

(MS)2TC Life Science 7 Summer Project #1: Create a Rock Collection

Directions:

Read and follow the directions in the following pages to help you create a 6-piece rock collection.

1. Obtain an empty, clean half-dozen count egg carton.
2. Gather your rock collecting equipment. You will find a list of tools and equipment (page 392) which are most useful to rock collectors. You do not need to purchase the tools if you can find comparable tools that you have at home already.
3. Read and follow directions for finding rock specimens (page 393). Be sure to follow all safety rules and precautions!
4. Collect 6 different rocks from various locations such as your backyard, the playground, on your travels to different states or countries, on your walk in the neighborhood, at nature centers, at national parks, or wherever you happen to find yourself this summer. Your rock collection should contain specimens from each of the three basic rock types (page 394 & 395).
5. Classify your rocks: Identify and label the rocks that you have collected by the three basic rock types, igneous, sedimentary, or metamorphic, found on pages 394 and 395 of this packet.
6. Research the three basic rock types at your local library, on the internet, in your book collection, etc. Write a brief description of each rock type (one paragraph for each type) including how they are formed, where to find them, their properties, and common examples of each type. This paper should be typed (12-point font size in Ariel or Times New Roman font style) and written in complete sentences. Include a Works Cited page to credit sources.
7. Create an original drawing/diagram to show the rock cycle. Your drawing should be neat, colorful, and original art.
8. Complete this project before the start of the 2017 - 2018 school year to be turned in to Mrs. Duddles on the second day of school at Butcher.

GETTING READY

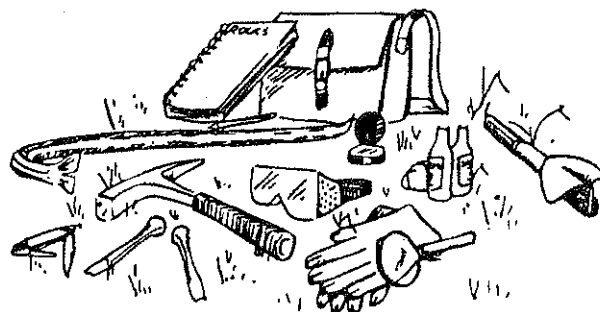
Gathering the equipment for rock collecting and becoming familiar with its use is an activity in itself. Put together a rock-collecting kit.

MATERIALS: Discussed below.

DOING IT:

1. Gather and examine the following rock-hounding equipment.

- *Crack hammer or small sledge hammer* -- useful for cracking large rocks. The best kind of hammer has a hard steel head and a steel handle (hammers made of cast iron break and scratch easily when hitting rock).
- *Rock pick or geologist's pick* (with a flat head on one side and a pick on the other) -- something to think about if you become a dedicated rock hound. You don't need one to begin rockhounding. The kind called a "hardrock pick" is best, and is found in mineral or rock shops, or at a hardware store. Use the blunt end for breaking off medium-size pieces from larger rocks. Use the pointed end to chip off small pieces and to pry rocks apart. Aim the hammer blows carefully; otherwise, you'll just get a lot of small rock chips and a chipped pick head.



- *Cold chisels* (the kind used on metal) -- useful for prying crystals out of cracks and for chipping away small pieces of rock surrounding crystals. Buy two: one with about a 2 cm cutting edge and one with about a 0.5 cm edge. If you can only afford one, buy a 1 cm chisel.
- *Safety goggles* -- very important for protecting your eyes from sharp, flying chips of rock. **Always wear goggles when you hammer or chip rocks.** Make sure that people near you are also wearing goggles. Rock chips can fly quite a distance.
- *Gloves* -- to protect your hands when you're digging or chiselling.
- *Crowbar or wrecking bar* -- useful for prying up small boulders, or for prying apart a rock that has a large crack in it.
- *Spade* -- use for digging. The best kind of spade is the small, folding type, which is also called an entrenching tool or a boy scout shovel.
- *Magnifying glass* -- useful for examining small crystals and seeing differences in very similar rocks. Get one that does not magnify more than ten times (10x).
- *Steel-bladed pocket knife, a piece of window glass, and a penny* -- handy for testing hardness.
- *Sturdy canvas bag or knapsack* -- for carrying equipment and rock samples. Don't get one that's too large or you may put more into it than you can carry!
- *Old newspapers* -- use to wrap each sample separately before it goes into the knapsack. This prevents samples from chipping/scratching each other.
- *Small plastic bottles or an egg carton* -- handy for carrying and protecting small crystals. Put cotton or crumpled paper in the bottoms of the containers.
- *Notebook, pencil, and labels* -- essential for keeping track of your rocks. They help you to make sense of your collection, especially when it becomes large. Masking tape makes a good temporary label.
- *Compass* -- useful for finding direction, especially if you're in unfamiliar territory.
- *Outdoor clothing* -- should be comfortable and provide protection from insects, temperature, etc. Shoes or boots should give you a secure grip on rocks.

A responsible rockhound follows a few simple rules. For safety -- and fun -- go rockhounding with at least one other person; work with someone older or more experienced. Don't climb up rock faces and quarry walls. Be careful around loose material on hillsides. Don't work below someone else. Never enter an abandoned mine (often, the only thing holding up an old mine is rotten timber). For your first few trips, choose familiar areas. Cause no damage to fences, signs, buildings, and so on. Treat the environment with respect; don't disturb wildlife or destroy vegetation. Fill in all holes you dig, because they may pose a danger to humans, wildlife, or livestock. Don't take larger specimens than you can reasonably use. Don't walk across or dig in cultivated land, especially if crops are growing on it. Always obtain permission to collect on private property. Property doesn't have to have "no trespassing" signs posted on it, and there are fines for trespassing. Tell the owner that you plan to collect rocks and will not damage his or her land. Know the boundary lines of property on which you plan to collect.

Topics: Rock Types.

ONE LEADS TO ANOTHER



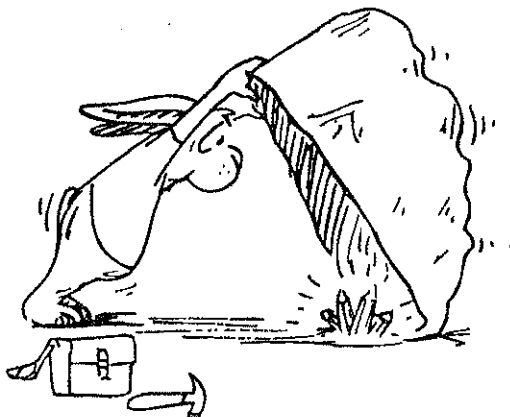
FINDING SPECIMENS

Where should you look for rocks? What do you do when you find something interesting? Here are some approaches.

MATERIALS: As discussed on the previous page. Optional -- map of collecting area.

DOING IT:

1. Choose a safe area and follow the general rules on the previous page.
2. Don't just collect several pieces of the same rock. Look for a variety of rocks. Don't be discouraged if you can't find dozens of different kinds of minerals in one area. Different kinds of minerals are found in different parts of the world.
3. Rocks exposed to rain, wind, and extreme temperatures may be hard to identify because of changes in colour and appearance (e.g. surface of rock turns yellow or brown). Look for freshly broken pieces of rock, or use your hammer or chisel to break apart a large rock.
4. It's easiest to pick up loose specimens lying on the ground or in cracks and hollows. Chipping away a specimen, like a crystal, from a large piece of rock takes more patience and skill.
5. A good specimen size is about 10 cm wide by 10 cm long and perhaps 5 cm thick. This size is large enough to show the rock's properties, but small enough to carry and store easily. Use a hammer or chisel to chip out a specimen. **Always wear safety goggles when chipping rock.** First, place the rock you want to break solidly on top of another large rock. Then, look for a crack and try to hit along that line. This takes some practice.



6. When you chip away a crystal, chip off an amount of rock surrounding the crystal that is several times as large as the crystal itself. You can trim when you get back to home base.

7. Besides the specimen itself, take a few chips. You can use the chips for testing hardness and other properties without harming your main find.

8. Take only the best specimens. A knapsack full of rocks can be heavy!

9. When you find a specimen you want to keep, put a small numbered label on it. In your notebook, record the number of the specimen, date, area in which specimen was found (you may want to mark the spot on a local map), and general surroundings (e.g. kinds of rocks around specimen). Include anything else you feel is important (e.g. is specimen similar to the bedrock?).

Rockhounds try especially hard to find crystals. They look for large, perfect crystals, but these are very rare. Most crystals are found broken or chipped. It's easier to find small crystals that are almost perfect. So, always look into even the tiniest cracks and crevices. Look carefully at the sides and bottom of hollows in large rocks. Use a magnifying glass. You may find some very good crystals that are less than 1 cm long (these are called micromounts and are valued by rockhounds).

There are some places which are especially good for rockhounding: rock exposures along cliffs and along the shores of seas, lakes, or streams; landslide areas; gulches; dry ravines; beaches; stream beds; quarries; mine site dumps; building excavation sites; and rock cuts (on the side of highways and railroad tracks).

Topics: Rock Types.

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CLASSIFYING AND IDENTIFYING

Start working with specimens by grouping them into the three basic rock types -- igneous, sedimentary, and metamorphic. Use this simple rock key.

MATERIALS: Rock specimens; magnifying glass; vinegar. Optional -- rock and mineral identification guide.

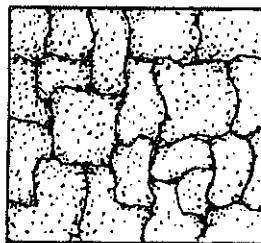
DOING IT:

1. Examine your rock specimens. In what ways are they alike? In what ways are they different? Look at characteristics such as shape, texture (related to where found; e.g. wearing effect of water in motion can make rocks smooth), odour, and weight.

2. Use a magnifying glass to get a close look at specimens (most crystals are rather small and buried within rocks). Hold the magnifying glass close to your eye. Then move the specimen toward the magnifying glass until the specimen is in sharp focus.

3. Use the following rock key to decide if a rock is igneous, sedimentary, or metamorphic. Working with a key takes practice. Start with part "a" of the first point. If the characteristic fits, it will tell you where to go next (e.g. go to point 2). If the characteristic doesn't fit, go to part "b" of the same point. It will tell you what to do.

1. a) Rock is made up of mineral grains that you can see → go to 2.
b) Rock is not made up of visible mineral grains → go to 5.
2. a) Rock is made up of mineral grains that look melted together (interlocked) → go to 3.
b) Rock is made up of mineral grains that look glued together (noninterlocked) → go to 6.
3. a) Mineral grains in the specimen all look to be the same kind → the rock is METAMORPHIC.
b) Mineral grains in the specimen are of two or more different types → go to 4.
4. a) Mineral grains in the specimen are *not* lined up; they are distributed in a random pattern, as shown in illustration A → the rock is IGNEOUS.
b) Mineral grains in the specimen are lined up; they show a definite arrangement or bonding, as shown in illustration B → the rock is METAMORPHIC.



A



B

5. a) Rock is either glassy or frothy (has small holes) → the rock is IGNEOUS.
b) Rock is made up of strong, flat sheets that look like they will split off into slate-like pieces → the rock is METAMORPHIC.
6. a) Rock is made of silt, sand, or pebbles cemented together; it may also have fossils → the rock is SEDIMENTARY.
b) Rock is *not* made of silt, sand, or pebbles but contains a substance that fizzes when vinegar is poured on → the rock is SEDIMENTARY.

4. After classifying rocks using the rock key, use the charts on the following page to try to identify specimens. The charts provide only examples of more common possibilities. Use a rock and mineral identification guide for more detailed information.

ONE LEADS TO ANOTHER

Classifying and identifying rocks involve the minerals within them. Rocks are made up of minerals, but rocks themselves are not minerals. Rocks are mixtures of minerals. Some rocks are mostly one mineral with small amounts of other minerals. Other rocks contain equal amounts of several different minerals. Certain rocks are even made from other rocks that have been naturally cemented together. The minerals that make up rocks are usually found in the form of particles or grains. Sometimes the grains are too small to be seen, even with a magnifying glass. Mineral grains in rocks can be scattered about or arranged in layers. The size and arrangement of mineral grains help to classify and identify rocks.

Topics: Classification; Rock Types.



THE THREE BASIC ROCK TYPES

IGNEOUS (formed from cooled and hardened magma from deep inside the Earth)				
Rock	Texture	Colour(s)	Mineral Content	Notes
Breccia	coarse ↓ fine	green-gray	feldspar, quartz	Cemented together by volcanic dust and ash. Individual grains visible.
Pegmatite		light	feldspar, mica, quartz	Very large, readily visible grains.
Granite		pink, buff, white-gray	feldspar & quartz, mica or hornblende	All mineral grains about the same size. Magma that cooled slowly; large crystals formed. Hard to scratch with a fingernail.
Basalt		black, dark green	feldspar, olivine	Solidified volcanic lava. Found in dikes, sills, and other intrusions. Hard to scratch with a fingernail.
Pumice		buff-gray	glass	Full of tiny holes. Solid, ash-like lava containing trapped volcanic gases. Floats on water.
Obsidian		red-black	glass	"Natural glass". Volcanic lava which cooled so quickly that no crystals were able to form.

SEDIMENTARY (formed when layers of sediment have cemented together)						
Rock	Texture	Hardness	Colour(s)	Content	How Formed	Notes
Conglomerate	coarse ↓ fine	hard ↓ soft	tan, red, white	rounded mass of pebbles; much quartzite and feldspar	coarse rock fragments carried by river, deposited, cemented together	Also called "puddingstone". Held together by brownish muds of sand or clay. Hard to scratch with a fingernail.
Tillite			tan, gray, white	both sharp and rounded stones of all sizes; much quartzite	stones carried by glaciers and dropped when ice melted	Held together by a coarse mud cement. Larger boulders may show glacial scratches.
Sandstone			red, gray, brown	quartz grains	sand carried by rivers, then deposited	Coarse or fine sand cemented together. Surface like sandpaper. Hard to scratch with a fingernail; can scratch off grains.
Limestone			black, gray, white, tan	calcite	built up in shallow seas from skeletons of tiny animals	May be rough or smooth. Fizzes in acid (e.g. vinegar, lemon juice). May contain fossils.
Shale			red, brown, gray, black	clay, mud, and silt	fine mud and silt carried by rivers, then deposited	Smooth surface. Can be split into layers. Often has alternating dark and light layers. Easy to scratch with fingernail.

METAMORPHIC (rock changed by heat, pressure, and/or chemical action)				
Rock	Colour(s)	Mineral Content	Rock Formed From	Notes
Quartzite	pale, whitish	quartz	sandstone	More compact than sandstone. Crystalline. One of the hardest rocks.
Marble	white, pink, gray, black	calcite	limestone	Smooth and soft. Fizzes in acid (e.g. vinegar, lemon juice). Crystalline. May have intermixed, coloured bands. May scratch with a fingernail.
Slate	red, gray, green, black	clay	shale	Very fine grain. Tiny mica flakes may be visible. Splits into flat layers.
Phyllite	variable	feldspar, quartz, mica, chlorite	shale and granite	Fine texture. Silky lustre. Irregular layers.
Schist	black, silver	mica, garnet, hornblende	slate, felsite, granite	Often soft; coarse grain. Thick layers. Flakes of mica come off on hands. Easy to scratch with a fingernail.
Gneiss	variable	garnet, feldspar, quartz, hornblende, mica	shale, sandstone, granite, conglomerate	Medium to coarse texture. Irregular bands. Hard to scratch with a fingernail.

ONE LEADS TO ANOTHER

