Grade 6 Science Curriculum (Units 1-5)

Created by: Mandy Araneo and Kate Mazza

Unit 1 - Exploring the Universe - 7 weeks

Big Idea - What natural phenomena do the motions of Earth and the Moon produce? What kinds of objects are in the solar system? What makes up the universe, and how does gravity affect the universe?

Enduring Understanding - Earth's motion around the Sun causes seasons. The Moon's motion around Earth causes phases of the moon. Earth and Moon's motions together causes eclipses and ocean tides. The solar system contains planets, dwarf planets, comets, asteroids, and other small solar system bodies. The universe is made up of star, gas, and dust, as well as invisible dark matter. Material in the universe is not randomly arranged, but is pulled by gravity into galaxies.

Essential Questions - How does Earth move?

Why is Earth warmer at the equator and colder at the poles?

Why do the seasons change as Earth moves around the Sun?

How does the Moon move around Earth?

Why does the Moon's appearance change?

What is a solar eclipse?

What is a lunar eclipse?

How do the Moon and the Sun affect Earth's oceans?

What is the shape of a planet's orbit?

What are some similarities and differences among the planets?

What is a dwarf planet?

What are the characteristics of comets and asteroids?

How do scientists measure the distance of objects in the sky?

What is the Milky Way, and how is it related to the solar system?

Learning Objectives-

Demonstrate the gravitational pull between the Sun and a planet.

Demonstrate the gravitational pull between the Sun, Earth, and the moon.

Model the motion of revolution and rotation.

Model how the sun strikes Earth's surface.

Model how solar energy spreads out over Earth's surface throughout the year.

Simulate how the moon moves around Earth.

Illustrate and demonstrate a solar and lunar eclipse.

Model the different phases of the moon.

Create a pocket model of the solar system to examine the position of the planets relative to each other and the sun.

Compare sizes of objects in the solar system and the Milky Way galaxy.

Participate in a gallery walk to compare and contrast the inner and outer planets.

Vocabulary - orbit, gravity, revolution, rotation, rotation axis, solstice, equinox, phase, waxing phase, waning phase, umbra, penumbra, solar eclipse, lunar eclipse, asteroid, comet, astronomical unit, terrestrial planet, dwarf planet, greenhouse effect, meteoroid, meteor, meteorite, crater, light-year, Milky Way, Big Bang Theory

Standards -

MS-ESS1-1 Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.

MS-ESS1-2 Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

MS-ESS1-3 Analyze and interpret data to determine scale properties of objects in the solar system.

Assessments- Eclipse Lab, Phases of the Moon Lab, Solar System Scale,Models, exit tickets, Vocabulary Quiz, Unit Test

Resources - Newsela, BrainPop, Generation Genius, National Geographic, Quizlet, Kahoot, Crash Course Kids, Earth & Space Science I- Science, Inspire Science, Scholastic Science World, Scholastic Study Jams, PBS Learning Media, Khan Academy, Edpuzzle, NGSS

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Unit 2 - Exploring Earth - 7 weeks

Big Idea- How is Earth structured? How do the three main types of rocks form? What natural processes break down rocks and begin soil formation? How do erosion and deposition shape Earth's surface?

Enduring Understanding-

Earth is a unified system that can be modeled by dividing it into four interacting subsystems: the biosphere, the atmosphere, the hydrosphere, and the geosphere.

Earth's three main layers are the crust, the mantle, and the core. The rock cycle is a series of processes that continually change rocks and Earth's materials into different types of rock.

Mechanical and chemical weathering break down rocks, which begins soil formation.

Erosion and deposition shape Earth's surface by building up and tearing down landforms.

Essential Questions-

What are Earth's major systems and how do they interact?

Why does Earth have a spherical shape?

What are the interior layers of Earth?

What evidence indicates that Earth has a solid inner core and a liquid outer core?

How do minerals and rocks form?

How are rocks classified?

What is the rock cycle?

How does weathering break down or change rock?

How are weathering, erosion and deposition related?

What features suggest whether erosion or deposition created a landform?

How does water and wind erosion affect Earth's surface?

How does gravity shape Earth's surface?

Vocabulary- gravity, geosphere, hydrosphere, atmosphere, biosphere, core, mantle, crust, density, lithosphere, asthenosphere, minerals, crystallization, magma, lava, sediment, rock, rock cycle, extrusive rock, intrusive rock, compaction, cementation, weathering, mechanical weathering, chemical weathering, soil, organic matter, erosion, meander, delta, deposition, abrasion, mass wasting, landslide, glacier, morain, outwash

Learning Objectives-

Illustrate the layers of the atmosphere.

Name Earth's system and explain how these systems interact with one another.

Create a model of Earth's interior layers.

Compare the layers of the Earth to a real life hard-boiled egg.

Develop a model of the rock cycle to describe the cycling of Earth's materials driven by thermal energy.

Illustrate how each igneous, sedimentary and metamorphic rock forms.

Classify rocks based on their texture and composition.

Model the process of cementation.

Demonstrate the difference between physical and chemical weathering.

Model one form of physical weathering and observe chemical weathering.

Describe the agents that change Earth's surface.

Standards-

MS-ESS2-1 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

MS-ESS2-2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

Assessments- Rock Cycle Lab, Earth's Layers Model, Weathering-Erosion-Deposition Models, exit tickets, Layers of the Atmosphere brochure/poster, Vocabulary Quiz, Unit Test

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Unit 3- Geologic Changes - 8 weeks

Big Idea- How is Earth's surface shaped by plate motion? What is the Theory of Plate Tectonics? What causes earthquakes and volcanic eruptions? What evidence do scientists use to determine the age of rocks? What have scientists learned about Earth's past by studying rocks and fossils?

Enduring Understanding- The forces created by movement of tectonic plates are responsible for the variety of Earth's constantly changing surface. Most earthquakes occur along plate boundaries. Volcanoes form at subduction zones, mid-ocean ridges, and hot spots.

Evidence from fossils, rock layers, and radioactivity help scientists understand Earth's history and determine the age of rocks. The geologic changes that have occurred during the billions of years of Earth's history have strongly affected the evolution of life.

Essential Questions- How do continents move? What forces can change rocks? How does plate motion affect the rock cycle? What features form when plates meet at plate boundaries? How do the different types of mountains form over time? Where do earthquakes occur and how do scientists monitor earthquake activity? How do volcanoes form and what factors contribute to its eruption style? What can fossils reveal about Earth's past? How can the positions of rock layers be used to determine the relative age of rocks? How was the geologic time scale developed? What are the causes of mass extinction? What major geologic events occurred during each of the time periods? What does fossil evidence from each era reveal?

Vocabulary- Pangeae, continental drift, mid-ocean ridge, seafloor spreading, normal polarity, magnetic reversal, reversed polarity, plate tectonics, lithosphere, divergent boundary, convergent boundary, transform boundary, subduction, convection, uplift, compression, tension, shear, ocean trench, volcanic arc, fault zone, earthquake, fault, seismic waves, focus, epicenter, primary wave, secondary wave, surface wave, seismologist, seismometer, seismogram, volcano, hot spot, shield volcano, cinder-cone volcano, composite volcano, viscosity, fossil, carbon film, mold, trace fossil, paleontologist, uniformitarianism, catastrophism, relative age, superposition, inclusion, unconformity, index fossil, absolute age, isotope, radioactive decay, half-life, mass extinction, era, period, epoch, Paleozoic, Mesozoic, and Cenozoic Era, ice age

Learning Objectives-

Analyze the evidence that supports the continental drift hypothesis.

Write an informative essay to explain the theory of plate tectonics.

Describe what causes the plates to move.

Construct a model to explain the theory of plate tectonics.

Contrast the motion of plates at a transform, convergent and divergent plate boundary.

Model the build-up and release of stress along a fault.

Simulate an explosive volcanic eruption.

Interpret that most volcanoes and earthquakes occur along plate boundaries.

Identify features formed at each plate boundary.

Create a model of one of the 4 types of fossils

Explain how earthquakes can be used to study the composition and structure of Earth's interior and to identify the location of active faults.

Describe methods scientists use to monitor earthquakes.

Illustrate the process of a volcanic eruption.

Explain the factors that contribute to the eruptions style of a volcano.

Differentiate between a cinder cone, shield volcano, and composite cone.

Debate between uniformitarianism and catastrophism.

Explain how fossils are formed and how they are used to reveal clues about Earth's past.

Distinguish between relative age and absolute age.

Describe how radioactivity decay can be used to date rocks.

Explain how geologists organize Earth's history.

Determine the cause of mass extinction.

Create a poster, brochure, or another type of visual presentation illustrating the major geologic events of the Paleozoic, Mesozoic, and Cenozoic eras.

Explain how scientists used fossil evidence to determine major geologic events that occurred during each era.

Standards-

MS-ESS1-4 Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.

MS-ESS2-2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

MS-ESS2-3 Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.

MS-ESS3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

Assessments- Plate Tectonics Essay, Plate Tectonics Model, Plate Tectonics Web Quest, Plate Boundary Models, Geologic Time Brochure, Fossil lab, exit tickets, Vocabulary Quiz, Unit Test

Resources - Newsela, BrainPop, Generation Genius, National Geographic, Quizlet, Kahoot, Crash Course Kids, Earth & Space Science I- Science, Inspire Science, Scholastic Science World, Scholastic Study Jams, PBS Learning Media, Khan Academy, Edpuzzle, NGSS

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Unit 4- Weather and Climate - 7 weeks

Big Idea- How does Earthś atmosphere affect life on Earth? How do scientists describe and predict weather? What is climate and how does it impact life on Earth?

Enduring Understanding- The gases in Earthś atmosphere, some of which are needed by organisms to survive, affect Earth's temperature and the transfer of thermal energy to the atmosphere.

Scientists use weather variables to describe weather and study weather systems.

Climate is the long-term average weather conditions that occur in an area. Living things have adaptations to the climate in which they live.

Essential Questions-

Why is Earth’s atmosphere important to life on Earth?

How did Earth's atmosphere form?

What is Earth's atmosphere made of?

What are the characteristics of the layers of the atmosphere?

How do air pressure and temperature change as altitude increases?

How does energy transfer from the Sun to Earth and the atmosphere?

How are air circulation patterns within the atmosphere created?

How does uneven heating of Earth's surface result in air movement?

How are air currents on Earth affected by Earth's spin?

What are the main wind belts on Earth?

What is weather?

What variables are used to describe weather?

How is weather related to the water cycle?

What are two types of pressure systems?

What drives weather patterns?

Why is it useful to understand weather patterns?

What are some examples of severe weather?

What instruments are used to measure weather variables?

How are computer models used to predict the weather?

What is climate?

Why is one climate different from another?

How are climates classified?

How has climate varied over time?

What causes seasons?

How does the ocean affect climate?

How can human activities affect climate?

How are predictions for future climate change made?

Learning Objectives-

Explain why Earth’s atmosphere is important to life on Earth.

Analyze a graph to explain how air pressure and temperature change as altitude increases.

Illustrate and explain how energy is transferred from the Sun to the Earth and to the atmosphere.

Create a sunscreen label advertising protection from UV radiation.

Determine how air circulates and explain how patterns influence weather conditions.

Create a model of prevailing winds incorporating oceanic flow. Justify how latitude and longitude correlate with weather patterns.

Define weather and describe variables that occur including temperature, air pressure, wind, humidity, and dew point.

Illustrate and explain how weather is related to the water cycle.

Compare and illustrate pressure systems and explain how air masses drive weather patterns.

Define and illustrate fronts.

Explain how and why severe weather occurs.

Describe ways meteorologists measure and predict weather.

Collect data using weather maps and predict future weather.

Define climate and explain factors that determine an area's climate.

Explain how scientists find information about past climates on Earth.

Model how the curve of Earth's surface affects the amount of solar radiation that reaches Earth.

Collect data about climate change in a specific area and justify the reasoning for global warming citing specific evidence

Vocabulary- atmosphere, water vapor, troposphere, stratosphere, ozone layer, ionosphere, convection, conduction, radiation, temperature inversion, wind, trade winds, westerlies, polar easterlies, jet streams, sea breeze, land breeze, air pollution, acid precipitation, photochemical smog, particulate matter, weather, air pressure, humidity, relative humidity, dew point, precipitation, water cycle, high-pressure system, low-pressure system, air mass, front, tornado, hurricane, blizzard, climate, rain shadow, specific heat, microclimates, ice age, interglacial, El Nino, monsoon, drought, global warming, greenhouse gas, deforestation, global climate model.

Standards-

MS - ESS2-5 Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions

MS-ESS2-6 Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climate.

MS-ESS3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

MS-ESS3-5 -Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Assessments- Atmosphere Essay, Weather Report Lab, Natural Disaster Assignment, Sunscreen Activity, exit tickets, Vocabulary Quiz, Unit Test

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Unit 5- Water and Other Resources - 7 weeks

Big Idea- What role does water play on Earth?

How does human activity impact the environment and why is it important to manage natural resources wisely?

Enduring Understanding- Water cycles throughout Earth's hydrosphere and is necessary for the survival of all living organisms.

Human activity has caused many changes to the environment such as climate change, soil erosion, poor air quality, and undrinkable water. Wise management of natural resources helps extend the supply of nonrenewable resources, reduce pollution, and improve soil, air and water quality.

Essential Questions-

Why is water important to life?

How is water distributed on Earth?

How is water cycled on Earth?

Why is water quality important?

How is water quality tested and monitored?

How does pollution affect marine organisms?

How does global climate change affect marine ecosystems?

What is the relationship between resource availability and human population growth?

How do daily activities impact the environment?

What are the main sources of renewable and nonrenewable energy?

What are the advantages and disadvantages of renewable and nonrenewable energy?

How can individuals help manage our resources wisely?

How can individuals help manage land, air, and water resources wisely?

Learning Objectives-

Create a model to demonstrate the water cycle.

Design a method to separate freshwater from saltwater.

Observe the difference in density between freshwater and saltwater.

Explain why water quality is important and distinguish between the sources of pollution.

Analyze data collected on water samples to determine how it affects aquatic organisms.

Construct an argument supporting the protection of ecosystems and their resources.

Explore the relationship between resource availability and human population growth.

Explain how daily activities can result in resource depletion and pollution.

Analyze and interpret maps and other data to recognize patterns in the distribution of resources.

Investigate the use of energy resources and estimate your own daily resource use.

Debate the advantages and disadvantages of renewable and nonrenewable resources.

Vocabulary- hydrosphere, evaporation, condensation, water cycle, transpiration, water quality, point-source pollution, nonpoint-source pollution, nitrate, turbidity, bioindicator, remote sensing, harmful algae bloom, coral bleaching, nonrenewable resource, renewable resource, nuclear energy, reclamation, solar energy, wind farm, hydroelectric power, geothermal energy, biomass energy, salinity, density, seawater, brackish, tsunami, sea level, freshwater, runoff, groundwater, water table, aquifer, wetlands

Standards-

MS-ESS2-4 - Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

MS-ESS3-1 - Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

MS-ESS3-3 - Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-ESS3-4 - Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Assessments- Freshwater Lab, exit tickets, Vocabulary Quiz, Natural Resource Brochures, Energy Debate, Unit Test

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