



PLANNED COURSE OF STUDY

Course Title	Earth Science
Grade Level	6th
Content Area / Dept.	6th Science
Length of Course	Half of one school year
Author(s)	John Fears

Course Description:

In this course, students will learn and use the habitats and techniques of scientists, including setting up experiments and making observations. In addition, they will learn earth processes including atmosphere, weather, climate, rock cycle, plate tectonics, earthquakes, and volcanos.

Course Rationale:

In the earth sciences, performance expectations at the middle school level focus on students developing understanding of several scientific practices. These include developing and using models, planning and conducting investigations, analyzing and interpreting data, using mathematical and computational thinking, and constructing explanations; and to use these practices to demonstrate understanding of the core ideas.



Curriculum Map (Year Long Course)

Month	Typical # of Weeks	Topics Covered this Month
September	4 weeks	Water Atmosphere
October	4 weeks	Weather Climate and Climate Change
November	3 weeks	Water Atmosphere
December	3 weeks	Weather Climate and Climate Change
January	4 weeks	Intro to Earth Minerals and Rocks
February	4 weeks	Plate Tectonics Earthquakes
March	4 weeks	Volcanos
April	(Remember PSSAs this month)	Weather Climate and Climate Change
May	4 weeks	Plate Tectonics Earthquakes
June	2 weeks	Volcanos



Unit Title	Atmosphere/Weather
Unit Description	In this Unit students will explore, investigate, and discover the interaction of water, gases, and energy from the sun to create our Earth's atmosphere, weather and climate.
Essential Questions & Enduring Understandings	Chapter 1: <i>How does fresh water cycle on Earth?</i> Chapter 2: <i>How do meteorologists predict the weather?</i> Chapter 3: <i>How does the sun's energy affect Earth's atmosphere?</i> Chapter 4: <i>What factors affect Earth's climate?</i>

PA Core Standards	Assessment Anchors
PE-MS-ESS2-4	S8.A.1 S8.C.2 S8.D.4
PE-MS-ESS2-5	S8.A.2 S8.C.3
PE-MS-ESS2-6	S8.A.3 S8.D.1
PE-MS-ESS3-1	S8.A.4 S8.D.2
PE-MS-ESS3-2	S8.C.1 S8.D.3

Key Unit Vocabulary	<i>habitat, groundwater, water cycle, evaporation, transpiration, precipitation, tributary, watershed, divide, reservoir, eutrophication, permeable, impermeable, unsaturated zone, saturated zone, water table, aquifer artesian well, salinity, sonar, seamount, trench, continental slope, continental shelf, abyssal plain, mid-ocean ridge, wave, wavelength, frequency, wave height, tsunami, longshore drift, rip current, groin current, Coriolis effect, climate, El Niño, La Niña, condensation, humidity, relative humidity, dew point, cirrus, cumulus, stratus precipitation, rain gauge, flood, drought, air mass, tropical, polar, maritime, continental, jet stream, front, occluded, cyclone, anticyclone storm, thunderstorm, lightning, hurricane, storm surge, tornado, evacuate meteorologist, isobar, isotherm, climate, tropical zone, polar zone, temperate zone, marine climate, continental climate, windward, leeward, monsoon, rain forest, savanna, steppe, desert, humid subtropical, subarctic, tundra, permafrost, ice age, aerosol, sunspot, greenhouse gas, fossil fuel, global warming, weather, atmosphere, water vapor, density, air pressure, barometer, mercury barometer, aneroid barometer, altitude, troposphere, stratosphere, mesosphere, thermosphere, ionosphere, exosphere, electromagnetic waves, radiation,</i>
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	<i>infrared radiation, ultraviolet radiation, scattering, greenhouse effect temperature, thermal energy, thermometer, heat, convection, conduction, convection currents</i>
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Learning Objectives – <i>The student will...</i>	Assessment Opportunities
Chapter 1.1 <ul style="list-style-type: none"> ▪ State how people and other living things use water. ▪ Describe how Earth's water is distributed. ▪ Explain how Earth's water moves through the water cycle. 	labs, formative/summative, quizzes, test
Chapter 1.2 <ul style="list-style-type: none"> ▪ Tell what a river system is. ▪ Explain how ponds and lakes form. ▪ Describe the changes that occur in ponds and lakes. 	labs, formative/summative, quizzes, test
Chapter 1.3 <ul style="list-style-type: none"> ▪ Describe how water moves through underground layers of soil and rock. ▪ Explain how people obtain water from an aquifer. 	labs, formative/summative, quizzes, test
Chapter 1.4 <ul style="list-style-type: none"> ▪ Identify characteristics of the ocean and ocean water. ▪ Identify the features and main sections of the ocean floor. 	labs, formative/summative, quizzes, test
Chapter 1.5 <ul style="list-style-type: none"> ▪ Explain how waves form and change and describe the characteristics of waves. ▪ Describe how waves affect shorelines and beaches. 	labs, formative/summative, quizzes, test
Chapter 1.6 <ul style="list-style-type: none"> ▪ Identify what causes surface currents and explain how surface currents affect climate. ▪ Identify the causes of deep currents and describe the effects that deep currents have. 	labs, formative/summative, quizzes, test



Chapter 2.1 <ul style="list-style-type: none">Describe the composition of the atmosphere.State how the atmosphere is a system	labs, formative/summative, quizzes, test
Chapter 2.2 <ul style="list-style-type: none">Identify some properties of air.Describe how barometers can be used to measure air pressure.Explain how altitude affects air pressure and density.	labs, formative/summative, quizzes, test
Chapter 2.3 <ul style="list-style-type: none">Identify the four main layers of the atmosphere and their characteristics.Explain the characteristics of the atmosphere's layers.	labs, formative/summative, quizzes, test
Chapter 2.4 <ul style="list-style-type: none">State in what form energy travels from the sun to Earth.Explain what happens to the sun's energy in the atmosphere and at Earth's surface.	labs, formative/summative, quizzes, test
Chapter 2.5 <ul style="list-style-type: none">Describe how temperature is measured.Describe how heat is transferred.	labs, formative/summative, quizzes, test
Chapter 2.6 <ul style="list-style-type: none">Explain how scientists describe and explain winds.Distinguish between local winds and global winds and identify major wind belts	labs, formative/summative, quizzes, test
Chapter 3.1 <ul style="list-style-type: none">Describe how water moves to and from the atmosphere during the water cycle.Describe humidity and how it is measured.	labs, formative/summative, quizzes, test



Chapter 3.2 <ul style="list-style-type: none">▪ Explain how clouds form.▪ Name the three main types of clouds.	labs, formative/summative, quizzes, test
Chapter 3.3 <ul style="list-style-type: none">▪ Identify the common types of precipitation.▪ Describe floods and droughts and their effects	labs, formative/summative, quizzes, test
Chapter 3.4 <ul style="list-style-type: none">▪ Identify the major air masses that affect the weather in North America and describe how they move.▪ Name the main types of fronts.▪ Explain the type of weather that is associated with cyclone	labs, formative/summative, quizzes, test
Chapter 3.5 <ul style="list-style-type: none">▪ List the main kinds of storms and explain how they form.▪ Describe measures that can be taken to ensure safety in a storm.	labs, formative/summative, quizzes, test
Chapter 3.6 <ul style="list-style-type: none">▪ Explain how weather forecasters use observations, data, and technology to predict the weather.▪ Describe what can be learned from information shown on weather maps.	labs, formative/summative, quizzes, test
Chapter 4.1 <ul style="list-style-type: none">▪ Identify factors that influence temperature.▪ Identify factors that influence precipitation.	labs, formative/summative, quizzes, test
Chapter 4.2 <ul style="list-style-type: none">▪ Identify factors used to define climates.▪ Describe the six main climate regions	labs, formative/summative, quizzes, test
Chapter 4.3 <ul style="list-style-type: none">▪ Explain the principle that scientists follow in studying ancient climates.	labs, formative/summative, quizzes, test



<ul style="list-style-type: none"> Identify natural factors that can cause climate change. 	
<p>Chapter 4.4</p> <ul style="list-style-type: none"> Explain how human activities are affecting the temperature of the atmosphere. 	labs, formative/summative, quizzes, test

Sequence of Teaching and Learning		
Number of Lessons / Blocks	Lesson Topic	Lesson Activities
2	Lesson 1.1 Water on Earth	Students will observe the formation of condensation on glass. Discuss the relevance of the air and water temperature to the formation of condensation.
2	Lesson 1.2 Surface Water	Students will locate and classify surface water using a map of their state. Discuss the various bodies of water in their state.
1	Lesson 1.3 Water Underground	Students will observe water movement in various types of materials. Discuss how different materials absorb water.
2	Lesson 1.4 Exploring the Ocean	Students will make inferences without their sense of sight. Discuss how they gathered information even without their sense of sight.
1	Lesson 1.5 Wave Action	Students will model waves and beach erosion. Discuss how the tongue depressor changes the wave activity.
2	Lesson 1.6 Currents and Climate	Students will model the effect wind blowing has on movement of surface and deep water currents.
2	Lesson 2.1 The Air Around You	Students will burn candles in different size jars. Discuss how the size of the jar impacts the burning time.
2	Lesson 2.2 Air Pressure	Students will compare the mass of an object with and without air. Discuss why the mass of the balloon changes when it is inflated.



2	Lesson 2.3 Layers of the Atmosphere	Students will explore pressure changes using a sealed jar and a plastic bag.
2	Lesson 2.4 Energy in Earth's Atmosphere	Students will measure the temperature of air in a sealed bag
2	Lesson 2.5 Heat Transfer	Students will use a metal spiral to explore how air moves when heated.
2	Lesson 2.6 Wind	Students will explore how the Earth's rotation affects wind direction.
2	Lesson 3.1 Water in the Atmosphere	Students will observe the process of evaporation. Discuss the role of evaporation in the water cycle.
1	Lesson 3.2 Clouds	Students will investigate the formation of fog. Discuss the conditions that create the fog.
2	Lesson 3.3 Precipitation	Students will investigate how hail forms. Discuss what they observed happening to the water crystals.
2	Lesson 3.4 Air Masses	Students will investigate how fluids of different densities move. Discuss the density of the cool water and the warm water.
1	Lesson 3.5 Storms	Students will use a bottle to create a tornado. Discuss the shape and motion of a tornado.
2	Lesson 3.6 Predicting Weather	Students will compare weather forecasts to actual weather.
2	Lesson 4.1 What Causes Climate	Students will explore how the sun's rays affect Earth's climate at various latitudes. Discuss how sunlight falls on various latitudes of Earth.
2	Lesson 4.2 Climate Regions	Have students do the Inquiry Warm-Up activity. Students will investigate climates across the world. Discuss the characteristics of climates in various regions of the world.
1	Lesson 4.3 Changes in	Students will analyze a photograph of tree rings. Discuss the observations they make about the tree.



	Climate	
1	Lesson 4.4 Human Activities and Climate Change	Students will investigate the effect of the sun's rays when trapped. Discuss scientific principles that underlie the greenhouse effect.

Resources for this Unit will include lab materials and hard copy and digital access to **Pearson Interactive Science**. www.pearsonrealize.com



Unit Title	Plate Tectonics
Unit Description	In this unit students will explore, investigate and discover the Earth's functions that cause the movement of plate tectonics. Additionally, how moving plates create and destroy landforms thus causing Earth's surface to be ever changing.
Essential Questions & Enduring Understandings	Chapter 1: <i>What is the structure of Earth?</i> Chapter 2: <i>How do rocks form?</i> Chapter 3: <i>How do moving plates change Earth's crust?</i> Chapter 4: <i>Why do earthquakes occur more often in some places than in others?</i> Chapter 5: <i>How does a volcano erupt?</i>

PA Core Standards	Assessment Anchors
PE-MS-ESS2-1	S8.A.1 S8.C.2 S8.D.4
PE-MS-ESS2-2	S8.A.2 S8.C.3
PE-MS-ESS2-3	S8.A.3 S8.D.1
PE-MS-ESS3-2	S8.A.4 S8.D.2 S8.C.1 S8.D.3

Key Unit Vocabulary	<i>system energy, atmosphere, geosphere, hydrosphere, biosphere, constructive force, destructive force, seismic wave, pressure, crust, basalt, granite, mantle, lithosphere, asthenosphere, outer core, inner core, radiation, convection, conduction, density, convection current, mineral, inorganic, crystal, streak, luster, Mohs hardness, scale, cleavage, fracture, geode crystallization, solution, vein, rock-forming mineral, granite, basalt, grain, texture, igneous rock, sedimentary rock, metamorphic rock, extrusive rock, intrusive rock, extrusive rock, intrusive rock foliated, plate, divergent boundary, convergent boundary, transform boundary, plate tectonics, fault, mid-ocean ridge, sea-floor, spreading, deep-ocean trench, subduction rift valley, continental drift, Pangaea, fossil, rift valley earthquake, focus, epicenter, P wave, S wave, surface wave, seismograph, modified Mercalli scale, magnitude, Richter scale, moment magnitude scale, Seismogram, volcano, magma, lava, Ring of Fire, island arc, hot spot</i>
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Learning Objectives - <i>The student will...</i>	Assessment Opportunities
Chapter 1.1 <ul style="list-style-type: none"> ▪ Identify and describe the main components of the Earth system, including constructive and destructive forces. 	labs, formative/summative, quizzes, test
Chapter 1.2 <ul style="list-style-type: none"> ▪ Explain the characteristics of Earth's crust, mantle, and core, and how geologists learn about them. 	labs, formative/summative, quizzes, test
Chapter 1.3 <ul style="list-style-type: none"> ▪ Explain how heat transfer causes convection currents in Earth's mantle. 	labs, formative/summative, quizzes, test
Chapter 2.1 <ul style="list-style-type: none"> ▪ Identify minerals, their formation, and their uses. 	labs, formative/summative, quizzes, test
Chapter 2.2 <ul style="list-style-type: none"> ▪ List the characteristics used to identify rocks, and identify the three major groups of rocks. 	labs, formative/summative, quizzes, test
Chapter 2.3 <ul style="list-style-type: none"> ▪ Identify the characteristics of igneous rocks and the ways they are used. 	labs, formative/summative, quizzes, test
Chapter 2.4 <ul style="list-style-type: none"> ▪ Describe the formation of three different types of sedimentary rock and their uses. 	labs, formative/summative, quizzes, test
Chapter 2.5 <ul style="list-style-type: none"> ▪ Describe the conditions under which metamorphic rocks form, how geologists classify metamorphic rocks, and how metamorphic rocks are used. 	labs, formative/summative, quizzes, test
Chapter 2.6 <ul style="list-style-type: none"> ▪ Describe the rock cycle. 	labs, formative/summative, quizzes, test



Chapter 3.1 <ul style="list-style-type: none">Explain Alfred Wegener's hypothesis about the continents, evidence supporting the hypothesis, and why the hypothesis was rejected.	labs, formative/summative, quizzes, test
Chapter 3.2 <ul style="list-style-type: none">Explain how sea-floor spreading affects Earth's crust, creating mid-ocean ridges and subduction trenches.	labs, formative/summative, quizzes, test
Chapter 3.3 <ul style="list-style-type: none">Explain the theory of plate tectonics.	labs, formative/summative, quizzes, test
Chapter 4.1 <ul style="list-style-type: none">Explain how stress in the crust changes Earth's surface.Describe the three major types of faults.Compare and contrast the land features that result from plate movement.	labs, formative/summative, quizzes, test
Chapter 4.2 <ul style="list-style-type: none">Describe how the energy of an earthquake travels through Earth, and how scientists locate and measure earthquakes.	labs, formative/summative, quizzes, test
Chapter 4.3 <ul style="list-style-type: none">Explain how seismographs work and the patterns of data they reveal.	labs, formative/summative, quizzes, test
Chapter 5.1 <ul style="list-style-type: none">Identify where volcanic regions and hot spot volcanoes are found on Earth's surface and why they are found there.	labs, formative/summative, quizzes, test
Chapter 5.2 <ul style="list-style-type: none">Explain what happens when a volcano erupts, the stages of volcanic activity, and the two different types	labs, formative/summative, quizzes, test



of eruptions.	
Chapter 5.3 <ul style="list-style-type: none"> ▪ List the landforms that lava, ash, and hardened magma beneath Earth's surface create. 	labs, formative/summative, quizzes, test

Sequence of Teaching and Learning		
Number of Lessons / Blocks	Lesson Topic	Lesson Activities
1	Lesson 1.1 The Earth System	Students will form a definition of a system.
1	Lesson 1.2 Earth's Interior	Students will study the interior of a model Earth.
1	Lesson 1.3 Convection and the Mantle	Students will examine air currents from home heating systems.
1	Lesson 2.1 Properties of Minerals	Students will grow and compare crystals
1	Lesson 2.2 Classifying Rocks	Students will observe and compare rock characteristics.
1	Lesson 2.3 Igneous Rocks	Students will model the difference between rocks formed from slow-cooling magma and fast-cooling lava.
1	Lesson 2.4 Sedimentary Rocks	Students will model the difference between rocks formed from slow-cooling magma and fast-cooling lava.
1	Lesson 2.5 Metamorphic Rock	Students will use sequins and clay to model how rocks become foliated.
1	Lesson 2.6 The Rock	Students will use interconnecting plastic blocks to model the rock cycle.



	Cycle	
2	Lesson 3.1 Drifting Continents	Students will locate oceans and continents on a globe.
2	Lesson 3.2 Sea-Floor Spreading	Students will investigate density changes by moistening a washcloth with water and watching its edges start to sink.
2	Lesson 3.3 The Theory of Plate Tectonics	Students will use modeling clay to model tectonic plate boundaries.
2	Lesson 4.1 Forces in Earth's Crust	Students will use modeling clay to model tectonic plate boundaries.
2	Lesson 4.2 Earthquakes and Seismic Waves	Students will model two kinds of waves that travel through a spring toy.
2	Lesson 4.3 Monitoring Earthquakes	Students will model a device to detect waves moving through matter.
1	Lesson 5.1 Volcanoes and Plate Tectonics	Students will model the formation of a "hot spot" volcano.
2	Lesson 5.2 Volcanic Eruptions	Students will use honey and cooking oil to model lava.
2	Lesson 5.3 Volcanic Landforms	Students will explore the effect lava has on the slopes of volcanoes.

Resources for this Unit will include lab materials and hard copy and digital access to **Pearson Interactive Science**. www.pearsonrealize.com