			Earth Science **Grade 6** **Unit#1**
Course/Subject: **Earth Science**	**Grade:** **6**	**The Makeup of Planet Earth**	**Suggested Timeline:** **Three months**

Grade Level Summary	The 6th grade curriculum focuses on giving students an understanding of the planet they live on, what it is made of, how it changes, and how we can continue to support and create a healthier Earth for future generations. Students will experience an inquiry based learning approach that encompasses 21st Century learning skills which include the 4 C's.
Grade Level Units	**Unit 1- The Make-up of Planet Earth** Unit 2- The Changing Earth Unit 3- Oceanography

Unit Title	The Makeup of Planet Earth
Unit Summary	Students will learn the make-up of the Earth including the layers inside the Earth out to the rocky surface. In addition, Earth's atmospheric layers will be investigated. A study of the different types of rock that make up the crust will lead into lessons on the importance of water as it relates to shaping the Earth's physical features.

Unit Essential Questions:

1. What is the interior and exterior of the planet that I inhabit made of, and how can I assist in sustaining life on Earth?

Key Understandings:

1. Demonstrate understanding, describe, and distinguish between the atmospheric layers of planet Earth.
2. Show and summarize the gases that constitute the atmosphere. (nitrogen, oxygen, trace gases, water vapor, etc.)
3. Explain and/or illustrate the cause and effect relationship between human created pollutants and how they mix with gases in our atmosphere to create air pollution.
4. Introduction to how topographical maps are constructed, what their symbols mean, and what we use these maps for pertaining to earth's landforms.
5. Identify specific characteristics and properties of rocks and minerals and classify them into different categories.
6. Students will compare and contrast different stages of the Rock Cycle. (Sediment, Sedimentary rock, Metamorphic rock, Magma, Igneous rock)
7. Analyze and explain the four causes of Weathering, Erosion, Deposition and its effects on Earth's landforms.
8. Investigate Earth's soil including formation, layers and types of soil, and apply concepts to conservation.

	9. Introduce the interior layers of planet Earth as we dive deeper into the Changing Earth.

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
3.3.6.A1	Recognize and interpret various mapping representations of Earth's common features.
3.3.6.A4	Describe how water on earth cycles in different forms and in different locations, including underground and in the atmosphere.
3.3.6.A5	Describe the composition and layers of the atmosphere.

Important Standards Addressed in the Unit:	
S6.A.3.2	Apply knowledge of models to make predictions, draw inferences, or explain technological concepts.
S6.D.1.1	Describe how constructive and destructive natural processes can influence different biomes.
3.3.6.A2	Examine how soil fertility, composition, resistance to erosion, and texture are affected by many factors

Misconceptions:	**Proper Conceptions:**
1. The Earth is not a sphere but is flat. Students may think that if Earth is a sphere people would fall off the bottom. 2. There is only one layer to the earth's atmosphere. 3. The ozone layer is the cause of the Global warming to our planet. 4. Greenhouse gases make up a large portion of our atmosphere. 5. Human activities alone are what cause the greenhouse effect. 6. Air pollution; there's nothing I can do about it. 7. The layers of the atmosphere have a definite start and stop point. 8. When using a 2 dimensional map, students see the Earth as a flat surface. 9. The inside of the Earth is hollow. 10. The atmosphere is large and small amounts of carbon dioxide or a few degrees of temperature change can't make much difference. 11. Rocks do not change. 12. Weathering and erosion are essentially the same thing. The two words can be used interchangeably. 13. Erosion happens quickly and is always bad. 14. All rocks are the same, and it's hard to tell how they originated. 15. Rocks and minerals are the same thing; distinguishing them is not important. 16. Humans can fabricate rocks and minerals; artifacts are the same as rocks and minerals.	1. Earth is a sphere, not flat. 2. The atmosphere is made up of five layers, each with its own set of characteristics and objects that move through them. 3. The hole in the ozone layer is not the same phenomenon as global warming. 4. The major components are nitrogen and oxygen with Greenhouse gases only exhibiting trace amounts. 5. The Greenhouse Effect is caused by certain molecules that trap and amplify the outgoing infrared energy.. Human activities are further increasing or amplifying the natural greenhouse effect. 6. Find out about air pollution near where you live, work and play. You can protect yourself, find alternatives and use green products. 7. There transition boundaries between each of the five layers of the atmosphere. 8. Use of a topographic map allows students to visualize the earth as a 3 dimensional object. 9. The inside of the Earth is made up of solid and molten layers of rocks and minerals. 10. Small changes in atmospheric composition or temperature increases can have a large effect. 11-13. Students tend to view the earth as static, stable, and unchanging. They often have difficulty believing that rocks can change or be worn down through the process of weathering. Students also tend to confuse weathering (the physical or chemical breakdown of rock) with erosion (the process of transporting sediments).

17. Minerals are not important to my life.	14. Rocks can be distinguished in different types, based on their origins and compositions. 15. Rocks and minerals are not the same thing; rocks are composed of minerals, which are naturally existing chemical compounds. 16. Rocks and minerals are naturally occurring substances that are usually crystalline and solid. 17. Almost every product we use in daily life contains or depends on minerals that have to be mined.

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
● Layers of the atmosphere ● Air Pollution ● Topographical maps ● 3 types of rock in the rock cycle ● Formation of soil and its types ● Soil conservation ● Internal layers of the Earth	● Identify the 5 layers of the atmosphere ● Students will graph and describe the reason that the atmospheric layers begin and end at certain altitudes. ● Students create a blueprint of an apartment building that spans all layers of Earth's atmosphere. Consideration must be taken so that the building levels can survive the varying conditions in each layer. Students must then present their proposed apartment to the future occupants (classmates) for review and questioning. ● Identify global physical features/landforms ● Students will read a simple topographic map and answer questions by interpreting the map. ● Compare and contrast 2D and 3D maps. ● Create a topographic map ● Follow the rock cycle through the 3 types of rock ● Classify rocks and minerals into three categories: sedimentary, igneous and metamorphic ● Rock lab- observe, categorize and analyze a personal rock ● Participation in the WED stations ● Identify the internal layers of the Earth ● 3 Green Cars Brochure-Green cars run on alternative fuels that cause little, if any, pollution. Create a brochure that displays, analyzes and compares the three major types of Green Cars in today's marketplace. ● Soil Conservation-solve soil conservation problems. Each group presents their prototype that will help conserve soil. ● Students participate in large motor movement associated with the layers of the Earth	● Collaboration ● Creativity ● Critical Thinking ● Communication ● Leadership ● Curiosity ● Effort ● Responsibility ● Perseverance ● Planning

Academic Vocabulary:

- Atmosphere
- Water Vapor
- Ozone Layer
- Exosphere
- Thermosphere
- Mesosphere
- Stratosphere
- Troposphere
- Ionosphere
- Altitude
- Air Pressure
- Air Composition
- Ultraviolet (UV)
- Greenhouse Effect
- Conduction
- Convection
- Radiation
- Wind
- Local Winds
- Global Winds
- Air Pollution
- Point-Source Pollution
- Nonpoint-Source Pollution
- Photochemical Smog
- Air Quality Index
- Clean Air Act
- Topography/Topographical Maps
- Elevation
- Scale
- Symbols
- Coastal Plain
- Interior Plain
- Mountains
- Plateau
- Landform Region
- Global Positioning System
- Satellite Images
- Mineral
- Color
- Luster
- Density
- Cleavage
- Fracture
- Hardness
- Rock
- Rock Cycle
- Igneous Rock
- Sediment
- Sedimentary Rock
- Metamorphic Rock
- Weathering
- Erosion
- Deposition
- Crust
- Mantle
- Outer Core
- Inner Core
- Soil Conservation
- Topsoil
- Subsoil
- Bedrock

Assessments:

- Tests/Quizzes, Homework, Projects, Cooperative activities, Presentations, Lab activities

Differentiation:

- Scaffolded notes
- Adapted tests/quizzes
- Project based learning with driving questions chosen by students
- Differentiated reading passages

Interdisciplinary Connections:

- Reading passages with comprehension checks
- Science journals with informative writing and written reflections
- Math skills needed to complete map activities and projects
- Illustrations and drawing skills

Additional Resources:

- Digital resources on iPads and Chromebooks

Created By: Carrie Allen and Tiffany Griffie-Gross

			Earth Science **Grade 6** **Unit #2**
Course/Subject: **Earth Science**	**Grade: 6**	**The Changing Earth**	**Suggested Timeline:** **Three months**

Grade Level Summary	The 6th grade curriculum focuses on giving students an understanding of the planet they live on, what it is made of, how it changes, and how we can continue to support and create a healthier Earth for future generations. Students will experience an inquiry based learning approach that encompasses 21st Century learning skills which include the 4 C's.
Grade Level Units	Unit 1- The Make-up of Planet Earth **Unit 2- The Changing Earth** Unit 3- Oceanography

Unit Title	The Changing Earth
Unit Summary	There are many changes to Earth that occurred over time by different geological forces and processes. These forces and processes that are related shape Earth's past, present, and future.

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
3.3.6.A1	Recognize and interpret various mapping representations of Earth's common features.
S6.D.1.1	Describe how constructive and destructive natural processes can influence different biomes.

Important Standards Addressed in the Unit:	
S6.A.3.2	Apply knowledge of models to make predictions, draw inferences, or explain technological concepts.
S6.A.1.1	Explain, interpret, and apply scientific, environmental, or technological knowledge presented in a variety of formats (visuals, scenarios, graphs).

Misconceptions:	Proper Conceptions:
1. The present is not the key to the past. 2. A giant meteor hit Earth, back when the dinosaurs were around. That killed off the dinosaurs and caused Pangaea to break up 3. Fossils are not forming today. 4. Volcanoes are randomly located across the earth's surface and found only on land and in hot climates. 5. All volcanoes erupt violently and only erupt straight up through the top vent. 6. If a volcano doesn't erupt for a hundred years, it's extinct. 7. If a volcano does not produce lava, it is not dangerous. 8. Pangaea broke apart a long time ago. Now the continents are coming back together on the other side of Earth. That's what causes earthquakes—the continents bumping into each other. There are more plates in the Pacific than the Atlantic. That's why earthquakes and volcanoes are more common in the Pacific	1. Earth's processes occurring today are similar to those that occurred in the past; our understanding of past Earth processes is based on those that are presently taking place. 2. The continental movement is heat moving from the Earth's movement through the crust and out of the planet. The effect of this it to cause convection, and plate movement. 3. Fossils are forming today. Organisms that die and settle to the bottom of a lake or ocean are buried by sediments. Once buried, these organisms start the process of fossilization. 4. The majority are located along tectonic plate boundaries. "Ring of Fire" is the name given to an area along the border of the Pacific Plate with a high concentration of volcanoes. The Pacific Northwest, Alaska's Aleutian Islands, and Japan are all located in the Ring of Fire. Volcanoes are found on land and under the ocean's surface, as well as in areas with cold climates (like Antarctica). 5. Students may also believe that all volcanic eruptions are violent, but many are not. The levels of silica and dissolved gases in the magma determine whether a volcano erupts explosively or effusively. Magma and gas may escape through cracks and weak areas on the sides of the volcano in addition to the top vent. Baking soda and vinegar models, a staple of elementary school science, do not accurately model an eruption and could lead to the formation of misconceptions. 6. Students may also not understand that volcanoes can be inactive for long periods without being considered extinct. When volcanoes no longer have a lava supply, they are extinct, but it can be quite difficult for scientists to know if and when this is the case. For example, scientists are fairly certain that volcanoes of the Hawaiian Islands chain are extinct. Mount Vesuvius in Italy was believed to be extinct before erupting violently. 7. Students may believe that volcanoes are only dangerous due to lava flows. In reality, pyroclastic flows, ash clouds, and mudflows can be extremely hazardous. Deadly mudflows (lahars) have occurred recently in Colombia and the Philippines, and the eruption of Mount St. Helens produced an ash cloud and landslides of ice, mud, and rock. 8. An **earthquake** is a violent movement of the rocks in the Earth's crust. Earthquakes are usually quite brief, but may repeat over a long period of time. They are the result of a sudden release of energy in the Earth's crust. This creates seismic waves, waves of energy that travel through the Earth. While shallow crevasses may form during an earthquake due to landslides or ground failures, the ground does not "open up" along a fault line. If a fault opened up, there would be no friction and no earthquake!

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
● Theory of Continental Drift ● Theory of Plate Tectonics ● Volcanoes and Plate Tectonics ● Earthquakes and Plate Tectonics ● Tsunami formation	● Introduce constructive and destructive images and discuss how humans impact Earth or how changes occur naturally ● The Great Puzzle- students will recreate Pangaea ● Learn how Alfred Wegener's theory provided evidence to support the Continental Drift ● Far Flung Fossils activity- students investigate fossils from the southern hemisphere and analyze data collected to prove how continents were together millions of years ago ● Create a Planet- students apply evidence from the Continental Drift theory to create their own Pangaea like landmass and its separation ● Continental Drift stations- alternative assessment for students to show knowledge of content taught ● Convection yoga and scaffolded notes/packet ● Skit and large motor movement associated with plate boundaries ● Complete color coded tectonic plate map of world and assess knowledge of locations; apply learned content by placing specific cities on correct plate location ● Edible tectonics- students manipulate a candy bar to recreate the plate movements that cause mountains and trenches ● Students will write a persuasive prompt arguing their viewpoint of whether mountains are constructive or destructive processes ● Virtual volcano- students recreate volcanic eruptions ● Google classroom volcano assignment- students will complete a digital volcano flipbook ● The Great Lava Race- interactive and hands on, students will make predictions and conclusions about three types of lava and their viscosity ● Introduction to comparing and contrasting Mt. Vesuvius and Surtsey using a graphic organizer ● Project Based Learning- students choose a historic volcanic eruption and will evaluate and critique why it caused the most global impact to Earth ● Students will write a persuasive prompt arguing their viewpoint of	● Collaboration ● Creativity ● Critical Thinking ● Communication ● Leadership ● Curiosity ● Effort ● Responsibility ● Perseverance ● Planning

	whether volcanoes are constructive or destructive processes ● Write a postcard identifying factors involved in the Great 1906 San Francisco Earthquake/Fire ● Use the Mercalli Scale to identify levels of damage from earthquake stricken areas in California ● Students will write a persuasive prompt arguing their viewpoint of whether earthquakes/tsunamis are constructive or destructive processes	

Academic Vocabulary:

● Uniformitarianism ● Theory of Continental Drift ● Tectonic Plates ● Theory of Plate Tectonics ● Pangaea ● Fossilization ● Plate Boundaries ● Lithosphere ● Asthenosphere ● Convection ● Convection Current ● Convergent ● Divergent ● Transform-Fault ● Folding Mountain ● Fault-Block Mountain ● Dome Mountain ● Trench ● Sea-floor Spreading	● Volcano ● Ring of Fire ● Magma ● Lava ● Lava flow ● Viscosity ● Ash ● Ash Cloud ● Pyroclastic Material ● Pyroclastic Flow ● Lahar ● Main Vent/Conduit ● Crater ● Cinder Cone ● Shield Cone ● Composite Cone ● Extinct ● Dormant ● Intermittent ● Active ● Tiltmeter ● Seismometer ● Subduction ● Subduction Zone	● Island arc ● Hot spots ● Caldera ● Seamount ● Rifting ● Earthquake ● Seismic Waves ● Seismology ● Seismologist ● Aftershock ● Fault ● Focus ● Epicenter ● Reverse fault ● Strike-slip fault ● Normal fault ● Richter Scale ● Modified Mercalli Scale ● Moment Magnitude Scale ● Primary Waves (P Waves) ● Secondary Waves (S Waves) ● Plastic deformation ● Elastic deformation ● Elastic rebound ● Magnitude ● Seismograph ● Liquefaction ● Tsunami ●

Assessments:

- Tests/Quizzes, Homework, Projects, Cooperative activities, Presentations, Lab activities

Differentiation:

- Scaffolded notes
- Adapted tests/quizzes

- Project based learning with driving questions chosen by students
- Differentiated reading passages

Interdisciplinary Connections:

- Reading passages with comprehension checks
- Science journals with informative writing and written reflections

Additional Resources:

- Digital resources on iPads and Chromebooks

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			Earth Science **Grade 6** **Unit#3**
Course/Subject: **Earth/Science**	**Grade:** **6th**	**Oceanography**	**Suggested Timeline:** **Three Months**

Grade Level Summary	The 6th grade curriculum focuses on giving students an understanding of the planet they live on, what it is made of, how it changes, and how we can continue to support and create a healthier Earth for future generations. Students will experience an inquiry based learning approach that encompasses 21st Century learning skills which include the 4 C's.
Grade Level Units	Unit 1: The Make-up of Planet Earth Unit 2: The Changing Earth **Unit 3: Oceanography**

Unit Title	Oceanography
Unit Summary	The global marine environments are affected by external factors and impact organisms around the world.

Unit Essential Questions:	**Key Understandings:**
1. How do external factors work together to affect the global marine environments?	1. Identify and discuss properties including salinity, density, and dissolved gases that make up ocean water. 2. Demonstrate how temperature and pressure change as you go deeper in the ocean. 3. Classify and differentiate between the plankton, nekton, and benthos categories of ocean organism and the depths at which they live. 4. Identify, describe and differentiate between the features that make up the ocean floor and the shoreline. 5. Introduction to erosion and weathering on the ocean floor. 6. Recognize ocean currents, compare and contrast global currents, and analyze how scientists can use ocean currents to study animals and help humans. 7. Identify the forces that causes surface currents and deep ocean currents. 8. Distinguish the parts of a wave and how they move 9. Construct a model to demonstrate how the moon causes the tides and how this information impacts humans. 10. Investigate various resources that oceans provide the global population 11. Identify the five types of ocean pollution and apply concepts to aid in the removal of pollution from Earth's oceans

Focus Standards Addressed in the Unit:	
Standard Number	*Standard Description*
3.3.6.A5	Explain the effects of oceans on climate. Describe how global patterns such as the jet stream and water currents influence local weather in measurable terms such as temperature, wind direction and speed, and precipitation.
3.3.6.A4	Describe how water on earth cycles in different forms and in different locations, including underground and in the atmosphere

Important Standards Addressed in the Unit:	
S6.A.3.2	Apply knowledge of models to make predictions, draw inferences, or explain technological concepts.
S6.A.1.1	Explain, interpret, and apply scientific, environmental, or technological knowledge presented in a variety of formats (visuals, scenarios, graphs).
S6.D.1.1	Describe how constructive and destructive natural processes can influence different biomes.

Misconceptions:	**Proper Conceptions:**
1. The saltiness in seawater is essentially table salt. 2. An ocean's deepest point is in the middle, .and shaped like a bowl. 3. There are not huge waves away from shore. 4. The ocean appears blue because it's reflecting the sky. 5. Icebergs are made of frozen saltwater. 6. Coasts and coastlines do not change. 7. Table salt + water = sea water 8. Oceans have the same salinity everywhere. 9. Earth's oceans are separate and not connected. 10. The ocean is infinite so pollution is not a problem. 11. The oceans' resources are limitless. 12. My personal actions don't impact the oceans.	1. It's considered salt water because it contains a bunch of minerals that come from the Earth's surface. Rain and snow pick up minerals from the ground, which turns into runoff that goes into the ocean. So, seawater has a lot of sodium and chlorine in it, but, it also has a bunch of sulfates, magnesium, calcium, and potassium. 2. Much like the land on earth, the surface of the ocean is not consistent. It has its equivalent of mountains and canyons and flat plains. The ocean contains trenches, which is the word scientists use to describe the deepest part. 3. People typically only see big waves close to the shore, so they assume that's not a problem in the open ocean, but there are rogue waves which can be a major problem in the middle of the ocean. 4. The ocean is not reflecting the color of the blue sky—it's actually absorbing it. 5. Icebergs are freshwater frozen due to its location. 6. Coasts and coastlines change as a result of erosion. Sea-level rise may also affect them. 7. Sunlight is made up of all colors of the rainbow. When sunlight hits the ocean it is scattered by the water molecules. Blue light is scattered the most – which is why the ocean looks blue. However, floating plants, sediments, and algae may make the ocean appear to be green, yellow, or even red! 8. Sea water's "salt" is made of dissolved minerals from surface runoff (excess water from rain, snow or other sources that must flow over land). 9. Salinity can vary by location or season. In the Arctic and Southern Oceans, the formation of sea ice results in a layer of highly saline water. 10. Earth's oceans are all connected and part of one global ocean system. 11. Pollution is a problem everywhere. In the ocean, pollution can affect the entire food chain. Tiny creatures such as plankton take in pollutants, which are passed on to the larger animals that feed on them. The effects of the pollution are most visible in the top predators in a food web, as they end up with the highest level of pollutants from their prey. 12. Like all other natural resources, those of the ocean are limited and must be conserved. 13. Many of our actions eventually impact the oceans in terms of surface runoff and pollution.

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
• Properties of ocean water • Density in the ocean • Classifying ocean organisms • Ocean floor and shoreline features • Erosion and weathering of ocean floor • Comparison of global ocean currents and how this information helps humans • Forces affecting surface and deep ocean currents • Parts of a wave and how they move • Causes of tides • Investigating of ocean resources • Types of pollution and applying ways to help globally reduce it	• Illustrate personal vision of what makes up an ocean • Apply previous knowledge of the water cycle to explain how oceans became salty • Global water distribution activity • Create and analyze a pie graph to better understand the elements and compounds that comprise Earth's ocean water • Exploring ocean temperatures lab • Graphic representations manipulated to show factors affect the ocean at the surface and depths • Mystery ocean floor feature graphing activity • Through an interactive Smartboard lesson, students will not only recognize the anatomy of the ocean floor but will explain what occurs at each location • Read specific facts covering how currents and waves move sand, rocks, and sediments around the ocean floor • Plot path of two buoys to determine the location of a lost ship crew in the Indian Ocean or track sea turtle migration through currents • Currents station rotation • Create a model demonstrating how the moon creates the tides • Ocean product advertisement • Design a new method for controlling ocean pollution • Collaborative groups of students choose an ocean organism to research. They create digital trading cards to share with classmates that highlight the characteristics of these three groups and the depth at which they live. • Scavenger Hunts	• Collaboration • Creativity • Critical Thinking • Communication • Leadership • Curiosity • Effort • Responsibility • Perseverance • Planning

Academic Vocabulary:

• salinity • density • sediment • nekton • plankton • benthos • phytoplankton • zooplankton	• continental shelf • seamounts • continental edge • continental slope • continental rise • abyssal plain • mid-ocean ridge • Mid-Atlantic Ridge	• currents • wave • hurricane • dredging • Coriolis effect • period • trade winds • crest

• dissolved gases • aquaculture • desalination	• ocean trenches • SONAR • inorganic • organic • pollution	• westerlies • trough • upwelling • thermocline • wavelength • turbidity current • Fetch • tides • spring tides • neap tides

Assessments:

- Tests/Quizzes, Homework, Projects, Cooperative activities, Presentations, Lab activities

Differentiation:

- Scaffolded notes
- Adapted tests/quizzes
- Project based learning with driving questions chosen by students
- Differentiated reading passages

Interdisciplinary Connections:

- Reading passages with comprehension checks
- Science journals with informative writing and written reflections

Additional Resources:

- Digital resources on iPads and Chromebooks

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