

A Special Place: Rocks and Soils - Uses, types and properties

Teachers' Notes

Background information:

1. Types of rocks

The Earth is made of a solid, iron sphere (which creates the Earth's magnetic field) surrounded by molten iron and nickel. Above that is the mantle which is mainly rock and then the Earth's relatively thin crust.

There are three main types of rocks – **igneous, sedimentary and metamorphic.**

Igneous rocks are formed when magma (molten rock) reaches the Earth's surface (where it is called lava) and then cools.

Examples of igneous rocks include basalt, granite and pumice.

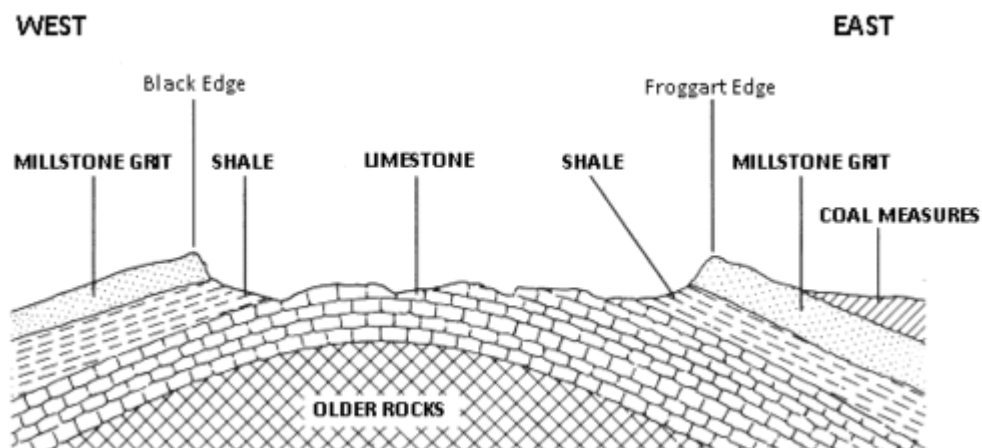
Sedimentary rocks are formed when rocks on the surface are eroded by the action of water and wind and the resulting particles are transported by wind, rivers and glaciers and are laid down in layers. Examples of sedimentary rocks are limestone, sandstone and shale.

Metamorphic rocks are formed when existing rocks are changed by extreme heat or pressure. Examples of metamorphic rock include marble (from limestone), slate (from shale/clay) and gneiss (granite or sedimentary rocks.)

Peak District Geology

Around 350 million years ago the Peak District was a shallow sea. Hard-bodied creatures in this sea died, sank to the bottom and the calcium in those hard bodies formed **limestone**, which is predominantly a white/grey colour, hence the description 'White Peak'. This can be seen if you are visiting Hope or Tideswell.

Sediments from rocks caused by the erosion of Scotland's mountains were transported down by rivers and formed **gritstone** (a type of sandstone) and **shale** in the north of the Peak on top of the limestone. Movements in the Earth's core pushed the limestone into a dome shape which caused the gritstone to form a horseshoe around the northern edge. This underwent **erosion**. The remains of these gritstones are the famous 'edges' of the Peak, popular with climbers e.g. Stanage. As this rock is predominantly dark, the northern part of the Peak is called 'The Dark Peak'. This can be seen if you are visiting [Longdendale](#), the [Moorland Discovery Centre](#) or [Macclesfield Forest](#).



2. Soil

The constituents of soil are divided into **organic** and **non-organic**. The organic ingredients of soil are living organisms (such as bacteria and invertebrates such as worms) and the remains of living organisms such as fallen leaves, twigs etc. Non-organic ingredients include minerals and rock particles, air and water.

The relative composition of the soil and size of the particles as well as the type of underlying rock will determine the type of soil. (For more information how rocks, soils, plants and animals are connected see the 'What's the connection?' module on the ['Rocks and Soils'](#) page.

Types of soil include:

Clay - very fine particles making it sticky when wet but very hard when dry. It may contain lots of nutrients. It is used to make bricks, pottery and ceramics.

Loam – the ideal gardeners' soil made of a roughly equal proportion of silt and sand.

Silt – Fertile and light but easily compacted.

Sandy soil – light and low in nutrients and which is often **acidic**.

Chalk soils – Very **alkaline** and low in nutrients.

Peat - A lot of organic matter and water (hence peat 'bogs')

3. Peak District Soils

As soil is often determined by the type of underlying rock, the soils tend to be different in the White and Dark Peak.

Limestone rocks in the White Peak form poor, chalky, alkaline soils. However, as grass finds it difficult to colonise these it allows other plant species to grow here. Because limestone is **porous** the water drains away quickly.

Shale and gritstone are much more **impermeable** which is why the Dark Peak soil holds much more water forming the very acidic peat bogs. Because it is so acidic, only specialised plants grow here. However, its high **carbon** content means it acts as a 'carbon sink' i.e. a store of carbon that would otherwise be released into the atmosphere and add to global warming. It also acts as a sponge for rain water, thus slowing down the run-off of rain water and helping the prevention of flooding in surrounding towns and cities.