The Rock Cycle Kit™

by Mini Me Geology
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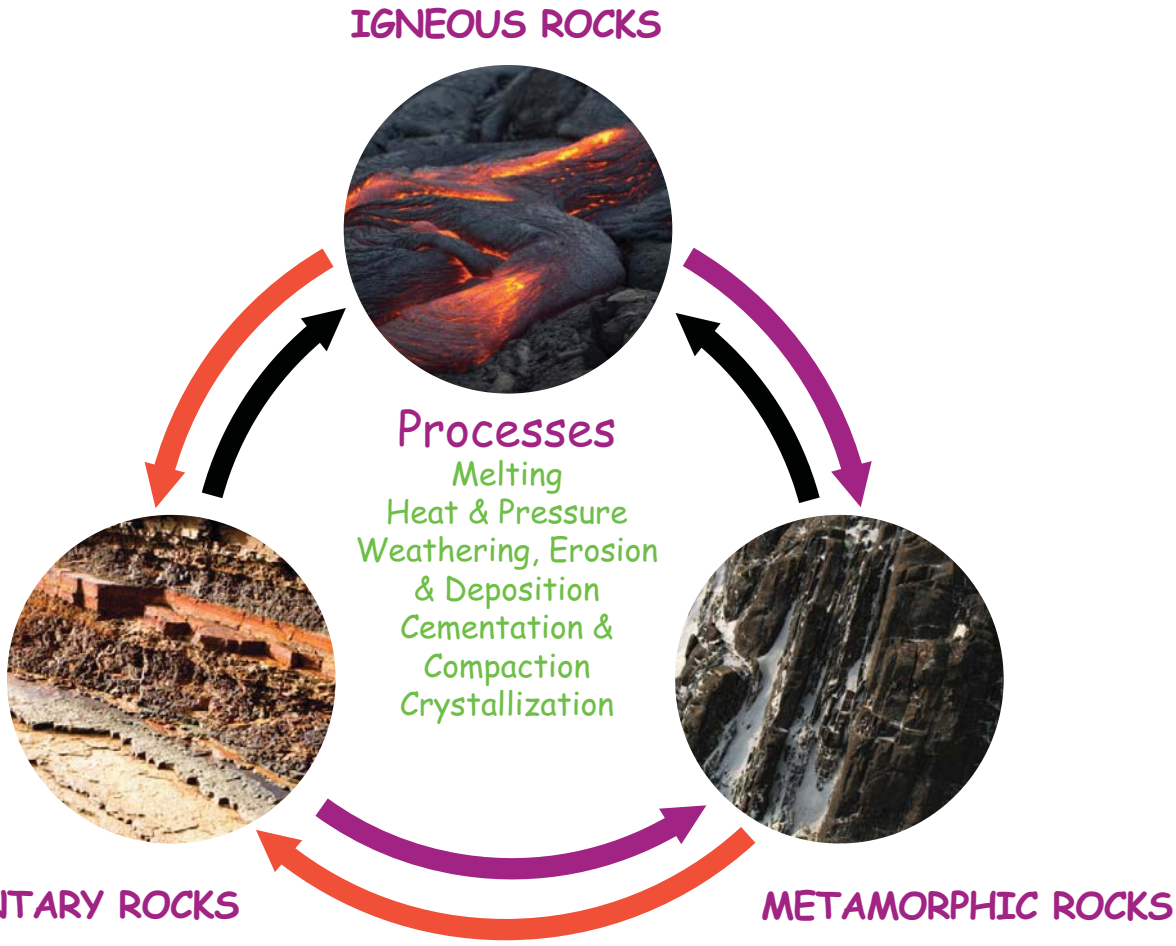
The Rock Cycle

Some of the Earth's rocks are created and destroyed every day. Igneous and metamorphic rocks break down from wind and water and can be formed into sedimentary rocks. Igneous and sedimentary rocks can be buried and heated and changed into metamorphic rocks. And, metamorphic and sedimentary rocks can move into deep, volcanic areas, be melted and turned into igneous rocks. This process of creating and destroying rocks is called: **THE ROCK CYCLE.**



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Mineral Sample Information

CALCITE

Color: White, colorless, gray, red, yellow, green, blue, violet, brown or black
Hardness: 3 on Mohs Hardness Scale
Streak: White
Luster: Glassy to Pearly
Cleavage: Rhombohedron
Locations: Worldwide
Uses: Microscopes, building materials and fertilizers
Features: Calcite will dissolve in an acid. Objects viewed through a clear piece will appear doubled. Calcite forms in water environments or in caves.

QUARTZ

Color: Clear. Other forms of quartz have many color variations.
Hardness: 7 on Mohs Hardness Scale
Streak: Colorless
Luster: Glassy
Cleavage: None. Conchoidal fracture.
Locations: World wide. Earth's most common mineral.
Uses: Quartz has many industrial uses - prisms, lenses and gauges, Glass, Paints, Stones, building materials and Abrasives.
Features: Quartz crystals mainly form in pegmatites, Alpine fissures and in geodes.

FELDSPAR

Color: Pink, green, white, red or yellow.
Hardness: 6 to 6½ on Mohs Hardness Scale
Streak: White
Luster: Glassy
Cleavage: Perfect in 2 directions, 90 degrees
Locations: Worldwide
Uses: Glazes, enamels, ornamental
Features: Feldspar is actually a group of minerals that occur in igneous and metamorphic rocks. These minerals can degrade into clay over time.

PYROXENE - AUGITE

Color: Dark Green, Brown or Black
Hardness: 5 to 6 on Mohs Hardness Scale
Streak: Gray-Green
Luster: Glassy to Resinous
Cleavage: Good in 2 directions, at almost 90 degrees
Locations: South Africa, United States, Greenland
Uses: Collecting
Features: Heavy, pyroxene mineral. Found in igneous rocks like gabbro and basalt and some metamorphic rocks.

MICA

Color: Brown, gray, silver, white, rose, green
Hardness: 2 to 2½ on Mohs Hardness Scale
Streak: Colorless Luster: Glassy
Cleavage: Platy (thin layers)
Locations: Worldwide - nice crystals in United States, Canada, Switzerland, India, Italy, Austria
Uses: Insulation and porcelain
Features: One of the most common minerals in rocks. Forms as a "book" with super thin crystal pages. Your fingernail can be used to flake apart the individual layers of the book.

Rock on!

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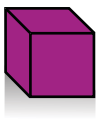
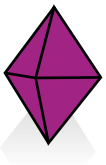
About Minerals

Minerals are all around you! They make up the rocks in the Earth and they have many uses too. Minerals come in many colors and shapes. Some minerals look very different from each other and some look very similar. Each mineral has a unique set of physical properties that geologists use to tell the minerals apart.

The most common physical properties that geologists use to identify minerals are crystal shape, color, luster, hardness and streak.

Crystal Shapes

There are many different crystal shapes in the world. In fact, there are too many to list here! Some of the most common minerals and their shapes are listed here for you. The most interesting part about crystal shapes is that minerals can sometimes for more than one shape depending on how it was formed!

Shape	CUBE 	OCTAHEDRON 	RHOMBODEDRON 	SIX-SIDED PRISM CENTER WITH SIX-SIDED PYRAMIDS ON BOTH ENDS 	SIX-SIDED PLATY 
Minerals that can form this shape	Halite, Pyrite	Fluorite, Diamond	Calcite, Rhodochrosite	Quartz, Amethyst	Lepidolite Mica

Sometimes you will see a mineral that looks like two crystals that have grown together. This is called a "twinned" crystal.

Minerals can also form where many crystals form in a group or layer and are attached to one another side by side. This is called a mineral "cluster" or "druze."

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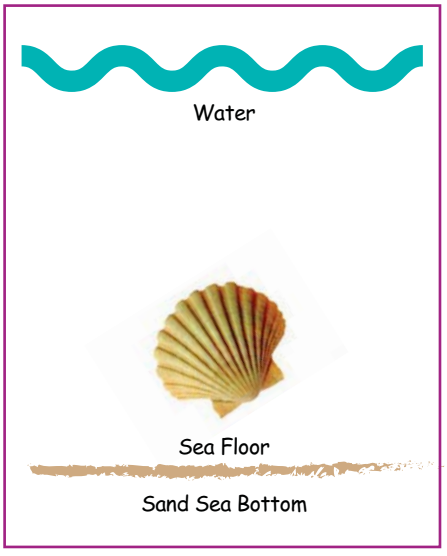
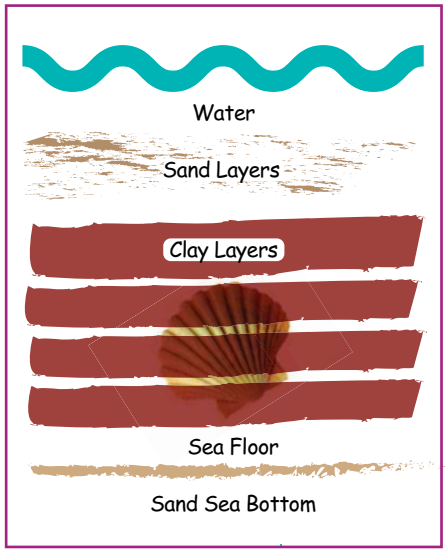
The Fossil Record

Sedimentary rocks can be some of the most interesting rocks on Earth. Sedimentary rocks can give you clues to the unique history of an area in a way that other rocks can not. **Why?** Because of fossils!

Fossils are bits of animals or plants that are preserved in a rock as it forms. Dinosaur bones, seashells and plant leaves are often found in limestone and shale. Fossils can also be imprints of animals or plants like dinosaur footprints.

Fossils usually form in quiet places where the rocks form without being disturbed by waves or wind (such as an ocean or lake floor) or where the layers of rock were deposited so quickly that the animal or plant was buried and not disturbed (such as a river, lake or desert).





1. A sea shell may drop to the bottom of the ocean in a deep area without waves.The sea shell is covered with sediment and buried.

2. Over time, the sediment layers, with the sea shell inside, are compressed into a rock.

3. That sea shell becomes a fossil!

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Types of Metamorphism and Index Minerals

There are two basic types of metamorphism (how rocks change). **Contact** metamorphism happens in a small area and **Regional** metamorphism happens over a large area.

Contact Metamorphism is caused by high heat only. This type of metamorphism happens near magma sources (near volcanoes and deep underground). Only the rocks closest to the magma are heated and changed. Hornfels is a common contact metamorphic rock.


HORNFELS

Regional Metamorphism is caused by high heat and high pressure. This type of metamorphism happens over really large areas as the rocks are buried far below the surface of the Earth. Slate, schist and gneiss are common regional metamorphic rocks.


GNEISS

Some rocks, like marble and quartzite, can be formed from both contact and regional metamorphism.


MARBLE

Index Minerals

Certain minerals, called "Index Minerals," form in metamorphic rocks as the temperature and pressure of the rock increases. When these minerals are seen, geologists know how high the temperature and pressure were when the rocks formed. These index minerals are another clue to the Earth's past. This table shows you the index minerals and the order they form in metamorphic rocks.

Order	Index Mineral		Temperature and Pressure
First to Form	Chlorite		Low Temperature and Pressure
Second to Form	Muscovite →		
Third to Form	Biotite		
Fourth to Form	Hornblende		Medium Temperature and Pressure
Fifth to Form	Garnet →		
Sixth to Form	Staurolite		
Seventh to Form	Kyanite →		High Temperature and Pressure
Eighth to Form	Sillimanite		

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All About Igneous Rocks

All rocks are made of one or more minerals. Igneous rocks are some of the oldest rocks on Earth and are formed in volcanic areas from magma. The type of igneous rock is determined by the minerals present in the rock and the method used to form the rock.

Minerals Present: Magma is a mixture of different elements that form the minerals in rocks. Magmas in different areas of world can have different mixtures. The type of igneous rocks formed at each location depends on the minerals that will form from the mixture.

Formation: Magma (melted rock) deep underground forms two types of igneous rocks:

- Extrusive Rocks are formed when magma is ejected (thrown out) of the volcano and forms rocks on the outside of the volcano. Usually, these rocks have no crystals or small crystals because the rocks cool very fast and there is not much time for crystals to grow. Examples of extrusive rocks are scoria, obsidian and basalt.

Fast Cooling = No Crystals or Small Crystals

- Intrusive Rocks are formed when magma is injected into cracks in rocks underground, cool slowly and form igneous rocks. Usually, intrusive rocks have medium to large size crystals because the magma cools very slowly and the crystals have time to form larger sizes. Examples of intrusive rocks are granite, pegmatite and gabbro.

Slow Cooling = Medium to Large Crystals

INTERESTING FACT	Look at the granite and obsidian samples in your kit. These two rocks were made from magma with the same mineral mixture. One rock is extrusive and one rock is intrusive. Can you see the difference in the crystal sizes? The obsidian cools so quickly that it looks like black glass and you can not see the crystals of quartz, feldspar and mica that can be seen in the granite which cooled slowly.

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Make a Geologists Field Notebook

Geologists use a field notebook to record information about their rocks, minerals, and maps. Create your own notebook with our Field Notebook Pages.

You will need:

- 1 copy of the Notebook Cover
- Several copies of the Notebook Inside Pages
- Hole punch (have an adult help you)
- String
- Markers, crayons or colored pencils

Optional:

- Construction paper and glue
- 3-ring binder

To Make Your Geologists Field Notebook:

- Decorate the cover of your Field Notebook with colors or pictures.
- Write your name on the bottom of the cover (where it says "Property of") so everyone knows that the field notebook belongs to you.
- Stack your cover and inside pages together.
- With an adults help, punch 2 or 3 holes along the left edge of the pages.
- Tie string through the holes to hold your field notebook together.

Other ideas:

To make your notebook stronger, glue your cover page to a piece of construction paper and put a second piece of construction paper at the back of the notebook.

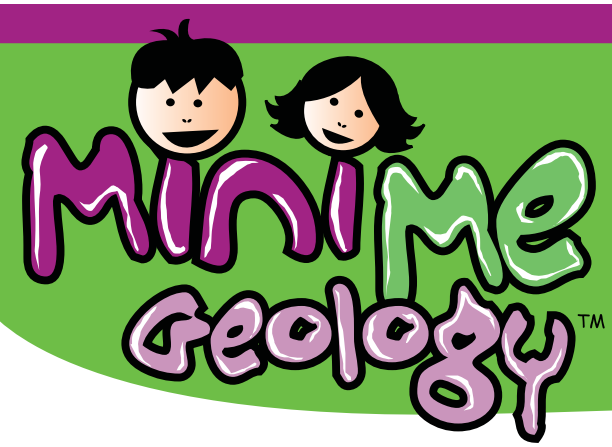
OR Instead of using string to tie your notebook, you can place the pages in a 3-ring binder.

To Use Your Geologist Field Notebook:

Each time you use your notebook, write the date, page number, and weather on the lines at the top. Give each page a title such as "Salt Growing Experiment," or "Nature Walk." Use the lined area to write notes about your nature walks, samples, or experiments. Use the space at the bottom of each page to draw pictures of your samples, locations and activities.

For safety, always take an adult with you on a nature walk or if you are rock hunting outdoors.

Have fun! The information you record in your book is up to you because you are the geologist!



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Mineral & Rock Word Find

E	O	U	J	I	I	U	R	O	N	A	C	I	E	C
G	N	V	Z	E	X	A	T	Y	B	U	O	A	N	A
Q	T	O	Q	T	P	Y	R	O	X	E	N	E	O	L
X	W	R	T	S	R	O	H	S	H	A	G	E	T	C
G	W	R	D	S	R	A	Y	Y	M	R	L	J	S	I
B	N	L	H	B	E	I	U	P	G	K	O	I	D	T
T	E	E	B	Y	S	M	H	Q	G	O	M	A	N	E
F	A	A	I	L	O	I	I	R	F	S	E	K	A	T
G	G	C	A	S	B	L	A	L	U	E	R	A	S	T
C	Z	T	I	O	S	N	I	R	K	C	A	Y	G	L
T	E	C	L	M	I	W	S	T	T	H	T	E	Q	A
E	T	I	Z	T	R	A	U	Q	E	A	E	S	L	S
O	T	F	E	P	T	A	E	T	I	N	E	Y	S	A
E	M	A	R	B	L	E	L	A	H	S	Y	B	Q	B
U	J	T	X	G	R	C	D	A	D	N	V	E	A	B

Amphibolite
Arkose
Basalt
Calcite
Conglomerate
Feldspar
Gabbro
Gneiss
Granite
Limestone
Marble
Mica
Pyroxene
Quartz
Quartzite
Rhyolite
Sandstone
Shale
Slate
Syenite