Rocks and Weathering Booklet

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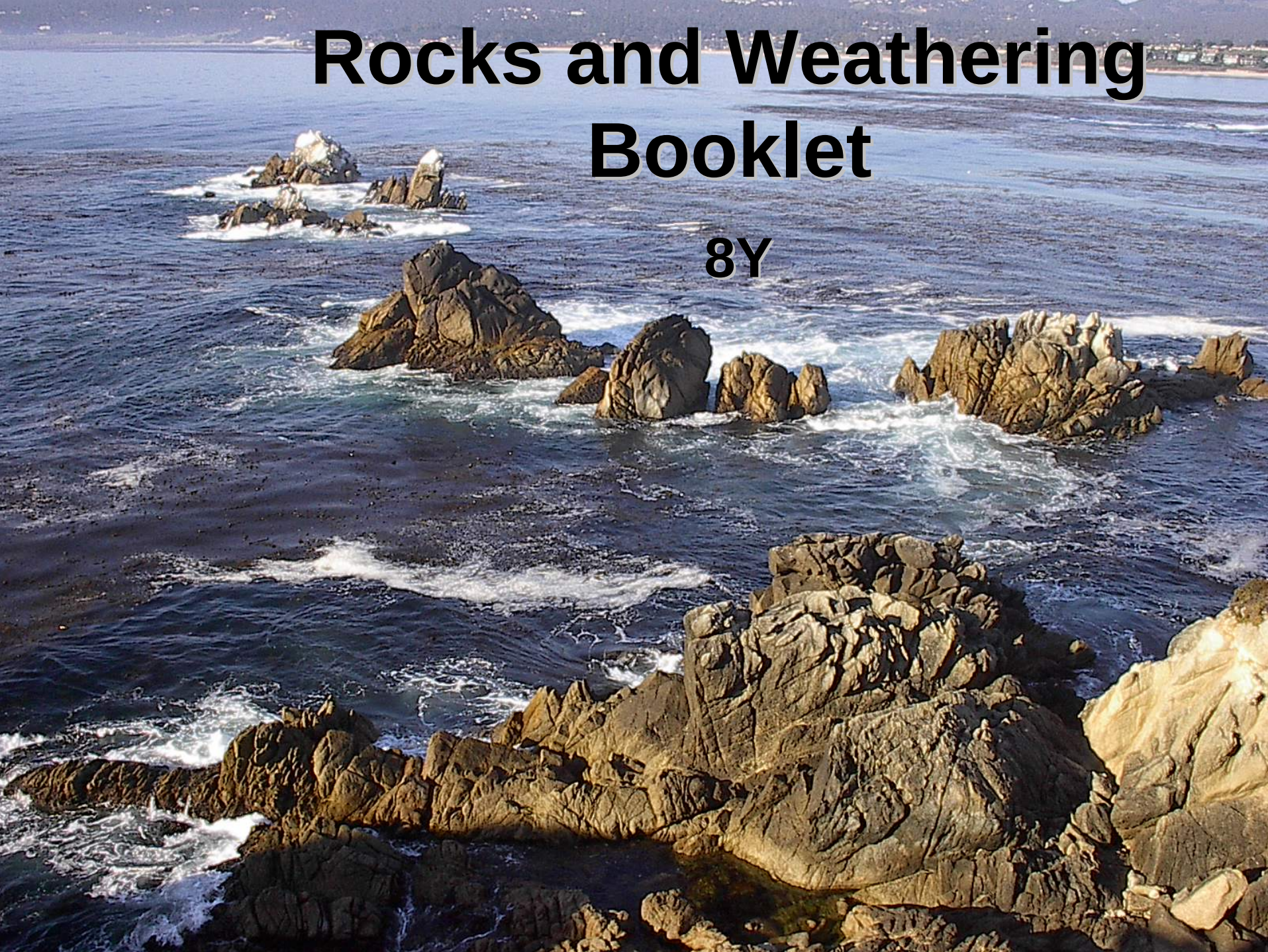


What are rocks?

A rock is made of **grains** that fit together. Each grain in the rock is made from a **mineral**, which is a chemical compound.

The grains in a rock can be different colours, shapes and sizes.

Sedimentary Rocks

How sedimentary rocks are formed?

1. When a river reaches a lake or the sea, its load of transported rocks settles to the bottom. We say that the rocks are **deposited**. The deposited rocks build up in layers, called **sediments**. This process is called **sedimentation**.

2. The weight of the sediments on top squashes the sediments at the bottom. This is called **compaction**. The water is squeezed out from between the pieces of rock and crystals of different salts form.

3. The crystals form a sort of glue that sticks or cements the pieces of rock together. This process is called **cementation**.

Sedimentary Rocks

- Chalk
- Sandstone
- Limestone
- Shale
- Conglomerate

Metamorphic Rocks

How meatmorphic rocks are formed?

Metamorphic rocks are formed from other rocks that are changed because of heat or pressure.

- Marble
- Slate
- Quartzite

Sedimentary Rocks → Metamorphic rocks

limestone →

marble

sandstone →

quartzite

shale →

slate

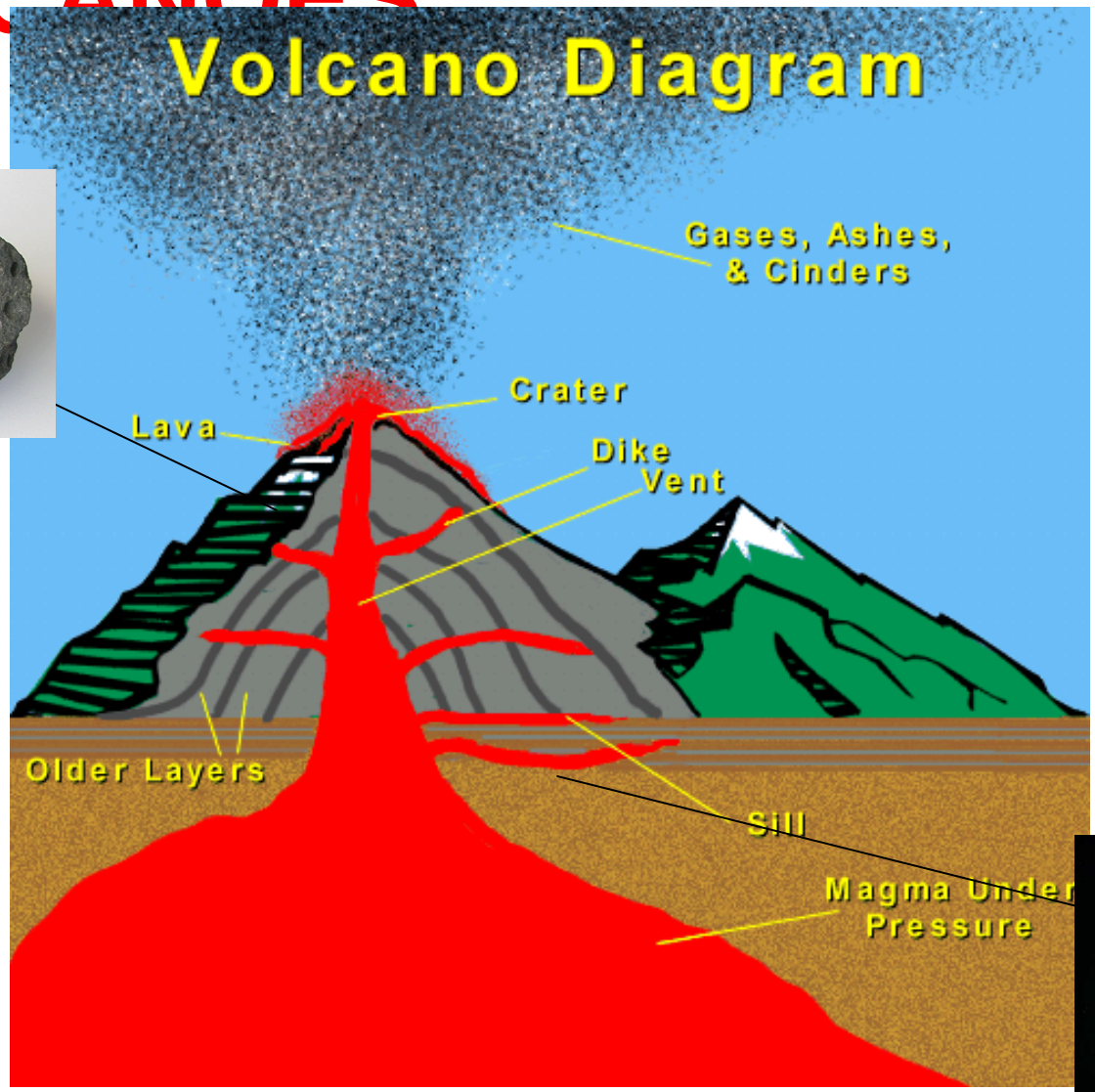
Igneous Rocks

How igneous rocks are formed?

The inside of the Earth is very hot - hot enough to melt rocks. Molten (liquid) rock forms when rocks melt. The molten rock is called magma. When the magma cools and solidifies, a type of rock called igneous rock forms.

VOLCANOES

basalt



granite

Chemical Weathering...

- Rainwater is naturally slightly acidic because carbon dioxide from the air dissolves in it. Minerals in rocks may react with the rainwater, causing the rock to be weathered. The weathering of rocks by chemicals is called **chemical weathering**.

- Some types of rock are easily weathered by chemicals. For example, limestone and chalk are made of a mineral called calcium carbonate. When acidic rainwater falls on limestone or chalk, a chemical reaction happens. New soluble substances are formed in the reaction. These are washed away and the rock is weathered. **Chemical weathering can make caves form and cliffs fall away.**

Physical or Mechanical Weathering

Caused by physical changes such as **changes in temperature, freezing and thawing**, and the **effects of wind, rain and waves**.

1 - Temperature changes

When a rock gets hot it expands a little, and when a rock gets cold it contracts a little. If a rock is heated and cooled many times, cracks form and pieces of rock fall away. This type of physical weathering happens a lot in deserts, because it is very hot during the day but very cold at night.

Physical or Mechanical Weathering

2. Freeze Thaw

The formation of ice can also break rocks. If water gets into a crack in a rock and then freezes, it expands and pushes the crack further apart.

When the ice melts later, water can get further into the crack. When the rock freezes again, it expands and makes the crack even bigger. This process of freezing and thawing can continue until the crack becomes so big that a piece of rock falls off.

Physical or Mechanical Weathering

3. Wind, rain and waves

The wind can blow tiny grains of sand against a rock. These wear the rock away and weather it. The rain can lash against a rock and wear it away. Waves can crash against a rock and wear it away.

Erosion and Transport

- **Erosion**

  Remember that weathering is the wearing away of rocks. Erosion is the **movement** of the broken pieces away from the site of weathering.

  Weathering and erosion are often confused, so be careful when answering questions about them. For example, a basalt cliff may be weathered by freeze-thaw, a type of physical weathering. This means that pieces of the cliff may break away. Erosion happens when these pieces of rock fall away down the cliff. In the photograph you can see a basalt cliff. At the bottom there are heaps of rocks, caused by weathering then erosion.

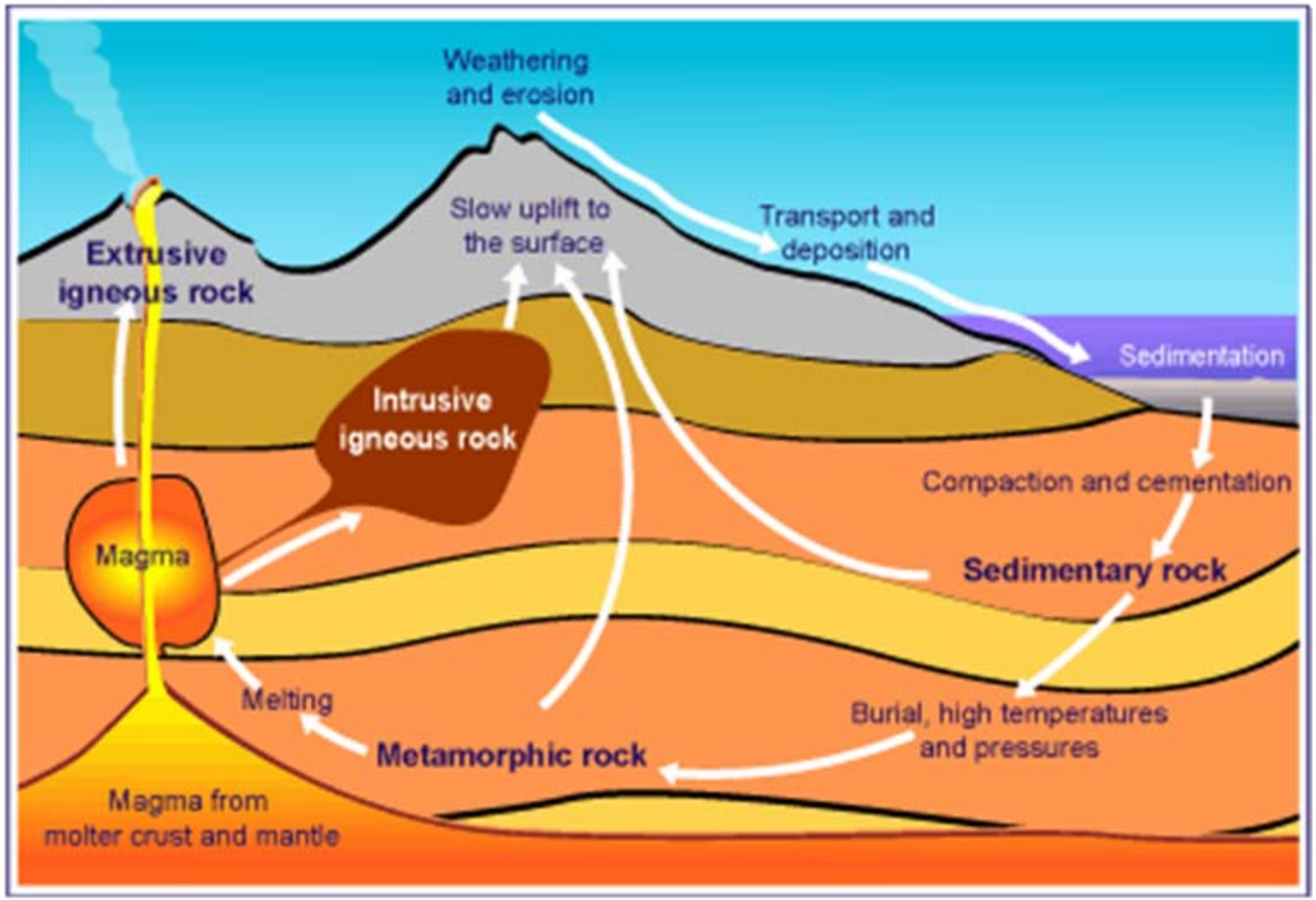
Erosion and Transport

- **Transport**

  Rivers and streams can move pieces of rock. This is called transport. Fast flowing rivers can transport large rocks, but slow moving rivers can only transport tiny pieces of rock. As the pieces of rock are carried along by the water, they bash against each other and the river bed.

  They gradually wear away because of this. They become smaller and more rounded.

Rock Cycle


Weathering
and erosion
Slow uplift to
the surface
Transport and
deposition
Extrusive
igneous rock
Intrusive
igneous rock
Sedimentation
Compaction and cementation
Magma
Sedimentary rock
Melting
Burial, high temperatures
and pressures
Metamorphic rock
Magma from
molter crust and mantle