Rocks Knowledge Organiser

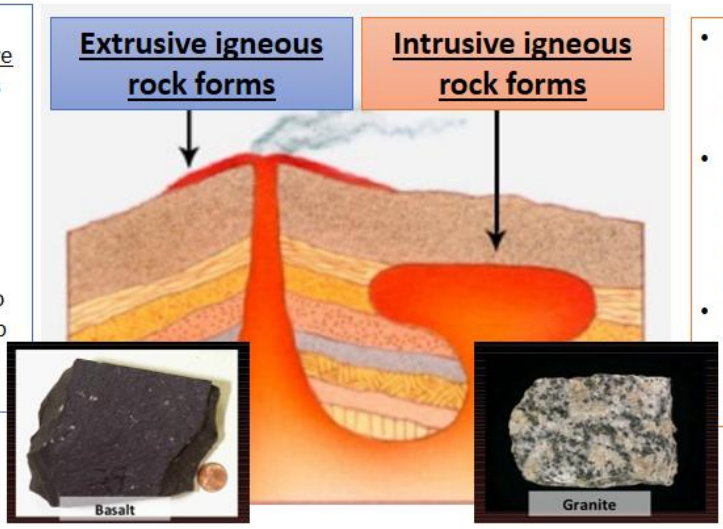
Topic Overview

- **Rocks** are mixtures of minerals found in the Earth's crust.
- A **mineral** is a solid chemical compound. For example, the *rock* limestone contains the *mineral* calcium carbonate ($CaCO_3$) along with silica, clay, silt and sand.

Igneous rocks

- Examples of igneous rock include basalt, granite and obsidian.
- Igneous rocks are made of interlocking **crystals** which makes them **hard** and **non-porous** (don't absorb water). Igneous rocks never contain layers or fossils.
- Igneous rocks are formed when molten rock (called magma or lava) **freezes** from a liquid into a solid.

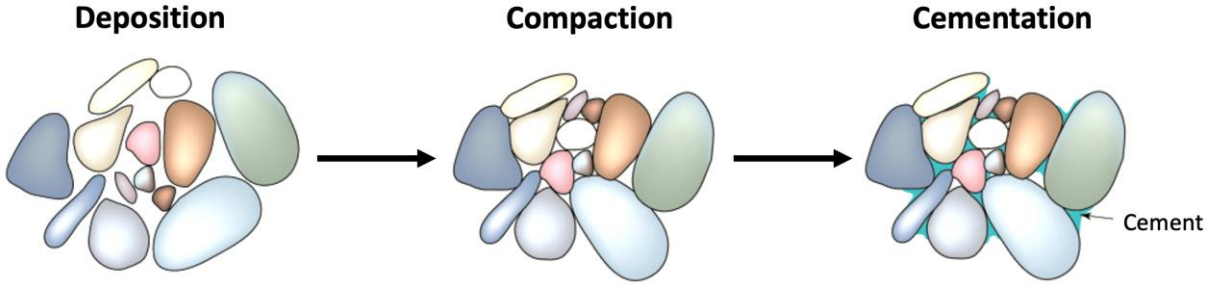
- **Lava** cooling on the surface forms extrusive igneous rocks, such as basalt.
- This is because, it is **cooler** on the surface which means the lava **freezes quickly**.
- As the lava freezes quickly, the crystals do not have much time to grow and are are **smaller**.



- **Magma** cooling inside the Earth forms intrusive igneous rocks, such as granite.
- This is because it is **warmer** under the crust which means the magma **freezes much more slowly**.
- As the magma freezes slowly, the crystals have time to grow and are **bigger**.

Sedimentary rocks

- Examples of sedimentary rock include limestone, sandstone and chalk.
- Sedimentary rocks are made of **grains** which makes them **soft** and **porous** (can absorb water). Sedimentary rocks may contain **strata (layers)** and / or **fossils**. A **fossil** is the preserved remains of a living thing from thousands or millions of years ago.
- Sedimentary rocks are formed when small particles of other rocks sink to the bottom of slow moving water and then get squashed and glued together.



Small particles called sediment **sink** to the bottom of slow-moving water.

As more sediment is deposited, layers form and dead plants/animals may be trapped. The weight of the sediment **squashes** the layers below.

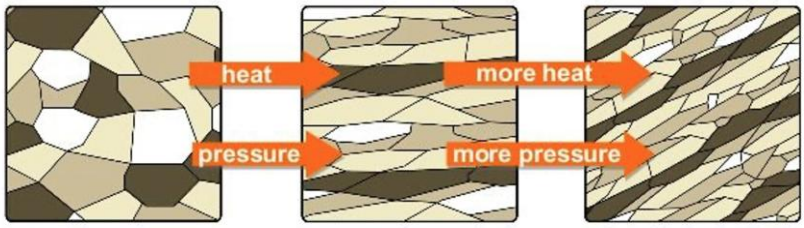
Any remaining water is forced out by the weight of the layers above, leaving minerals behind which **stick** the particles together forming a sedimentary rock.

Metamorphic rocks

- Examples of metamorphic rocks include marble, slate and gneiss (pronounced 'nice').
- Metamorphic rocks are made of interlocking **crystals** which makes them **hard** and **non-porous** (don't absorb water). Due to the way metamorphic rocks are formed, they may contain layers and / or distorted fossils.
- Metamorphic rocks are formed from existing rocks which have been exposed to **heat and pressure** over long periods of time.

The diagram shows how a sedimentary rock becomes a metamorphic rock:

- **Heat** changes the grains into crystals.
- **Pressure** compresses the crystals so they become smaller and arranged into layers.



Weathering and erosion

- Weathering is the breaking down of large pieces of rock into smaller pieces of rock.
- There are three types of weathering:
  - Biological weathering is caused by **living organisms**, for example tree roots can cause rocks to break into smaller pieces.
  - Chemical weathering wears rocks away. It is caused by **chemical reactions between rain and rocks containing calcium carbonate** such as chalk, limestone and marble. Rainwater is naturally acidic and causes weathering. However, this process is sped up when pollution causes acid rain to form.
  - Physical weathering uses mechanical processes to break rocks down, for example waves can slowly wear away at cliffs. Changes of temperature can also cause physical weathering to take place through processes known as freeze-thaw and onion-skin weathering.
- Erosion is the **movement** of rock by water, wind or ice. The rocks are broken down into even smaller pieces by erosion, becoming rounder and smoother in the process.

The rock cycle

- The rock cycle links together all the ideas in this topic as it describes how different rocks are made and changed over time: