**Unit 3 Notes: Minerals, Rocks, and the Rock Cycle**

Rocks are natural substances that are made from different combinations of minerals. Minerals are made from different combinations of elements. In order to be a mineral a substance must have all 5 of these characteristics:

1. Naturally occurring (found in nature; can form without people)
2. Inorganic (can form without a living creature)
3. Solid (at average Earth’s surface temperatures; ignore the Arctic/Antarctic or inside the mantle)
4. Definite chemical composition (has a particular ratio of elements, i.e. quartz is SiO2—2 silicon atoms for every 1 oxygen atom)
5. Crystalline form (the atoms arrange themselves in a repeating pattern like the one shown to the right)

The most common type of minerals is the group of silicates—those that contain silicon atoms. All of the various minerals from all groups can be combined in different ways to make different rocks depending on the way the rock forms.

The 3 types of rocks are igneous, metamorphic, and sedimentary rocks. Each type can be transformed into the other types, or even a different version of the same type, through a series of natural process called the Rock Cycle. The processes that make the rock also determine the type of rock that has been made.

Igneous rocks form when a rock is first melted and then cooled until it has solidified. This 2-step process must happen in order or an igneous rock does not form. Where the melted rock cools will determine if the new rock is an intrusive igneous rock or an extrusive igneous rock. Intrusive igneous rocks cool underground, slowly the rate at which they cool. The slow cooling of these rocks allow time for large crystals/grains to form. Extrusive igneous rocks cool above ground, causing them to cool very quickly. Cooling quickly means there is little time for crystals to form, so either there will be no crystals or only very small ones.

Metamorphic rocks form when a rock is placed under high heat, high pressure, or a combination of both. This process of metamorphism can produce parallel banding, called foliation, in a rock.

Sedimentary rocks form from the bits and pieces of other rocks, fossils, and even shells through a 5-step process. First, the original rock is broken down through weathering. These pieces are called sediments. Second, the sediment (pieces of old rocks) is moved by wind, water, ice, or another natural force. Third, the sediment accumulates/collects/is deposited on the bottom of a water body, like a lake. Fourth, the accumulated sediment is compacted by the weight of the water and even other sediments. Fifth, the compacted sediment is cemented together into a solid piece as the water reacts with the minerals in the sediment.

**Key Ideas:**

1. Rocks are all made from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Minerals are made from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Ice is NOT a mineral because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. A seashell is NOT a mineral because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. The most common mineral group is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. There are \_\_\_ types of rocks.
7. The continuous series of processes that change rocks into other rocks is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
8. The 2 steps that form igneous rocks, in order, are:
	1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
9. An intrusive igneous rocks forms \_\_\_\_\_\_\_\_ ground, cools \_\_\_\_\_\_\_\_\_, and has \_\_\_\_\_\_\_\_\_ crystals.
10. An extrusive igneous rock forms \_\_\_\_\_\_\_\_ ground, cools \_\_\_\_\_\_\_\_\_, and has \_\_\_\_\_\_\_\_\_\_ crystals.
11. Metamorphic rocks form by the process of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which requires \_\_\_\_\_\_\_\_\_\_\_\_ and/or \_\_\_\_\_\_\_\_\_\_\_\_.
12. When a metamorphic rock looks like the image to the right, it is said to

have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or be foliated.

1. Sedimentary rocks are the only ones where you can see \_\_\_\_\_\_\_\_\_\_\_\_.
2. The 5 steps to forming a sedimentary rock, in order, are:
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. If you change the order of steps in forming an igneous rock, does an igneous rock form?
9. If you only have heat during metamorphism, will a metamorphic rock form?
10. If you reorder the steps in forming a sedimentary rock, does a sedimentary rock form?