**The Rock Cycle: How Rocks Form**

 The following activities are all based on the Rock Cycle interactive website by the Annenberg Center (<https://www.learner.org/interactives/rockcycle/change.html>)

This lesson investigates the specific processes by which rocks transform between igneous, metamorphic, and sedimentary. Please go to the Rock Cycle interactive website and begin on the How Rocks Change page.

Read the introduction, and answer the following questions:

-How does the time in a human lifetime compare to the amount of time needed to change an igneous rock into a sedimentary or metamorphic rock?

What does the phrase “geologic time” mean?

What are two similarities between the Rock Cycle and the Water Cycle?

-

-

Heat and Pressure--

 Think back to the lesson when we examined rock types. What type of rock is formed when intense heat and pressure are applied over a very long time?

When a yummy dessert like a cake or a cookie gets baked in an oven, do chemical reactions occur that actually change the matter in the cake/cookie into a different chemical compound, or does the cake/cookie just “dry out” and become a solid because the liquid in the batter evaporates? What do you think?

**Watch the short video on “Heat and Pressure”.** In this video, what type of rock exits before heat and pressure is applied, and what type of rock is it after the heat and pressure are applied?

In the video, what is causing the pressure on the rock?

What happens to the rock because of the pressure?

As the rock sinks lower into the Earth, the edges of the rock are colored red. What does the red tell you about what is happening to the rock as it gets buried deeper into the Earth?

Think about cakes and cookies (Yummmmm!!!) and what happens to dough as they get baked in the oven. In the video, what is happening to the chemicals in the rock as it gets squeezed and heated?

Every rock type (such as granite, or basalt, or marble) is unique because of the specific chemical substances that it is made out of. Some of these chemical substances are described with a special name: a **MINERAL**.

**Minerals** are solid substances that occur naturally. They can be made from a single element (like gold or copper) or from a combination of elements. The Earth is made up of thousands of different minerals. Minerals have a specific chemical structure which is the same throughout the entire mineral. Rocks, on the other hand, are composed of a variety of different minerals and are not consistent throughout their structure.

What is the specific science term that describes the process of change in a rock as it gets heated and squeezed? Complete the word below.

Met….

Go to the next page on the website, which is called “How Rocks Change- Melting”

Have you ever left a candy bar inside of a car on a hot sunny day? What happens to the bar as it heats up?

When the candy bar melts, does it change into a different substance, like cake batter does when it is baked, or is the candy bar just the same chemicals, only liquid instead of solid?

How hot, in degrees Fahrenheit, do rocks need to get before they begin to melt?

What word is used to describe liquid rock?

Watch the animation on “Melting”. How is what happens to the rock in this video different from what happened to the rock in the previous video (Heat and Pressure) about metamorphism?

What happens to the density of a rock when it melts (changes from a solid to a liquid)?

What do substances in the Earth do as a result of becoming less dense?

If you want to make ice cubes, you take liquid water and place it in the freezer. During this “Cooling” process, the molecules in the liquid slow down and arrange themselves into a particular pattern known as a “Crystal”. Igneous rocks, which are rocks formed when magma cools and solidifies, are formed out of “***Mineral Crystals***”.

Now watch the animation on “Cooling”.

In the Cooling video, notice how magma rises up through the Earth. As it gets closer to the Earth’s surface it cools, and as it cools it begins to solidify (turn from a liquid into a solid).

Sometimes, magma flows out of the Earth onto the Earth’s surface. Magma that flows on the Earth’s surface is called

\_\_\_\_\_\_\_\_\_\_.

What does the term “Extrusive” igneous rock mean?

**Extrusive igneous rocks** cool very quickly, because the surface of the Earth is much colder than the inside of the Earth. When igneous rocks cool quickly, they have very little time to form large mineral crystals. When you look at an extrusive igneous rock, you cannot see crystals because they are too small to be seen with the naked eye.

Most of the time magma that rises up through the Earth solidifies before it reaches the surface. Igneous rocks that cool and become solid while still inside of the Earth are called

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ igneous rocks.

How long, in years, might it take for magma rising up through the Earth to cool down enough to become a solid igneous rock?

Intrusive igneous rock cools so slowly that the molecules and atoms have lots of time to arrange themselves into crystals. When you look at an intrusive igneous rock, you can clearly see the mineral crystals with the naked eye.

Move ahead to the next page on the website, “How Rocks Change: Weathering and Erosion”.

What are THREE things that can cause rocks on the Earth’s surface to break down into smaller pieces?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is the geology term for the small pieces that are broken off and removed from bigger rocks?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Once small pieces are broken off of bigger rocks, the small pieces get TRANSPORTED to new locations on the Earth. What are THREE things that can move sediments across the Earth’s surface?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Watch the animation on “Weathering and Erosion”. What direction do the sediments move in once they break off of the rock?

In this video, where to the sediments end up?

When you go to Old Orchard Beach, you play in the sand. Where do you think that this sand came from? How did it end up at the beach?

Sediments that are transported across the Earth’s surface eventually stop moving. Once they stop moving, it is likely that they will get buried by new sediments that arrive in that same location.

What are the THREE types of locations in which sediments are likely to stop moving and pile up?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What does the term “Compaction” mean?

What does the term “Cementing” mean?

Watch the animation “Compacting and Cementing”. What is it that “Compacts” the sediments?

The video does not mention “Cementing”. Cementing means that the sediments stick to each other with more and more force as they get squeezed together. Sometimes, a chemical “glue” even forms that helps to hold the particles together!

How thick does a pile of sediments need to be before enough weight is there to squeeze the sediments into rock (called “Sedimentary” rock)?

At the bottom of the page click on the “Transform the Rock” link. Take the quiz, and write down your score here \_\_\_\_\_.