



KNOWLEDGE ORGANISER

SCIENCE: ROCK DETECTIVES

YEAR THREE

KEY KNOWLEDGE:

QUESTION 1: What different types of rock are there?

ANSWER

A rock is a solid made up of a bunch of different minerals. Rocks are generally not uniform or made up of exact structures that can be described by scientific formulas. Scientists generally classify rocks by how they were made or formed. There are three major types of rocks: Metamorphic, Igneous, and Sedimentary.

- **Metamorphic Rocks** - Metamorphic rocks are formed by great heat and pressure. They are generally found inside the Earth's crust where there is enough heat and pressure to form the rocks. Metamorphic rocks are often made from other types of rock. For example, shale, a sedimentary rock, can be changed, or metamorphosed, into a metamorphic rock such as slate or gneiss. Other examples of metamorphic rocks include marble, anthracite, soapstone, and schist.
- **Igneous Rocks** - Igneous rocks are formed by volcanoes. When a volcano erupts, it spews out hot molten rock called magma or lava. Eventually the magma will cool down and harden, either when it reaches the Earth's surface or somewhere within the crust. This hardened magma or lava is called igneous rock. Examples of igneous rocks include basalt and granite.
- **Sedimentary Rocks** - Sedimentary rocks are formed by years and years of sediment compacting together and becoming hard. Generally, something like a stream or river will carry lots of small pieces of rocks and minerals to a larger body of water. These pieces will settle at the bottom and over a really long time (perhaps millions of years), they will form into solid rock. Some examples of sedimentary rocks are shale, limestone, and sandstone.

QUESTION 2: Are some rocks harder than others?

ANSWER

Some rocks are much, much harder than others. If a rock can scratch glass, it's harder than glass. And if it can scratch another rock, it's harder than that rock. ... Softer rocks include talc, pumice, and the gypsum inside the wallboard in your walls.



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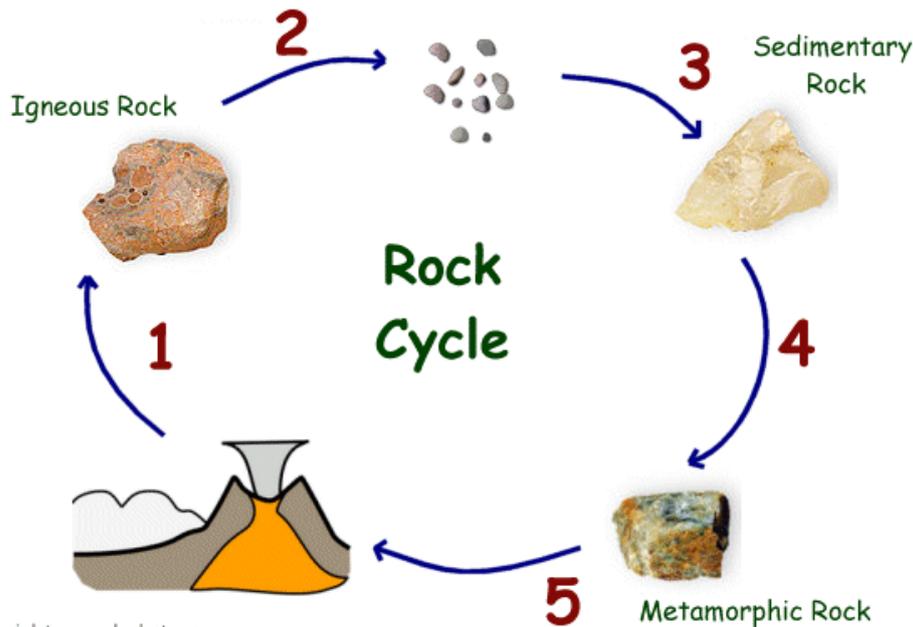
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QUESTION 3: How do rocks change over time?

ANSWER

Rocks are constantly changing in what is called the rock cycle. It takes millions of years for rocks to change.

Here is an example of the rock cycle describing how a rock can change from igneous to sedimentary to metamorphic over time.



1. Melted rock or magma is sent to the earth's surface by a volcano. It cools and forms an igneous rock.
2. Next the weather, or a river, and other events will slowly break up this rock into small pieces of sediment.
3. As sediment builds up and hardens over years, a sedimentary rock is formed.
4. Slowly this sediment rock will get covered with other rocks and end up deep in the Earth's crust.
5. When the pressure and heat get high enough, the sedimentary rock will metamorphose into a metamorphic rock and the cycle will start over again.

QUESTION 4: How is soil made?

ANSWER

What is soil?

Soil is the loose upper layer of the Earth's surface where [plants](#) grow. Soil consists of a mix of organic material (decayed plants and animals) and broken bits of rocks and minerals.

How is soil formed?

Soil is formed over a long period of time by a number of factors. It can take up to 1000 years for just an inch of soil to form. Besides time, other factors that help soil to form include:

- Living organisms - This includes organisms such as plants, [fungi](#), [animals](#), and [bacteria](#).
- Topography - This is the relief or slope of the surface of land where the soil is forming.
- Climate - The overall climate and weather where the soil is forming.
- Parent material - The parent material is the minerals and rocks that are slowly disintegrating to form the soil.



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Why is soil important?

At first you may think of soil as just dirt. Something you want to get rid of. However, soil plays a very important role in supporting life on Earth.

- Plants - Many plants need soil to grow. Plants use soil not only for nutrients, but also as a way to anchor themselves into the ground using their roots.
- Atmosphere - Soil impacts our atmosphere releasing gasses such as carbon dioxide into the air.
- Living organisms - Many animals, fungi, and bacteria rely on soil as a place to live.
- Nutrient cycles - The soil plants an important role in cycling nutrients including the carbon and nitrogen cycles.
- Water - The soil helps to filter and clean our water.

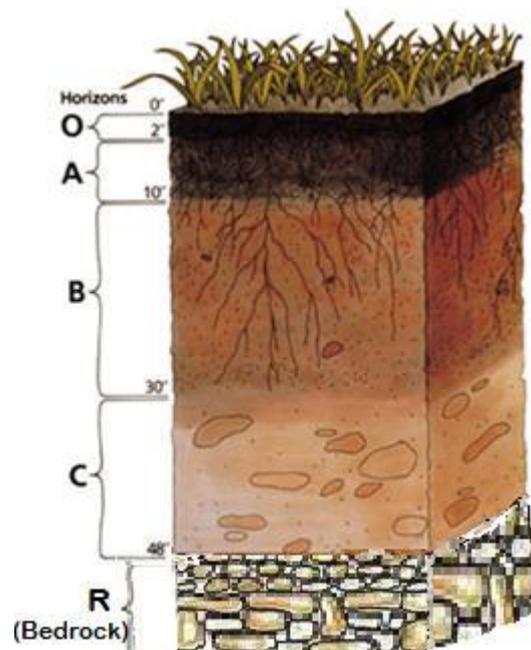
Properties of Soil

Soil is often described using several characteristics including texture, structure, density, temperature, color, consistency, and porosity. One of the most important properties of soil is the texture. Texture is a measure of whether the soil is more like sand, silt, or clay. The more like sand a soil is the less water it can hold. On the other hand, the more like clay a soil is, the more water it can hold.

Soil Horizons

Soil is made up of many layers. These layers are often called horizons. Depending on the type of soil there may be several layers. There are three main horizons (called A, B, and C) which are present in all soil.

- Organic - The organic layer (also called the humus layer) is a thick layer of plant remains such as leaves and twigs.
- Topsoil - Topsoil is considered the "A" horizon. It is a fairly thin layer (5 to 10 inches thick) composed of organic matter and minerals. This layer is the primary layer where plants and organisms live.
- Subsoil - Subsoil is considered the "B" horizon. This layer is made primarily of clay, iron, and organic matter which accumulated through a process called illuviation.
- Parent material - The parent material layer is considered the "C" horizon. This layer is called the parent material because the upper layers developed from this layer. It is made up mostly of large rocks.
- Bedrock - The bottom layer is several feet below the surface. The bedrock is made up of a large solid mass of rock.





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QUESTION 5: What are fossils?

ANSWER

What is a fossil?

A fossil is the preserved remains or impressions of a living organism such as a [plant](#), animal, or [insect](#). Some fossils are very old. Studying fossils helps scientists to learn about the past history of life on Earth.



How do fossils form?

There are a number of ways that fossils may form.

- Amber - Full body insect fossils can be found preserved in hardened tree sap called amber. These fossils can remain preserved in amber for up to millions of years.
- Carbonization - Carbonization is when all the elements of the organism are dissolved except for the carbon. The carbon leaves a residue which shows an outline of the organism.
- Casts and molds - A cast or a mold fossil is an impression of a living organism. They are made when an organism dissolves in the Earth and leaves a hollow mold behind. The mold is then filled in by minerals leaving something like a statue of the organism behind.
- Freezing - Some fossils are preserved in ice. As long as the ice doesn't melt the fossil may be preserved for thousands of years. Large fossils such as the woolly mammoth have been discovered in the glaciers of the Arctic.
- Mummification - In really dry areas a fossil may be formed through mummification. This is when the dead organism quickly dries out. Because there is little moisture, the remains of the organism can be preserved for a long time leaving a fossil.

Types of Fossils

There are two main types of fossils: body and trace fossils.

- Body fossils - Body fossils are fossils where some portion of the actual organism's body remains as part of the fossil. This might be a tooth or piece of bone.
- Trace fossils - Trace fossils are fossils where there isn't any actual part of the original organism, but "traces" of the organism are preserved in rocks and minerals. There are many different types of trace fossils including molds, animal tracks, casts, and impressions.

Where are fossils found?

Fossils are found all over the world. Most fossils are found in sedimentary rock such as shale, limestone, and sandstone.