

# KS3 Science

# Independent Learning

# Booklets

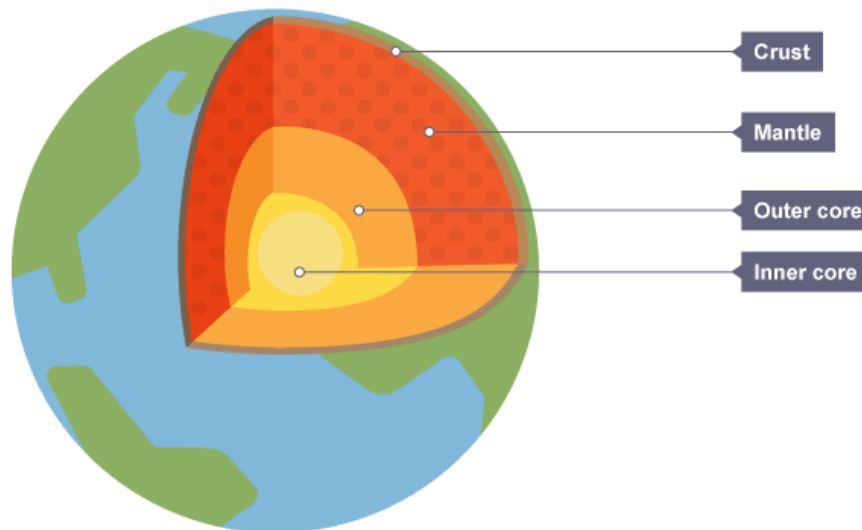
## Earth's Structure

If you have internet at home, you can use bitesize to help you with some of the activities.

Try your hardest to work through the booklets

The Earth is almost a sphere. These are its main layers, starting with the outermost:

- crust (relatively thin and rocky)
- mantle (has the properties of a solid, but can flow very slowly)
- core (made from nickel and iron)



The radius of the core is just over half the radius of the Earth. The Earth's atmosphere surrounds the Earth.

The Earth's crust, its atmosphere and oceans are the only sources of the resources that humans need.

## Rocks

Rocks are solid at room temperature. They are made of grains that fit together. Each grain in a piece of rock is made from a mineral, which is a chemical compound. The grains in a rock can have different:

- colours
- shapes
- sizes

There are 3 types of rock you need to know about: Igneous rock, sedimentary rock and metamorphic rocks.

## Igneous rocks

Igneous rocks are formed from molten rock that has cooled and solidified.

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

What are igneous rocks like?

Igneous rocks contain randomly arranged interlocking crystals. The size of the crystals depends on how quickly the molten magma solidified:

- magma that cools slowly will form an igneous rock with large crystals
- lava that cools quickly will form an igneous rock with small crystals

This means that we get two main types of igneous rock, extrusive and intrusive, as shown in the table:

	Extrusive	Intrusive
Where the magma cooled	On the surface	Underground
How fast the magma cooled	Quickly	Slowly
Size of crystals	Small	Large
Examples	Obsidian and basalt	Granite and gabbro

Extrusive igneous rocks form from magma that erupted onto the surface as lava, where it cooled quickly. On the other hand, intrusive igneous rocks form from magma that cooled slowly, deep underground.



Obsidian has tiny crystals



Granite has large crystals

Igneous rocks do not contain any fossils. This is because any fossils in the original rock will have melted when the rock melted to form magma.

### Sedimentary rocks

Sedimentary rocks are formed from the broken remains of other rocks that become joined together.

A river carries, or **transports**, pieces of broken rock as it flows along. When the 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**.

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. The crystals stick the pieces of rock together. This process is called **cementation**.

These processes eventually make a type of rock called sedimentary rock. It may take millions of years for sedimentary rocks to form.

Examples of sedimentary rock are:

- chalk
- limestone
- shale
- sandstone

## Metamorphic rocks

Metamorphic rocks are formed from other rocks that are changed because of heat or pressure. They are not made from molten rock – rocks that do melt form igneous rocks instead.

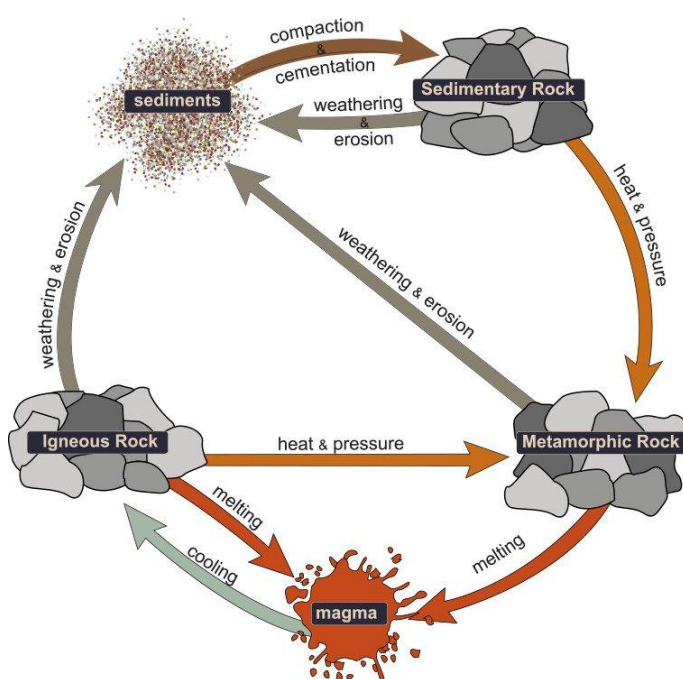
Earth movements can cause rocks to be deeply buried or squeezed. As a result, the rocks are heated and put under great pressure. They do not melt, but the minerals they contain are changed chemically, forming metamorphic rocks

### What are metamorphic rocks like?

Marble is formed from limestone and contains tiny interlocking grains. The layers in slate, formed from shale, are arranged in layers. This makes slate useful for making roof tiles because it can be split into separate flat sheets.

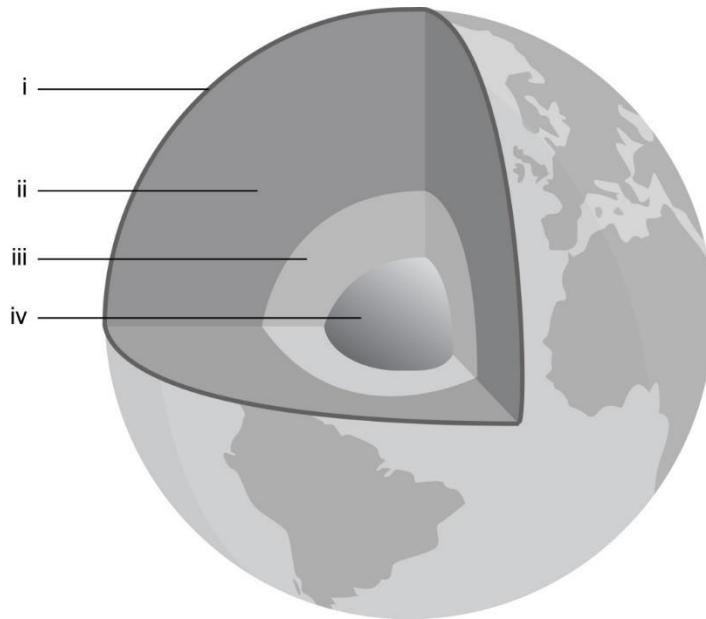
Metamorphic rocks rarely contain fossils. Any that were present in the original sedimentary rock will not normally survive the heat and pressure.

## Rock cycle



## Tasks

1. Label the four layers of the earth and give a description of each:



**Magma**

**extrusive**

**below**

**cooled**

**intrusive**

**cools**

**crystallises**

**features**

2. Complete the sentences below (use the words above to help you).

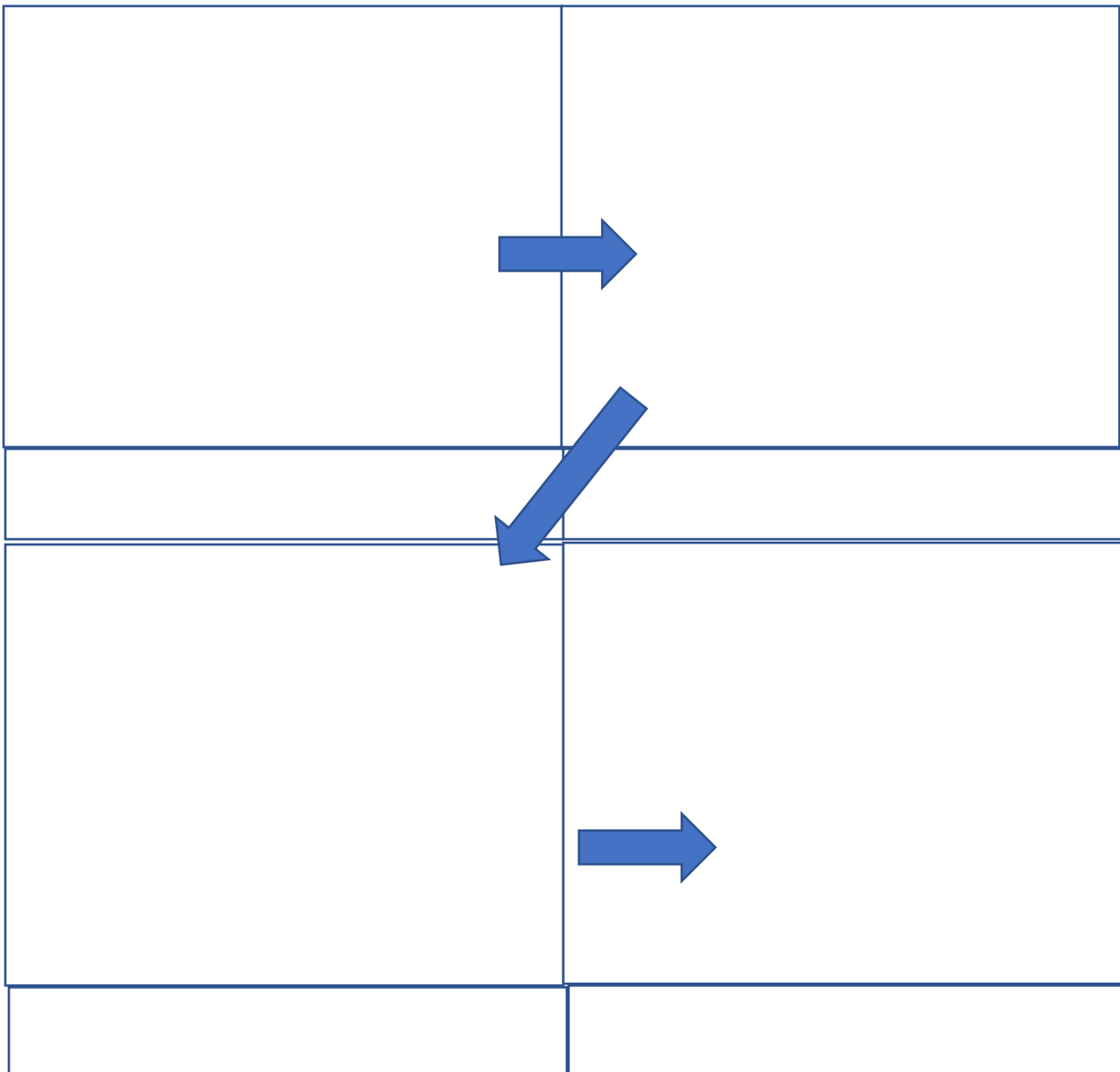
Igneous rocks are formed when liquid hot rock (\_\_\_\_\_) comes up towards the surface. As it rises it \_\_\_\_\_ and \_\_\_\_\_, either above the surface or \_\_\_\_\_ the surface.

We call igneous rocks which form above the surface: \_\_\_\_\_ igneous rocks and we call igneous rocks which form below the surface: \_\_\_\_\_ igneous rocks. Both these rocks have different \_\_\_\_\_ due to the speed at which they have \_\_\_\_\_.

3. Draw a labelled diagram of how an extrusive rock forms:

4. Draw a labelled diagram below of how an intrusive rock forms:

5. Draw a flow diagram to show how sediment rocks are formed. Add captions to each diagram to explain what is happening.





9. state whether the following are true or false. Challenge: correct the false statements.

- 1) Granite is a type of metamorphic rock.
- 2) Fossils can be found in metamorphic rock.
- 3) Metamorphic rock forms due to heat and pressure inside the Earth.
- 4) Marble is a type of metamorphic rock.
- 5) Metamorphic rocks contain layers.
- 6) Heat and pressure chemically alter the minerals in rocks.
- 7) Metamorphic rocks can only be formed from sedimentary rocks.

10. Draw your own version of the rock cycle, labelling the arrows show what is happening:



11. complete the wordsearch below:

## Earth structure

Find the words below in the wordsearch.

I S M N N A X I S Y E E I X O V H V V I  
L I A H C R K G E Q A E A H W D K Y A W  
E O N K P X V I D J M T J O L B C O S A  
Q Z T F Q G X K I X M Y R Z H S F L K O  
J I L V O A L F M M Q D J U W C Z I C G  
J M E F U C G R E Y X O X D L E I M O V  
E D L D F K C N N H E G R A N I T E R A  
N X W L M S T U T W N X T T F N P S R C  
O D C S E K R P A G U N V I E O I T M J  
T E D B T W U T R W E K F H B I S O Y E  
S T I H A O T D Y M B C S P Q S N N J G  
D I S O M L A M I H N W C R U S T E F R  
N S U A O J N D G F Y N I C K E L S N I  
A O O K R C E B C W Q J B W I R J M I J  
S P E Y P S G X W Y G H N S R P C J T Y  
A E N L H P O W Z H O Z V A K M O C W H  
T D G E I W F W B M N C M I L O B J J T  
T Y I C C B A S A L T Q O A C C Q E J R  
I X W Y X A E X K Z D P Y R I T T C D A  
V Q C E M E N T A T I O N X E K L Y E E

---

IGNEOUS  
ROCKS  
CORE  
COMPRESSION  
LIMESTONE  
BASALT

METAMORPHIC  
CRUST  
NICKEL  
CEMENTATION  
SANDSTONE  
EARTH

SEDIMENTARY  
MANTLE  
SEDIMENT  
DEPOSITED  
GRANITE

12. Layers of earth description sort. Match up the descriptions with the layers.

Crust	Mantle	Core



thickest layer of earth	deepest layer of earth	thinnest layer of the earth
made mostly of granite and rocks	is as hot as the sun	the outermost layer
five times hotter than boiling water	made mostly of nickel and iron	slowly moves like putty
made of solid and melted rock	contains the ocean floor and continents	has an inner and outer portion

13. Complete the tasks below:

## What is the earth made of?

The earth is made up \_\_\_\_\_ layers.

### 1. The CRUST

This is the layer we \_\_\_\_\_ on. It is a thin skin of \_\_\_\_\_ around the \_\_\_\_\_.

### 2. The MANTLE

The mantle forms about \_\_\_\_\_ of the earth. It is made of \_\_\_\_\_ rock.

The upper mantle is \_\_\_\_\_. The rock below it is \_\_\_\_\_ and \_\_\_\_\_ like soft \_\_\_\_\_. It is \_\_\_\_\_ in places.

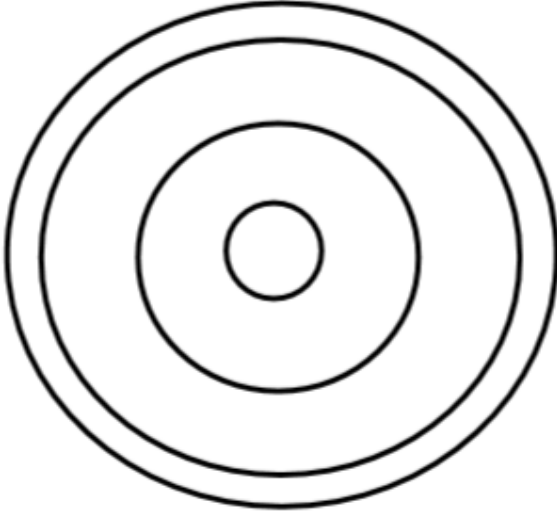
### 3. The CORE

The core is mainly \_\_\_\_\_ mixed with a little bit of \_\_\_\_\_. The outer core is \_\_\_\_\_ and the inner core is \_\_\_\_\_.

Look at the diagram of the earth's core and answer these questions.

1. How thick is the crust? \_\_\_\_\_
2. How wide is the mantle? \_\_\_\_\_
3. Which part of the core is liquid? \_\_\_\_\_
4. What is the outer core made of? \_\_\_\_\_ and \_\_\_\_\_
5. How wide is the inner core? \_\_\_\_\_
6. Add up all the distances and work out how far it is from the surface of the earth to the centre core. (You can use a calculator)

## Diagram to show a slice through the earth.



## How did the layers form?

Some time after the \_\_\_\_\_ formed, it got so \_\_\_\_\_ that everything inside \_\_\_\_\_. The \_\_\_\_\_ substances in the liquid \_\_\_\_\_ and the \_\_\_\_\_ substances rose to form \_\_\_\_\_. As the earth \_\_\_\_\_ most of them turned \_\_\_\_\_.

A great deal of \_\_\_\_\_ is still \_\_\_\_\_ inside the earth and it gets \_\_\_\_\_ as you go down deeper. At 200km deep the rocks are \_\_\_\_\_. At the centre of the earth the temperature is \_\_\_\_\_.

14. For fun.....

Make your own model of the earth from anything around the house!!!!!!

