

Explaining the Earth

Rocks are made from a mixture of **minerals**. The shape of rocks can be changed by **weathering** and **erosion**. Weathering can be chemical, physical or biological.

Sedimentary rocks

Rock fragments, formed as a result of weathering and erosion, are **transported** by moving water, wind or ice, and the fragments get worn down. Small rock fragments are called **grains**. When the water, wind or ice slows down, some of the grains are **deposited** at the bottom of rivers, lakes or seas, as **sediment**.

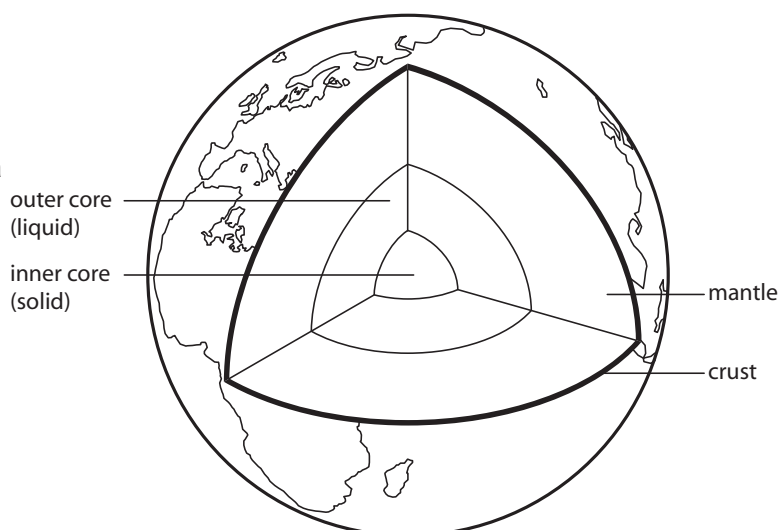
Layers of sediment collect on the sea bed, and the bottom layers get squashed. The grains of sediment are forced closer together (**compacted**) and the water is squeezed out from between the grains. Minerals from water that flows through the sediment 'glue' the grains of rock together (**cementation**). Eventually, **sedimentary rock** is formed. The composition and texture of sedimentary rocks vary and depend on the way the rocks were formed. For example, the sediments that made a rock with large grains must have been moved by a fast-flowing river.

If any animals or plants get trapped in the sediment, they may form **fossils**.

Igneous rocks

Molten rock is called **magma**. If the molten rock flows out of volcanoes it is called **lava**. **Igneous rocks** are formed when magma cools down.

Lava cools down quite quickly, and forms igneous rocks with small crystals (like **basalt**). Magma underground cools down much more slowly and forms rocks with bigger crystals, like **granite**.



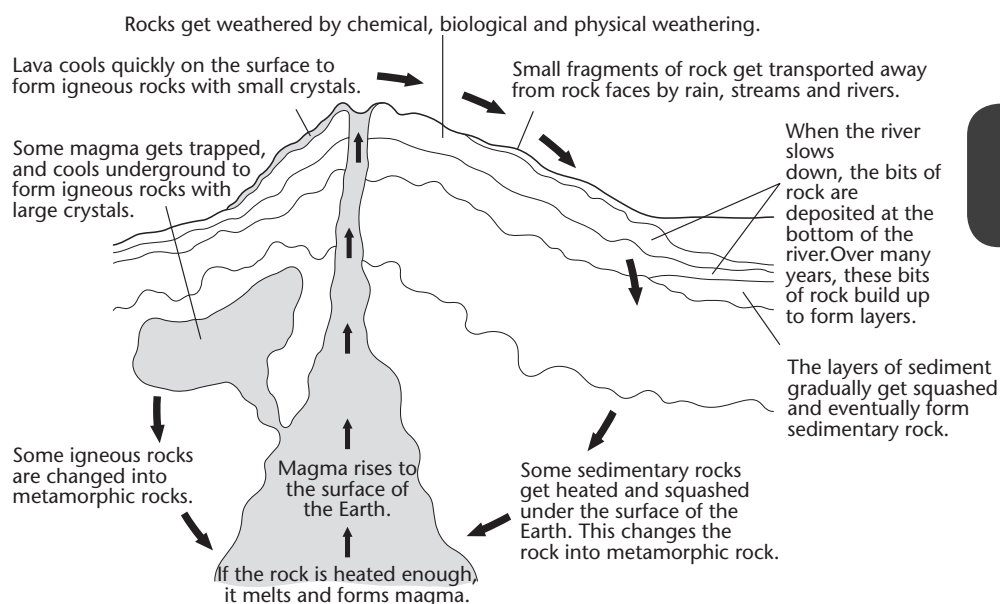
Metamorphic rocks

Sedimentary or igneous rocks can be changed by heat or pressure into new kinds of rock, called **metamorphic rocks**. Metamorphic rocks have different properties from the sedimentary or igneous rocks they were made from.

Type of rock	Sedimentary	Igneous	Metamorphic
Examples	limestone, sandstone, mudstone, chalk	basalt, granite	marble, quartzite, slate, schist, gneiss
Grains or crystals?	separate grains	crystals that are not lined up	crystals – often lined up or in bands of different colour
Hard or soft?	often soft or crumbly	hard	hard
Porous?	often	not usually	not usually

The rock cycle

The Earth is continually changing. Rocks are weathered and eroded and new rocks are being formed. The processes that make rocks, weather them and change them are linked together in the **rock cycle**. The earth movements that bury rocks as part of the rock cycle are caused when the **plates** that form the surface of the Earth push into each other.



Theories about the Earth

There have been many different theories about how the rocks of the Earth were formed. A scientific theory is an idea that can explain many different observations, and it can make predictions that can be tested.

Creationism says that the Earth was formed in a few days by a divine being. Different religions have different creation stories. Most people do not regard this as a scientific theory any more.

Catastrophism says that all rocks were formed by sudden events such as volcanic eruptions. Some rocks are formed this way, but most are not.

Uniformitarianism says that the same processes we see today occurred in the past, and all rocks were formed by very slow processes. According to this theory, the Earth must be very old.

Today scientists think that uniformitarianism is mostly right, but there are some fast processes that also help to shape the Earth, such as volcanic eruptions and earthquakes.