



August 2010 – Rocks & Minerals

Why are rocks all different shapes and colors? What is the difference between rocks and minerals?

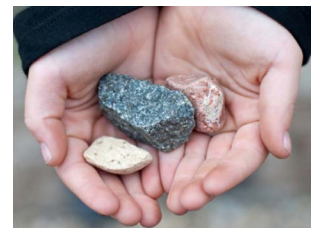
Keep reading to find out the answers to these questions with fun science projects!

Geology Science Projects

Collecting Rocks

It's easy to find rocks - they're just about everywhere in nature! If you live near mountains or rocky shores, you can easily find small pieces of rocks that have broken away from large boulders or cliffs. If you live near an ocean, lake, or stream, you can find pebbles and other stones. You can even find interesting rocks on a gravel road, driveway, or at a park! (Important Note: it is illegal to take anything - including rocks - from national parks, monuments, and most state parks. Be sure to ask for permission before taking rocks from someone else's property.)

Collect some of the rocks you see that you like best. Look for ones with interesting shapes and colors. Store them in a box or bag until you get home, then rinse them off and dry them. Notice how much different they look when they're wet instead of dry. The water cleans dirt off of them, but also helps them reflect light so the colors and features inside are easier to see.



Do you notice any interesting patterns, lines, or colors in your rocks? Get a closer look at crystals, cracks, and other features of your rocks with a [magnifying glass](#). Sort your rocks by their color, size, or texture. An empty egg carton makes a great place to store your collection - you can put one rock in each cup or put several similar ones together.

To learn more about the rocks you find, visit [this website](#) and see if you can identify any of them. (Click on "Play," then "Geology," and then "In the Field: Rock Sherlock.")

Types of Rocks

Learn more about each type of rock with the activities below.

Igneous

Igneous rocks are formed when melted rock, called magma or lava, cools. As it cools, it becomes hard. You can see how melted rock can cool into igneous rock with this simple (and

tasty!) activity. You will need a bowl of ice cream and some hot fudge sauce that will harden (not chocolate syrup).

Pour some chocolate sauce over the ice cream. Watch what happens. Does the chocolate start to look different after a minute or two? When it comes into contact with the very cold ice cream, it cools down quickly.

In this example, the ice cream represents the earth and the hot fudge sauce represents lava (melted rock from inside the earth). As the lava spills onto the earth from inside a volcano, it starts to cool down and quickly hardens back into rock.

Sedimentary

Sedimentary rocks are formed when dirt, sand, and small bits of rocks (also known as sediment) settle down and stick together, often at the bottom of a lake. To see how this works, fill a clear jar with water and add a few handfuls of different sediment such as sand, dirt, soil, leaves, or pebbles. Screw the lid on the jar and shake it up well, then set the jar on a table and watch as the sediment starts to settle to the bottom of the jar. The largest pieces fall to the bottom fastest, but eventually most of the sediment will settle. In nature, sediment settles in layers. Over a long period of time, more sediment forms new layers on top of the last one. Eventually, the layers stick together and become rock.

You can use some aluminum foil to represent a sedimentary rock. Tear a piece about 12" long and crumple it up. The shape you end up with will be your "rock." If you look closely the crumpled foil, you'll notice tiny folds going in all different directions. Sedimentary rocks are made of lots of particles that can stick together in all different directions. There are also spaces in your "rock" because sedimentary rocks often have holes called pores in them.

Metamorphic

A metamorphic rock is formed when an old rock, which could be either igneous or sedimentary, is exposed to a lot of heat and a lot of pressure. The heat changes the minerals that the rock is made of and crystals are allowed to grow in the spaces left in sedimentary rocks. The very strong pressure that presses down on the rock flattens it together. The changes from the heat and pressure together make a brand new rock!

You can show how this works by flattening your foil sedimentary "rock" with a rolling pin or hammer. First, flatten it a little by pressing it hard against a wall or table. Then use a rolling pin or hammer to see if you can get it any flatter and take a look at it. Does it look a lot different from before you flattened it? Most of the little folds of foil should be going the same direction now. All that pressing made the folds line up on top of each other. The hammer or rolling pin represents the pressure that the rock would be exposed to over time when it turns to a metamorphic rock. Of course, this does not include the heat that helps change rocks to metamorphic ones, but you can see how pressure is important to change them.

Fun Facts

- Basalt (an igneous rock) is the most common rock found on Earth.
- Each year, up to 100,000 tons of rock fall to the earth from space!

- 70% of all the rocks on earth are sedimentary.

Silly Science

- What is a rock's favorite ice cream?
 - *Rocky Road.*
- How do rocks wash their clothes?
 - *On the rock cycle.*
- What do you do to a baby rock?
 - *Rock it.*

Way Cool Websites

- Test five different kinds of rocks with this [interactive game](#).
- Play an online [matching game](#) with colorful geodes!
- Check out photo galleries of various minerals [here](#) and [here](#).

Teacher Tidbits

Geology & The Rock Cycle

Have you ever heard the word **geology**? Do you know what it means? Geology is the study of the earth and what it is made of. Geologists study rocks, minerals, land, oceans, and even what's below the surface of the earth! They study how these things change over time.

Did you know rocks can change? Weather and other natural forces can wear them down into smaller or different-shaped ones. Rocks can also be completely transformed into new kinds of rocks! These changes are part of the rock cycle. In the rock cycle, rocks get melted down, morphed, or compacted into new rocks. Rocks don't go to waste in nature. They get recycled over and over again! Take a look at this [interactive rock cycle](#) animation to learn more, or check out [this diagram](#) of the rock cycle.

There are many ways rocks can change. Wind and rain weaken and wear them down. This is called erosion or weathering. Sometimes water gets into small cracks in rocks and then when it freezes, the water expands (takes up more space), making the crack larger. After freezing and thawing a few times, the expanding water that turns to ice can break rocks apart! Roots from plants growing in cracks or holes in rocks can also break them apart.

Smaller pieces of rocks can be moved around more easily by water (such as streams and rivers) or by falling away from the side of a mountain or cliff. Over a long period of time, the rocks continue to break into smaller and smaller pieces. Eventually, some rocks break down so small that they become sand or dirt. After a while, layers of sand or soil and small bits of rock are piled up on top of each other at the bottom of lakes and oceans. This is called sediment. Sediment can come from any type of rock. The weight of all the layers and the water on top of them compresses the layers at the bottom and form a new kind of rock, called sedimentary rocks. Sometimes plants and animals get trapped between the layers as they are turning to rock and leave fossils in between the layers of rock! Limestone is a common sedimentary rock that often has fossils in it.

Some rocks are formed deep below the surface of the earth and others are formed above the surface. It's very hot deep inside the earth - so hot that part of the earth's center is liquid, melted rock, called **magma**. Magma is just melted rock. It comes from sedimentary, metamorphic, or igneous rocks that have been pushed down far enough into the earth to get really hot and melt. When magma is pushed up to the surface of the earth through a volcano, it becomes lava. When lava cools, it becomes **igneous** rock.

Another kind of rock is formed when either igneous or sedimentary rocks are pushed down into the earth. Once they're in there, they get lots of heat and lots of pressure. Eventually, all the heat and pressure completely changes them into a new type of rock, called **metamorphic** rock. Metamorphic means "change in form" and that's exactly what happens when a rock becomes metamorphic. This process is sort of like when you bake cookies - a big change happens while the dough is in the oven, and something very different comes out at the end! Remember that sedimentary rock we talked about, called limestone? When it becomes metamorphic, it turns into marble! Metamorphic rocks are usually very hard and sometimes have a striped or banded look (because all of the pressure makes the crystals line up flat). They also tend to have a flaky or grainy texture when broken and will often break apart in sheets.

Minerals

Minerals are solid substances that are formed from elements found naturally in the earth. Elements are pure and cannot be broken down into other substances. Minerals are usually formed from two or more elements joined together, but some minerals are made of just one element. An example is the diamond, which is made from the element carbon. Minerals have a crystal structure. You can learn more about crystals [here](#). Scientists have discovered over 2000 types of minerals on earth.



Rocks are mixtures of different minerals. All rocks are made up of two or more minerals, just like minerals are made from two or more elements. Minerals are what give rocks their rough texture.

Why do minerals often have larger crystals than rocks that contain the same minerals? When a mineral grows on its own without combining with any other substance, it has more space to grow, so larger crystals can form. When minerals grow as part of a rock, particularly an igneous or sedimentary rock, the crystals don't have as much space to grow. They get crowded out by other minerals and by being compacted down by soil, water, or other causes.

More About Types of Rocks



Igneous Rocks

These kinds of rocks can look a lot different from each other. Pumice has lots of holes and is very lightweight - in fact, it can float in water! The holes were caused by gas that was trapped in the melted rock before it cooled. Obsidian is heavier, all black in color, and very smooth. In fact, because the minerals in obsidian cooled

very quickly, it doesn't have any crystals and is actually a type of glass! (The photo above shows lava cooling to form obsidian.) Granite is a type of igneous rock that forms below the earth's surface. It has a coarse, grainy texture with lots of crystals because it cooled slowly. You can find pictures and learn more about several kinds of igneous rocks [here](#).

Sedimentary Rocks

Sandstone, limestone, and shale are very common sedimentary rocks. You can usually see the layers of sediment that formed the rock. Sometimes there are fossils between the layers of sedimentary rocks, which are indentations left by plants or animals that got trapped as the rock was forming. Minerals in between the layers act like cement to keep the layers together. Some sedimentary rocks can be broken apart pretty easily, though. Grains of sand can be rubbed or scraped off of sandstone, for example.

Baking [layered bar cookies](#) is a fun way to show how sedimentary rocks form. (Click on "Sedimentary Rock Snacks")

Metamorphic Rocks

Metamorphic means "change in form" and all rocks can become metamorphic at some point. They are very hard and have a "grainy" texture. Some examples are schist, slate, and gneiss (say: NICE). One example of a rock that can change into another rock is limestone (a sedimentary rock). It can change into a metamorphic rock known as marble when the conditions are right. The crystals of the minerals inside the limestone become larger when the temperature and pressure around the rock increases. Another example is carbon, which turns to diamonds under the right conditions! Some metamorphic rocks have lines or stripes on them - the mineral crystals inside the rock were under so much pressure while the rock was changing that they didn't have anywhere else to move, so they all lined up nice and flat.

Printable Worksheet

Lots of things are made from different minerals, from paint to jewelry. Help kids recognize the difference between rocks and minerals with the worksheet below.

Pictured are several items that contain minerals, one mineral sample, and three rock samples - one sedimentary, one igneous, and one metamorphic. Have kids color the page and circle the rocks to show that they are different from minerals and objects that contain minerals. Older kids can label each type of rock.

Rocks & Minerals

All of the objects pictured here are made of minerals, but there are also three rocks.

There is a picture of each type of rock: igneous, sedimentary, and metamorphic. Can you find and circle each one?

