The outermost layer of the Earth, called the crust, is made from rocks. All of the mountains, ocean floors, volcanoes, valleys and cliffs on our planet are made from rocks, but what exactly are rocks? How do they form and what are the different types? How can rocks change over time?

**WHAT ARE ROCKS?**

Rocks are made from a mixture of different minerals; these are solid chemical compounds that occur naturally on Earth. Some rocks are made from interlocking mineral crystals that fit tightly together whereas others are made up from broken fragments, or grains, of older rocks and minerals which have been cemented together.

Depending on the way a rock has formed it will belong to one of these groups: igneous, sedimentary or metamorphic (find out more on the next page!).

No rock stays the same forever. Over thousands and millions of years rocks are broken down, moved around and deposited in different places. Rocks can be compacted together and pushed deep into the Earth where they are melted or deformed by intense heat and pressure only to be uplifted again to the surface. All of these processes combine to make the rock cycle.

Rock images: Flickr/James St.John
Thin sections: Wikimedia/M.C.Rygel & Wikimedia/Siim Sepp
THE ROCK CYCLE

SEDIMENTARY

Rocks on the Earth’s surface are gradually broken down into smaller pieces by water, ice, wind, plants and animals (known as weathering). These broken up pieces are called sediment and are transported away, or eroded, by rivers, glaciers and wind. Sediments often collect at the bottom of lakes and oceans. Over time they are squashed and compacted together to become a sedimentary rock such as sandstone, limestone or mudstone.

Sedimentary rocks are laid down in layers. They can contain fossils from animals and plants that become trapped in the sediment before it becomes a rock.

Sedimentary rocks are made up of grains which can be rounded or angular. Under the microscope we can sometimes see gaps between the different grains – these gaps are called pores.

If the pores connect together, water, air or oil can flow through the rock, and the rock is called permeable. If a permeable rock is put in water you will see bubbles coming out as water pushes the air out.

METAMORPHIC

Metamorphic rocks are rocks that have been changed over time. When rocks are pushed deep down into the Earth, grains and minerals can become stretched, squashed and slightly melted from the extreme pressure and heat. This is called metamorphism and it causes new metamorphic rocks with different textures and/or minerals to form. Metamorphic rocks are crystalline like igneous rocks however the minerals in metamorphic rocks tend to line up to form layers like in this gneiss from NW Scotland.

IGNEOUS

When rocks are pushed deep enough down into the Earth, they can melt to form molten rock. Below the surface of the Earth, molten rock is called magma but when erupted above the ground, usually through volcanoes, it is called lava.

Igneous rocks form when either magma or lava cools down and turns from liquid to solid. When this happens, igneous rocks form crystals and are said to crystallise.

Lava cools down very quickly because the surface of the Earth is cold. This means that igneous rocks formed from cooling lava, such as basalt, only have time to grow tiny crystals. Often gas bubbles can get trapped in these rocks too. Obsidian, or volcanic glass, cools so quickly that you cannot see any crystals at all!

Magma deep within the Earth takes thousands of years to crystallise because it is much hotter below the surface. Crystals have more time to grow, so they grow larger. If you look closely at an igneous rock that has formed deep within the Earth, for example granite or gabbro, you will be able to see the different coloured mineral crystals.