October 15, 2019

6th Grade Weathering and Erosion Review

*Weathering and erosion are the two main ways that Earth’s rocky surface is shaped and changed!*

* *Slow, gradual processes over time result in very large-scale changes in the Earth’s surface*
* *Plate tectonics creates mountain ranges, while weathering and erosion break mountains down*

***Vocab***

* **Rocks:** mixtures of different elements and chemical compounds that combine to form hard, solid materials on the Earth’s surface
* **Weathering:** the *breaking down* of rocks into smaller pieces caused by exposure to air, moisture, and organic materials
	+ **Local, small-scale surface changes on rocks**
* **Physical weathering:** breaking down of rock materials into small fragments or pieces
	+ Does not change the chemical composition of the rocks
	+ **Frost-wedging:** water seeps into cracks in rock and freezes. When the water freezes, it expands and cracks the rock
	+ **Plants**: as a plant grows, its roots can put pressure on rock and crack it
	+ **Animals**: burrowing loosens and weakens rock, ex. prairie dogs
	+ **Gravity**: ever-present force that pulls down on all matter on Earth
		- Avalanches or rock slides dislodge rock, which exposes more rock to weathering
* **Chemical weathering:** decomposition of rock due to the chemical reactions between compounds in the rock and chemicals in the environment
	+ Changes the chemical composition of the rocks
	+ **Carbonic acid**: produced naturally by the combination of carbon dioxide and water
	+ **Acid rain:** caused by pollution
		- Sulfur is released into the air by factories and combines with water, creating sulfuric acid
* **Erosion:** the process by which rock and soil materials are loosened and *transported* from one place to another
	+ **Large-scale changes over great distances**
		- Rivers, valleys, canyons
	+ **Wind erosion**: the movement of soil and sand from one location to another by wind
		- Sand grains carried by strong winds can act like sandpaper and scrape away little pieces of solid rock from hills and mountains
		- Can also pick up soil from plains or fields and transport particles to other areas
	+ **Water erosion**: begins with a single raindrop!
		- The detachment and removal of soil and rock by water
		- **Three factors that influence amount of water erosion:**
			* Rainfall intensity and runoff: heavier rains cause more erosion
			* Slope gradient (how steep the slope is): steeper slopes allow more erosion
			* Vegetation/obstacles (big rocks): more plants and big rocks LIMIT erosion
* **Watershed**: the area of land around system of streams and rivers, ex. Chesapeake Bay watershed
* **Soil:** the mixture of organic component, sand, and gravel that makes up the upper surface of Earth
	+ The end result of weathering and erosion
	+ Sand and pebbles come from the weathering of rock
	+ Humus is organic material that comes from decomposing plant and animal material
* **Structure of Earth**
	+ **Crust**: surface layer of Earth, “floats” on top of the mantle
		- Solid, cool, very thin – like the shell on a hard-boiled egg
		- Present on continents *and* on the sea floor!
	+ **Mantle**: middle *layer* of Earth, semi-solid liquid
		- Able to flow, very hot
		- Convection currents in the mantle cause movement of the crust
	+ **Core**: actual middle of Earth, composed of molten iron and nickel
		- Extremely high pressure and temperature
* **Convection currents**: hotter rock material in the mantle rises to the crust. The rock cools as it reaches the crust and begins to sink as it cools.
	+ **\***Hot material rises due to its low density, cool material sinks due to its high density
	+ Convection currents cause the creation of new crust where hot material is able to push through to Earth’s surface
		- Ex. volcanoes, near ocean trenches
* **Plate tectonics**: the large-scale movement of crust plates
	+ Earth’s crust is broken up into 7 major and several minor plates, which float atop the mantle
	+ The formation of new crust caused by convection currents pushes the old crust out of the way, ultimately moving the crust’s plates
		- This movement causes the continents to move!
		- Can also create mountain ranges when plates push against each other
* **Continental drift**: the gradual, *constant* movement of continents across Earth’s surface
	+ Caused by the movement of tectonic plates, which make up Earth’s crust
	+ Think Pangea

*Convection currents in the mantle force materials up onto the Earth’s crust to create new crust, which pushes tectonic plates into one another, causing continental drift!*

* **Igneous rock**: magmatic rock formed through the cooling of lava or magma
* **Sedimentary rock**: rock formed when sand, mud, and pebbles are deposited on top of each other
	+ These layers are squashed into each other until they form rock
	+ Many fossils are found in sedimentary rock
* **Metamorphic rock**: type of rock that has been changed by extreme heat and pressure

 **Steps of the Rock Cycle**

1. Molten rock from the mantle rises to Earth’s surface and cools to create new crust
	1. This cooling magma forms *igneous* rock
2. As a result of weathering, rock breaks down
3. Over time, broken down rocks are layered on top of each other to form *sedimentary* rock
4. As more and more rock builds up, pressure and temperature increase *a lot*
	1. This increased pressure and temperature form *metamorphic* rock
5. Metamorphic rock sinks into the mantle and melts into magma, becoming part of the mantle
6. Through convection, the magma is pushed back up to the surface and creates new igneous rock
7. AND THE CYCLE REPEATS

***Focus Questions***

* **How are physical and chemical weathering different?**
	+ Physical weathering breaks rocks into smaller and smaller pieces without changing the chemical composition of the rocks. Chemical weathering occurs when compounds in the rock react with chemicals in the environment, changing their chemical composition.
* **How do physical and chemical weathering combine to weather rocks?**
	+ By breaking rocks into smaller pieces, physical weathering exposes more of a rock’s surface area to chemical weathering. The combination of the two types of weathering speeds up the overall process of weathering.
* **What occurs when erosion takes place?**
	+ When erosion takes place, soil is moved from one location to another.
* **What factors increase or decrease water erosion?**
	+ Soil from a steep slope will be eroded more than the soil from a less steep slope.
	+ Obstacles such as rocks and vegetation will decrease the erosion of soil from the slope.
	+ Heavier, more intense rainfall will cause more erosion than lighter rain showers.
* **What are some components of soil?**
	+ Some components of soil include gravel, organic matter, and sand.
* **How are the different components of soil different from each other?**
	+ The different components of soil are different chemically and in size.
* **What happens when tectonic plates push against each other?**
	+ Material at impact site is pushed up, creating mountains
	+ Weathering and erosion processes SLOWLY wear away these mountain ranges