Calendar Connections

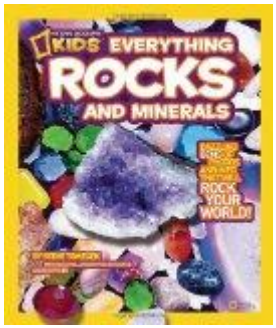
Geology

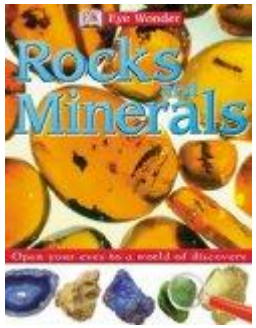
Target Level: grades 3-6

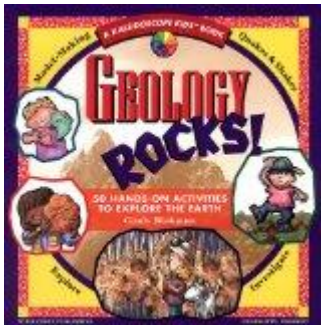
The facts are created at a more advanced level but can easily be used for the entire homeschool family! Young children will soak up the information their older siblings are taught while all together.

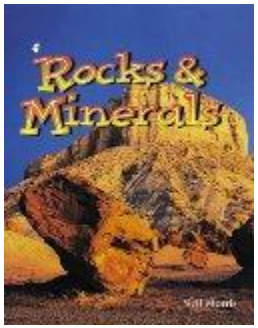
Geology Books

Click on the book image to see it on Amazon.









Calendar Connections

Helpful Items

~these are the *exact* products we use~

cardstock

laminator

laminating film

We use this particular calendar, you can get it on Amazon here!

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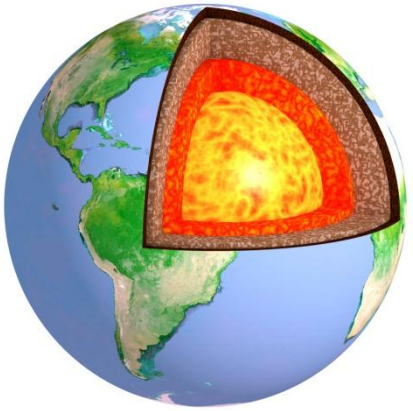

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Rocks and Minerals

Before you begin this study, take a 5-10 minute walk outside and take note of all the different rocks and minerals you notice. Look at houses, buildings, roads, sidewalks, fields, and cars. Notice the colors and textures. Now look around your house. Look at the kitchen counters, sinks, walls, floors, and furniture. Rocks and minerals have many uses and purposes. Most of our planet is made of rocks and minerals as well as many of the things we use. Even our bodies require nine minerals (Vitamins A, D, E, K, B, C, Calcium, Iodine, & Iron) in order to live and contain 51 others in trace amounts!

2

Geology

The study of rocks and minerals is known as geology – the study of solid earth or the rocks of which it is composed. The word is from the Greek – **geo** means "**earth**" and **logos** means "**study**." A person that studies this field of science is known as a geologist. A person that studies only rocks is known as a petrologist. A person that studies only minerals is known as a mineralogist. There are many other fields of study under geology including that of other planets such as Mars!

3

Earth

Our earth is made of four layers. The center of the earth is called the inner core. This inner core is solid, measures 760 miles in radius and is thought to be made of an iron-nickel alloy. It may have a temperature close to that of the sun – 5430*C. The next layer is called the outer core and is a liquid layer of iron and nickel. It is not solid like the inner core because it is not under enough pressure. The layer following is called the mantle and makes up 84% of the Earth's volume. The mantle is a rocky shell about 1800 miles thick. The final layer is called the crust. This is the layer that we are all familiar with and from which all the minerals and rocks that we use in our everyday lives comes from. We can not drill any deeper than the mantle.

4

What makes a rock?

Go outside and find a rock – one big enough that you can see the different colors – or maybe even break in half (don't forget to wear safety glasses if you attempt to do this!). If you look at the rock carefully you will see that it is not one solid material. You may see a bit of sparkle or vein of color running through your rock. That's because rocks are made up of crystals of minerals. Different amounts of minerals make up different rocks. For example, if you have granite for your kitchen counters it is made up of quartz crystal, feldspar crystals, and mica crystals.

5

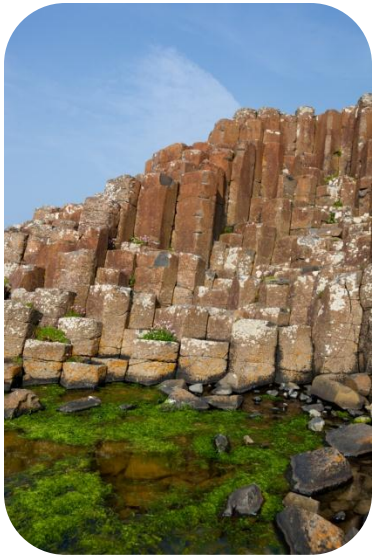
Volcanoes

What happens when you take a ball of play-doh and squeeze it between your hands? It comes out between your fingers, right? The pressure you placed on the play-doh causes it to find a way out of the confines of your hands. This is a bit like what happens within a volcano. A volcano is an opening in the earth's crust which allows hot magma, or molten rock, to escape from below the surface. When this molten rock has cooled and hardened it forms igneous rock.

6

Types of Rock

Though there are several hundred different kinds of rocks, they all fall under one of three types: Igneous, Sedimentary, or Metamorphic. Each of these rock types is in constant change and can become one of the others, depending upon what happens to it - the amount of pressure, heat or how the elements condition it.



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7 **Igneous Rock**

Igneous comes from the Latin word **ignis**, meaning "fire." This rock type is formed by the cooling and hardening of magma or lava. This type of rock forms the greatest part of the Earth's crust and surface layer. Scientists love to study this type of rock as it gives them great information about the minerals found within the mantle layer of the Earth since this is where the magma originates. Over 700 different types of igneous rock have been identified. They are classified according to their properties of composition and how they were formed. The photo on the front is of Giant's Causeway in Northern Ireland – the most famous igneous formation . The basalt lava cools and forms hexagon-shaped columns. The most common igneous rock is granite, while pumice stone is the only floating rock.

8 **Sedimentary Rock**

Sedimentary rock is formed exactly how it sounds – through sediment – or deposits of loose materials on the Earth's surface or within bodies of water. As things weather or erode (break down) the small particles accumulate and form piles of dirt or sand. This is sediment. If left, the sediment eventually forms sedimentary rock – due to pressure and heat. One type of sediment is chalk. Tiny sea shells and skeletons break down and create chalk cliffs which solidify as they pile up and apply pressure to that which is under it. Plants also break down, are buried, squeezed together, and eventually forms coal. It is often in this type of rock in which layers are able to be seen.

9 **Metamorphic Rock**

Metamorphic rock comes from the Greek – "**meta**" meaning **change** and **morph** meaning "**form**." The Earth is always changing form. Did you know that mountains are actually pushed up out of the Earth's crust? When this happens it creates friction which heats up the rock causing it to develop into metamorphic rock. An example of this is when heat and pressure as granite is forced up causes the development of the metamorphic rock marble.

10 **Meteorites!**

We are not the only planet made up of rocks and minerals – Mars, Jupiter, Mercury, etc. are all made up of rock. Even our moon is a type of rock! Space is full of rocks and occasionally one of these rocks hits Earth, this is called a meteorite. Most of these are the size of a pebble, but sporadically we will have a large one that will hit the Earth and form a crater – a deep debit in the ground. Though we can't see it, we also receive about 25 tons of "space dust" as it rains down upon our Earth everyday!

11 **Caves**

What are caves but hollowed out rock? Within caves are beautiful formations of rocks fashioned by the constant water flow of a river or waterfall or by the gentle dripping of water with traces of the mineral calcite from the ceiling to the ground. Exploring a cave for science or recreation is called spelunking (spi-**luhngk**-ing).

12 **Stalactites**

One of the two most common forms of rocks that develop within caves are stalactites. These long slender formations build up gradually over time as drops of water with calcite drip down from the ceiling. These formations hang from the ceiling – just remember stalactite has a "**c**" in it for ceiling and you will remember that stalactites hang from the ceiling.

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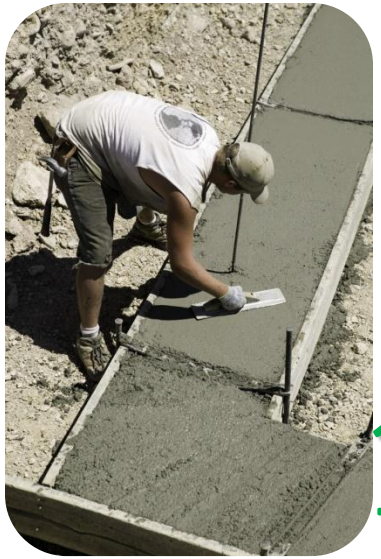

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Stalagmites

These formations are the counterpart to stalactites. As the water drips down from the ceiling and is released to the floor the mineral calcite that is deposited on the floor of the cave builds up from the ground to form a slender pillar called a stalagmite. Stalagmite has a "**g**" in it to help you remember that they grow up from the **ground**. The tallest stalagmite in the world is the height of a six-story house!

14

Hoodoo!

Though the word sounds as if it comes right out of a Dr. Suess book hoodoos are real! Hoodoos are columns of soft sandstone topped by a harder, less easily eroded stone cap that protects the column underneath. Hoodoos are formed in desert areas that are hot and dry. The soft rock erodes from rain and wind leaving the harder cap exposed. If the cap is lost, erosion of the remaining column will occur quickly.

15

Glaciers

So why are we talking about frozen water in geology? Because in the mountainous regions of the world, glaciers are the major cause of erosion. Glaciers move – did you know that? They move slowly, only about one to two inches a day, but they do move. As they move they gather rocks, boulders, and sediment. They also scrape and scratch the sides and floor of the glacial valley, producing fine grains of rock known as rock flour. This rock flour is carried down by the glacier and then deposited into mountain lakes giving them a beautiful turquoise blue color!

16

Crystals

Did you know that you eat rocks? Salt is a crystalline rock! Crystals form in many different types of rock from beautiful purple amethyst to toxic flexible strands of tremolite. Crystals continue to grow as long as the conditions are favorable. The word crystal comes from the Greek word "***kyros***" meaning "***icy cold***." Ancient Greeks believed that quartz crystals were made of ice that had frozen so hard it could not melt! The largest crystals in the world are found in a cave a thousand feet below Naica mountain in the Chihuahuan Desert of Mexico. They measure up to 36 ft. long and weigh 55 tons. The conditions proved to be perfect to allow these crystals to grow to such tremendous size and weight!

17

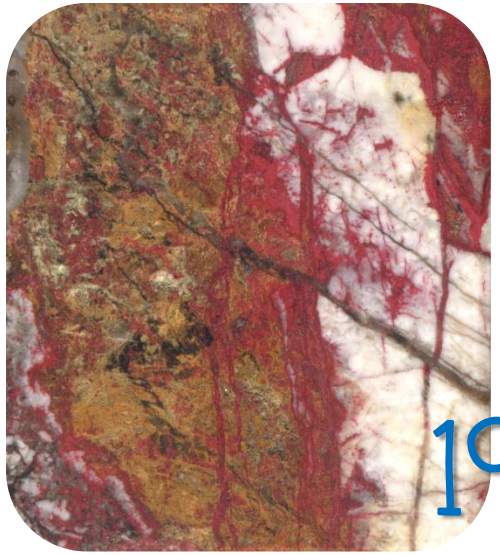
Rocks as First Tools

Have you ever taken a rock and attempted to use it as a hammer? Early humans thought rocks were useful as well. Early American Indians were known to use flat and round stones to grind grain into flour to make bread. Flint was discovered to break in any direction and form sharp edges and points – perfect for creating hand axes, knives, and arrowheads. Many people today still prefer to use stone as a cooking tool – such as marble at Cold Stone Creamery for mixing their ice cream and pizza stones for baking.

18

Rocks for Building

When you went out for your walk prior to starting this study did you notice how many different types of rock are used to create buildings? How about your sidewalks and roads? Brick is a common man-made stone to use to construct buildings. Clay, a mineral, is formed into bricks and baked to harden. The impurities within the clay produce different strengths and colors making them useful for different tasks. Concrete, a mixture of gravel, cement, sand, and water, is often used for buildings and sidewalks. Granite is an incredibly strong rock and has been used for thousands of years for building, including London's Tower Bridge! Even the pyramids in Egypt are made of limestone, pink granite, alabaster, basalt, and mud.



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Rock Art?

Have you ever taken a piece of charcoal and drawn on the sidewalk? How about some chalk? Many rocks and minerals hold different colors and have been useful for thousands of years. Cave painters used rock as their canvas as well as several different minerals for color, such as coal for black, chalk for white, and clay for browns and greens. In later years cinnabar (pictured on front) was used for red and realgar for orange. Both of these, however, and many others, turned out to be toxic. Man now produces many of these colors in a laboratory.

20

Keeping Warm!

The first reference to coal as being used as a heat source is by Greek scientist Theophrastus (371-287 BC) who stated "coal…once set on fire, burns like charcoal." Coal is the largest source of energy worldwide. It is burned to produce electricity. The coal is burned to heat up a water boiler causing water to turn to steam which then spins turbines that turn generators and creates electricity! Coal is formed by the breaking down of plants. As the plants decay and are buried, the pressure over many years eventually turns to coal.

21

Gems

Some rocks are more valuable than others! Gemstones are minerals that occur in nature. They are rare, beautiful, and hard. Gems are mined from rock and are then cut and polished to reveal their true beauty! Not all gems are mined, however. Pearls (forms in certain shellfish), amber (fossilized resin of fir trees), jet (fossilized remains of wood), and coral (skeletal remains of tiny sea creatures) are also considered precious gems. These gems are much softer than the ones mined from the Earth, so they are polished and never cut.

22

Gold and Silver

Ask your mom or dad to see some gold and silver jewelry or coins. What do you notice about it? It is shiny? Is it heavy? Gold and silver have long held great significance in the status of a persons wealth. If you had it, you were rich! Even today it is still valued for its beauty and rarity. Gold and silver are mined from the Earth and are not only used to create jewelry and coins but are now used in the electronics field, dentistry, and photography. Recently, platinum has become more valuable than both gold and silver. Though it was first discovered in the mid-18th century it wasn't widely used until this century. It's major industrial use is in reducing pollution from car exhaust and in refining oil.

23

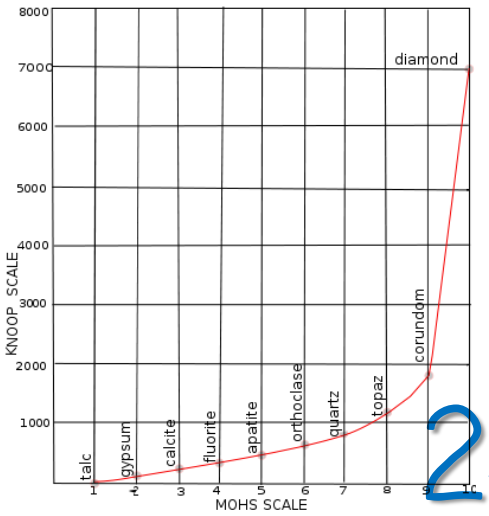
Ore

Have you heard of iron ore (pronounced "or") or copper ore? What is ore? Ore is the rock that holds a certain mineral – such as iron or copper. Some ores are located close to the surface of the Earth. Others are hidden deep underground. Coal, gold, and silver are all mined from under the ground – meaning people go beneath the Earth, into mines, to dig for these items. Ore is extracted through open-pit mines. Rock is blasted away so workers can take it away by the truckload to extract the metal. After the metals are refined they are smelted – fused and melted - to create metal. Around 3000 BC tin was added to copper to create bronze, a harder metal than each individually. But by 500 BC iron ore was discovered and was proven to be harder than bronze and in greater supply.

24

Fossils

Eventually, you realized we would have to get to this topic, right? Fossils are found in sedimentary rocks, usually limestone and shale. Fossils are an indication of past life. They often reveal details about plants or animals that are extinct. Fossils are formed when an animal or plant is buried in sediment. The soft parts decay, but the hard parts remain and form the fossil. If it is a fossil of a footprint it is known as a "trace fossil."



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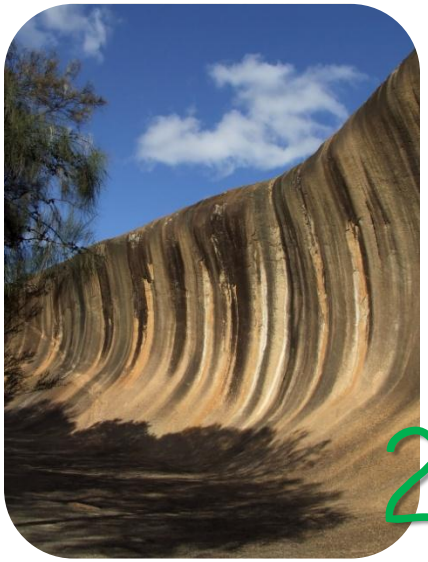

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Mohs Scale

Back in 1812, geologists needed a scale to determine the hardness of a rock. Friedrich Mohs developed a scale that categorized minerals based on the ability of one natural material to scratch another. Minerals were placed on the scale from one to ten with ten being the hardest. Pure minerals were used as rocks are a combination of minerals. The hardest known substance when the scale was developed was diamonds, so they are at the top of the scale and labeled number 10. Talc, a mineral used to make baby powder is one on Mohs scale. Our fingernails would be listed as a 2.5 and a steel nail would fall around 5.5 on the scale.

26

Do rocks float?

Sounds like a silly question, right?!?! Of course rocks don't float – they are much heavier than water. But there is one rock that does float – pumice. It is the ONLY floating rock known to exist. Pumice is cooled and hardened lava froth. Froth is like the foam you see at the top of your soda. When this froth hardens it is full of air bubbles causing the rock to be sprinkled with little holes, allowing it to float in water! How cool is that?!?!

27

Weird

There are many rocks and minerals that look strange, causing legends to be developed to explain their existence. The photo on the front is an example of one of these legends. These fossils of oyster shell remains were once thought to be the Devil's toenails! There is another stone

28

Wonderful

There are truly some amazing and wonderful rock formations around the world. One such formation is called the Wave Rock in Australia. Its name is appropriate as it looks like a crashing ocean wave. It measures 47 ft. high and 350 ft. long! It is formed in this manner as the softer rock beneath the upper lip erodes due to downpours of rain. The different streaks are caused by the minerals that wash down from the top.

29

Rock Hunter

Have you caught the rock collecting bug? Are you eager to try your hand at being a geologist? Go for it! Start by looking around for small colorful pebbles at the beach or on a hiking trail. It is a good idea to note where you found your specimen in a notebook and take a photo or sketch of it prior to removing it. This will provide a permanent field record. It's also a good idea to store each specimen in its own cardboard box as some rocks tend to break down easily if rubbed against another. Depending upon where you live you may need to be careful as dangerous creatures tend to hide under rocks. Always check with your parents first to see if it is okay to look for and take the specimen.

30

It's in what?

Rocks and minerals are found in many of the everyday items located around our houses. Did you know that clay and limestone are used to make books? How about that silver is used in telephones? Or that quartz is used in our computer? Or that silica sand is used to make both televisions and plastic buckets? It is truly amazing the number of different uses rocks, minerals, and metals have in our world!

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“I tell you,”
he replied,
“if they keep
quiet, the
stones will
cry out.”

Luke 19:40 (NIV)