain energy to grow.

2.3 Kilauea



Activity 2
Ask Questions
Kilauea



Quick Code:
ca7296s

In this activity, students will construct questions around the cycling of matter and energy of Kilauea.

Unit Project: The Importance of Beaches

Students will play investigative reporters, exposing the impact of human activities on the rock cycle at the beach. They will provide a report that will identify how energy flows and matter cycles through beaches.

Unit Performance Assessment (CAST-Like): Everything Is Connected

In this activity, students will analyze the Hawaiian ecosystem, develop models of the rock cycle associated with volcanic activity and the cycle of energy and matter, and construct a scientific explanation for the conservation of matter in these cycles.

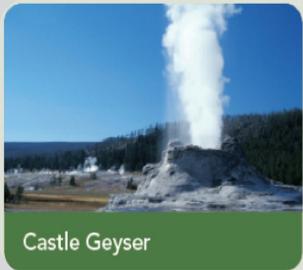
 |  **Optional Project Based Learning Pathway**

FARMING TO FEED THE EARTH: In this unit, students focus on composting and sustainable farming as partial solutions to global hunger. Students design effective organic composting techniques to increase crop yield.

Unit Storyline

In this unit, students are confronted with the scientific claim that Yellowstone is home to a supervolcano and asked to consider the impact on the local ecosystem if the supervolcano erupts again. Students investigate Earth's moving surface, particularly paying attention to the frequency of earthquakes in California. Students continue to develop their understanding of the unique land features and natural resources of California as they uncover why gold-diggers were drawn to California. Students model energy flow through ecosystems in order to generate evidence to argue how an additional eruption at Yellowstone park would influence the ecosystem.

Anchor Phenomena: Yellowstone Super Volcano



Castle Geyser



dlc.com/ca7505s

Students will apply what they learned about interactions between individual rocks and individual organisms to understand systems such as evident in Yellowstone National Park.

Unit Project Preview: Landscape Changes

Students will begin to think about and sketch a possible solution to reduce or prevent landscape erosion.

Concepts



3.1 Earth's Moving Surface



3.2 Earth's Natural Resources



3.3 Interactions in Ecosystems

Investigative Phenomena

3.1 The San Francisco Earthquake



Activity 2
Ask Questions
The San Francisco Earthquake of 1989



Quick Code:
ca7510s

In this activity, students obtain scientific information contained in media to ask questions about the causes and effects of earthquakes.

3.2 California Gold Rush



Activity 2
Ask Questions
California Gold Rush



Quick Code:
ca7529s

In this activity, students ask questions that arise from scientific information presented in a video about the California Gold Rush.

3.3 Life in Death Valley



Activity 2
Ask Questions Like a Scientist
Life in Death Valley



Quick Code:
ca7555s

In this activity, students gather scientific information from media to construct an explanation for how resource availability affects organisms living in Death Valley.

Unit Project: The Yellowstone Supervolcano

In groups, students will research the effects of the Yellowstone volcano on the park's ecosystem and create a presentation describing these effects.

Unit Performance Assessment (CAST-Like): Unfamiliar Ecosystems

In this activity, students apply models of hydrothermal vents to explain why the chemistry of the vent changes over distance and how energy is supplied to organisms living in the ecosystem.

| Optional Project Based Learning Pathway

BIG IDEA: In this unit, students focus on composting and sustainable farming as partial solutions to global hunger. Students design effective organic composting techniques to increase crop yield.

Unit Storyline

In this unit, students are presented with NOAA data depicting how the land and ocean temperature has changed between 1981-2010. Student questions about the causes of the changes displayed in the data, drive their learning in the first concept where they evaluate a climate change model depicting a larger change in global temperatures than predicted by natural forces. Students build upon their understanding of the causes of climate change by investigating the impact of climate change on organisms, specifically the monarch butterfly. The impact of organisms, including humans, and their actions on the environment and the role it plays in climate change is presented with primary source data related to cattle populations. Students communicate their understanding of the interdependent relationship of organisms and climate change when designing a solution to reduce the impact of cow's methane production on the environment.

Anchor Phenomena: Measuring Climate Change



Quick Code:
ca7750s

Students will investigate the ways in which natural disasters, human activity, and ecosystems are intertwined to explain events like mega-landslides, how they are related to natural events and human activity, and how they impact ecosystems.

Unit Project Preview: Mega-Landslides, People, and Ecosystems

Students will connect causes and effects of natural disasters such as landslides depicted in the anchor phenomenon video for the unit.

Concepts



4.1 Mass Wasting



4.2 Synthetic Materials



4.3 Human Impact on Ecosystems

Investigative Phenomena

4.1 Deadly Mudslides in California



Activity 2
Ask Questions
Deadly Mudslides in California



Quick Code:
ca7755s

In this activity, students ask questions to seek additional information, after careful observations of mudslides in California.

4.2 Firefighter Jackets



Activity 2
Ask Questions
Firefighter Jackets



Quick Code:
ca2509s

In this activity, students will obtain information and ask questions about why synthetic materials are the preferred materials for firefighter jackets.

4.3 Honeybee in an Almond Tree



Activity 2
Ask Questions
Honeybee in a Flowering Almond Tree



Quick Code:
ca7797s

In this activity, students observe the importance of bees in the ecosystem and begin to ask questions about how changes in their populations would affect the Earth.

Unit Project: Mega-Landslides, People, and Ecosystems

Students will describe the effects of landslides on ecosystems and describe a possible remedy.

Unit Performance Assessment (CAST-Like): Selenium in the Central Valley

In this activity, students investigate the present-day problem of selenium accumulation in California's Central Valley as a result of human activity and evaluate engineering solutions to this problem.

  **Optional Project Based Learning Pathway**

BIG IDEA: In this unit, students focus on composting and sustainable farming as partial solutions to global hunger. Students design effective organic composting techniques to increase crop yield.



SCIENCE
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Grade 8 Unit Outlines

Unit Storyline

In this unit, students are presented with evidence uncovered by scientists regarding a strong gravitational pull coming from Antarctica, which can be explained as an impact crater from an asteroid. Students complete multiple investigations to build evidence of why satellites sometimes fall to Earth. Students continue their exploration of force and motion to determine the relationship of mass and energy needed to launch a rocket into space. Students look for patterns in data depicting the frequency of small asteroids entering Earth's atmosphere before summarizing their learning by generating a press release, based on data from the NASA Jet Propulsion Laboratory regarding an asteroid heading toward Earth.

Anchor Phenomena: Antarctica Impact Crater



Gravity Anomaly in Antarctica



Quick Code:
ca8005s

Students will describe the forces necessary to cause an impact crater of the size depicted in the anchor phenomenon and identify other possible events that resulted from the impact.

Unit Project Preview: Prepare for Impact

Students will brainstorm about the potential velocity and impact of a large asteroid colliding with Earth.

Concepts



1.1 Falling Objects



1.2 Energy for Launch



1.3 Colliding Objects

Investigative Phenomena

1.1 Satellites



Activity 2
Ask Questions
Satellites



Quick Code:
ca8010s

In this activity, students gather evidence from media and use it to support or refute claims about satellite orbits.

1.2 Rockets



Activity 2
Ask Questions
Rockets



Quick Code:
ca8029s

In this activity, students gather and evaluate information from multiple sources about how rockets work, and develop an initial model that depicts the relationships among forces acting on a rocket at different stages of its flight.

1.3 Meteorites Hitting Earth



Activity 2
Ask Questions
Meteorites Hitting Earth



Quick Code:
ca8050s

In this activity, students gather information from media about meteorites that strike Earth. Then, they ask questions that they would need to answer to support or refute a claim.

Unit Project: Prepare for Impact

Students must apply what they have learned about kinetic energy, velocity, and force to prepare for an asteroid collision and determine, based on data from the Jet Propulsion Laboratory, the amount of time left to warn the public about a potential threat and the likely impacts of the asteroid.

Unit Performance Assessment (CAST-Like): Who Wants to Try the High Striker?

In this activity, students will design an experiment to provide evidence that the chances of winning the High Striker depend on the mass of the puck and the forces acting on it.



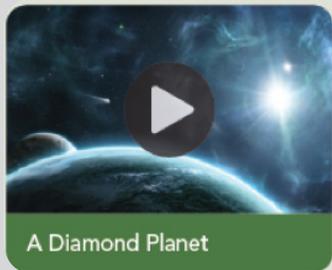
Optional Project Based Learning Pathway

BIG IDEA Students will examine cybersecurity and cyber threats. Students will work to design a physical security system that will mimic the cybersecurity measures used to protect the Kybert Satellite data.

Unit Storyline

In this unit, students listen to scientists' present data to support the idea of a diamond exoplanet and explanations of the properties of the exoplanet. Students begin their analysis of planetary data through the introduction to the types and limitations of technology tools used by scientists to study space objects. Students dive into the claim of the possibility of Mars having water by modeling and investigating the cause and effect relationships of electricity and magnetism. Predictable patterns in the orbit of planets and the properties of the planet establish the classification of a space object to be deemed a planet are investigated by students as they further explore the force of gravity. Lastly, students investigate collisions in space, with the creation of galaxies and the transfer of energy in the solar system. Students propose a design solution to a technological tool to assist scientists in finding additional exoplanets based on the forces explored throughout the unit.

Anchor Phenomena: A Diamond Planet



Quick Code:
ca8250s

Students will explore the impact of gravitational forces on objects in our solar system, as well as other noncontact forces used to move objects on Earth.

Unit Project Preview: Exoplanet Follow-Up

Students will begin to think about data needed to find exoplanets.

Concepts



2.1 Observing Planetary Objects



2.2 Planetary Forces



2.3 Orbital Forces



2.4 Energy in the Universe

Investigative Phenomena

2.1 Finding Exoplanets



Activity 2
Ask Questions
Exoplanets



Quick Code:
ca8255s

In this activity, students ask questions about the types of tools and technology scientists use to learn more about objects outside our solar system.

2.2 Water on Mars



Activity 2
Ask Questions
Water on Mars



Quick Code:
ca8255s

In this activity, students gather information from media to ask questions to clarify evidence about whether life has ever existed on Mars.

2.3 Pluto's Moons



Activity 2
Ask Questions
Pluto's Moons



Quick Code:
ca8296s

In this activity, students will identify the criteria scientists use to classify planets and ask related scientific questions.

2.4 Gravity and Orbs



Activity 2
Ask Questions
Gravity and Orbits



Quick Code:
ca8313s

In this activity, students identify forces acting on a spin art system and predict how the force of magnetism would impact the system.

Unit Project: Exoplanet Follow-Up

Students propose a tool that could be used to further confirm the existence of the exoplanet Proxima B.

Unit Performance Assessment (CAST-Like): Io

In this activity, students will investigate hypotheses about Io's volcanic activity.



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Optional Project Based Learning Pathway

BIG IDEA: Students investigate a common challenge faced by many communities around the world: antibiotic resistance of bacteria. Working in teams, students design an app to inform the school and community of this dangerous, health-threatening trend.

Unit Storyline

In this unit, students view the data collection in rock materials which provide clues for scientists into the environmental conditions during the dinosaur's lifespan and the cause of the dinosaurs to become extinct. Students are transported to China where rock evidence communicates the greatest mass extinction event of Earth's history. Students are introduced to other clues that help provide scientists with data on environmental conditions within a particular habitat, as they learn of the Medium Ground Finch. The fossil record is one of the greatest data sources to understanding evolution of species over time past as well as current phenomenon such as flu strains, and insect resistance to pesticides provide clues into environmental conditions for organisms. Moving into contemporary topics on how humans influence the characteristics of living organisms, students investigate how dogs become domesticated and genetic engineering. Students apply their understanding across the unit topics to provide evidence of the challenges with bringing organisms like a dinosaur, woolly mammoth or Tasmanian tiger back to live in a present-day climate region.

Anchor Phenomena: End of Dinosaurs



Quick Code:
ca8501s

Students will learn how to make inferences from clues in rock layers and the fossil record to explain why dinosaurs do not exist today.

Unit Project Preview: Dinosaur De-Extinction?

Introduce students to the STEM project for the unit. Students can record their initial ideas and return to their ideas at the end of the unit.

Concepts



3.1 Earth's History and the Fossil Record



3.2 Evolution and Natural Selection



3.3 Evidence for Evolution



3.4 Modifying Organisms

Investigative Phenomena

3.1 Clues in the Rocks



Activity 2
Let's Investigate Changes in Rocks



Ask Questions 10 min

Quick Code:
ca8505s

The investigative phenomenon for this concept is an expedition by geologists to a part of China where there is a very clear rock record of the Permian-Triassic extinction event that occurred around 250 million years ago.

3.2 The Medium Ground Finch



Let's Investigate the Medium Ground Finch

The investigative phenomenon for this concept is a group of finches found on the Galapagos Islands, a small archipelago that lies 1000 kilometers off the coast of Ecuador.

3.3 Flu Shots



Activity 2
Flu Shots



Ask Questions 10 min

Quick Code:
ca8554s

The investigative phenomenon for this concept is the changes that occur in the common viral disease, influenza. Students may have seen signs for flu shots at their local health provider or pharmacy.

3.4 Dogs



Activity 2
Let's Investigate Dogs



Ask Questions 10 min

Quick Code:
ca8581s

Dogs are a popular subject with students. The investigative phenomenon for this concept is dog breeds. Encourage students to identify different dog breeds and their structural and behavioral characteristics.

Unit Project: Dinosaur De-Extinction?

Using scientific logic, analysis, and critical thinking, students will respond to questions about the technical difficulties, strategies, and ethics surrounding how transgenics may be used in the future.

Unit Performance Assessment (CAST-Like): Mosquitoes: A Global Threat

Students analyze data from two natural systems to evaluate cause-and-effect relationships related to the flow of water, evaluate each of the two systems using systems models, and draw comparisons between the two systems.



Optional Project Based Learning Pathway

BIG IDEA: In this activity, students will create an argument in favor of or in opposition to new genetic engineering methods designed to control mosquito populations.

Unit Storyline

In this unit, students are introduced to an airplane outfitted with technology to measure the biodiversity of an area. The maps taken from the observatory show patterns which help scientists understand how human impacts are affecting the biodiversity of the location. Students begin by investigating sound and electromagnetic waves, necessary to capture data using technology. Students investigate the properties of lasers and light energy, used by satellites to map the surface of planets. Students model and interpret models of how the sun's electromagnetic radiation influences the biodiversity of a region. Students return to discovering the structure and function of technology, specifically satellites and the measure and monitor Earth's environment. The last concept introduces students to the California condor and the technology used to tag the condors to determine the successful attempt to save the species. To wrap up the unit, students are empowered to perform as conservationists to research an organism of their choice and propose a solution to restore the species population.

Anchor Phenomena: Sensing Biodiversity from the Sky



Carnegie Airborne
Observatory and Other
Research



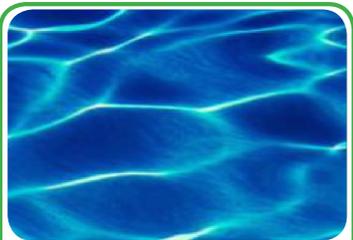
Quick Code:
ca8751s

Students will describe the impact that using electromagnetic waves could have to manage and protect the resources of Earth.

Unit Project Preview: Bringing Back from the Brink

Students begin to consider how they will design an organism restoration program.

Concepts



4.1 Nature of Waves



4.2 Waves and Matter



4.3 Warming Earth

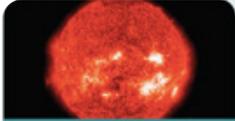


4.4 Remote Sensing



4.5 Sustaining Biodiversity

Investigative Phenomena

4.1 Supernova's Waves	4.2 Laser Art	4.3 The Sun	4.4 Columbia Glacier	4.5 California Condor
 <p>Activity 2 Ask Questions A Supernova</p>  <p>Quick Code: ca8755e</p>	 <p>Activity 2 Ask Questions Laser Art</p>  <p>Quick Code: ca8785e</p>	 <p>Activity 2 Ask Questions The Sun</p>  <p>Quick Code: ca8808e</p>	 <p>Activity 2 Ask Questions Columbia Glacier 1986 and Columbia Glacier 2017</p>  <p>Quick Code: ca8830e</p>	 <p>Activity 2 Ask Questions The Eye of the Condor</p>  <p>Quick Code: ca8852e</p>
<p>The investigative phenomenon for this concept is the explosion of a star in a supernova.</p>	<p>The investigative phenomena for this concept are how light interacts with matter and how these interactions have a wide range of technological applications.</p>	<p>In this activity, students communicate in written form their existing ideas about what causes the sun's energy and how that energy affects Earth.</p>	<p>The investigative phenomenon for this concept is the use of satellites to monitor changes on Earth.</p>	<p>In this activity, students communicate information they already know about the California condor and ask questions they have about the condor.</p>

Unit Project: Bringing Back from the Brink

Students will explore the challenges presented by species restoration. This is a capstone project designed to provide students with an opportunity to present how they would propose to use technology tools to assist in their restoration project.

Unit Performance Assessment (CAST-Like): Amazon Deforestation

This Problem Based Assessment will present students with images from NASA showing the progress of deforestation as monitored by a satellite. Based on these data, students will explain how light waves allow scientists to monitor deforestation and explain the impact this will have on the ecosystem.

 |  **Optional Project Based Learning Pathway**

BIG IDEA: Students will examine cybersecurity and cyber threats. Students will work to design a physical security system that will mimic the cybersecurity measures used to protect the Kybert Satellite data.

