Science – Year 3/4B Autumn 1

Rocks

This Planet Rocks

Session 2

Resource Pack

Session 2 Teacher's Notes

Health and Safety

Harmful micro-organisms

During this session the children will be handling rock samples. These could potentially be contaminated with harmful micro-organisms, particularly if you have sourced some of the rocks yourself. Samples from educational suppliers should be safe to handle. If you have any doubts about cleanliness and safety of the samples;

- Talk to the children about the risk including the need to keep their hands away from their mouths
- Provide plastic gloves for the children to wear whilst handling the samples
- Wash hands thoroughly after the tasks

Acid

During this session the children will be testing rocks with small drops of acid (household vinegar). This is a weak acid but it would cause stinging if it came into contact with eyes. Take precautions by;

- Warning the children of the danger
- Providing the children with protective goggles for the task

Classroom Organisation

Storing samples for testing

The children will need labelled samples for the Hardness Test and the Water Test. Use recycled packaging that has separate sections e.g. egg boxes, fruit packaging etc. During the session groups of 3 children will work on labelling and sorting the samples as below.

To help the session run as smoothly as possible, it would help to have your 3 testing zones set up with all the necessary equipment and work sheets ahead of the lesson as follows;

Zone 1 The Acid Test (Teacher led) – Plenty of newspaper to protect tables from acid, unlabelled rock samples (1 set for each group of 3), if possible include basalt, shale, conglomerate and pumice along with your 6 essential rocks, a beaker containing a little household vinegar and a pipette per group, magnifiers, safety goggles for each child and a copy of the Rock Identification Sheet per child

Zone 2 The Hardness Test (Year 4)- A set of labelled rock samples in compartments per group of 3 children, paper plates (to collect rubbings), and items to test hardness e.g. sandpaper, nails, lolly sticks, plastic spoons etc. and the Hardness Test Task Sheet to record agreed method and observations

Zone 3 The Water Test (Year 3)- A set of labelled rock samples in compartments per group of 3 children, pipettes, beakers of water and magnifiers and the Water Test Task Sheet to record agreed method and observations

Working towards the Outcome

The children have agreed to help Mr Crag to make some pilot TV programmes on rocks and fossils. This means they will need to:

- Become experts on rocks and fossils by gathering new knowledge and understanding each session
- Think about how to present information to the viewers to teach the content. Teaching someone else is a higher order learning skill and so will serve to securely embed their own knowledge and understanding
- Practise some presentation skills in preparation for the final session when they will work in groups to present one aspect of the topic they have met along the way
- Keep notes, task sheets, graphs, etc. to use in the final session – ideally in a folder or book so each child can make reference to them later
- Make some resources to use in the pilot programmes

During this session, children are encouraged to practise presenting the information they have learned or discovered – Year 4 demonstrating how observing and testing rocks will give clues on how they were formed and Year 3 on explaining the 3 different types of rocks and how each are formed.

Chalk	Limestone
Sandstone	Granite
Marble	Slate

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Sandstone	Granite
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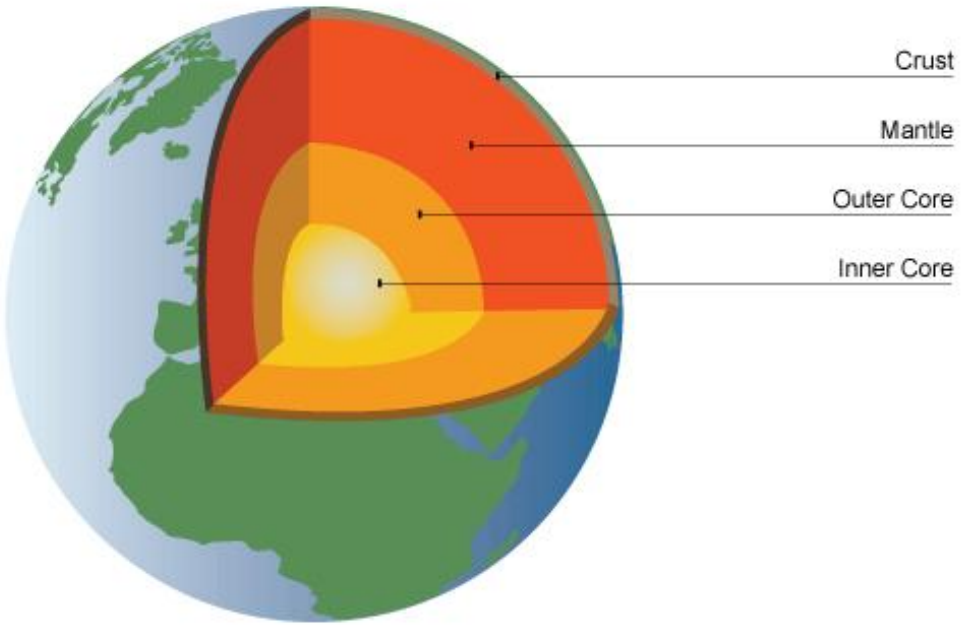
Rocks

If you dig down anywhere on planet Earth, you will find rock.

There are many different types. But how did they get there?



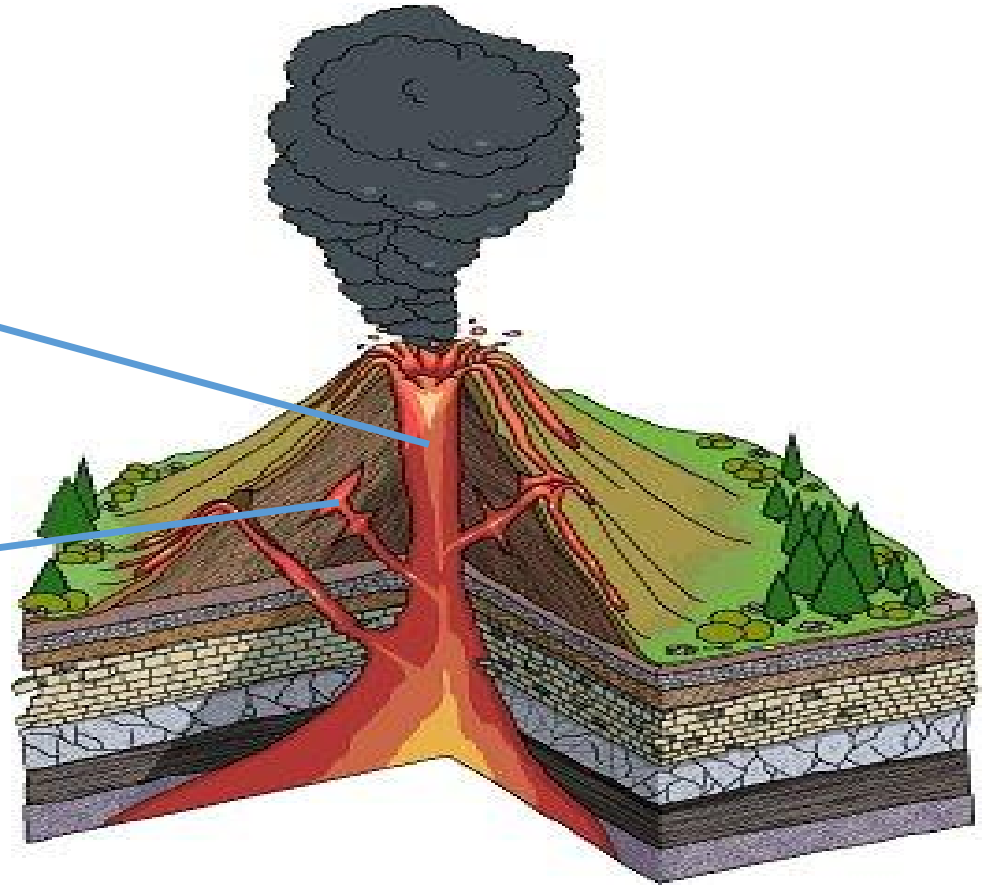
A layer of rock is under every town and city, under fields and forests, even under the sea! This layer of rock is called the Earth's crust.

Below the crust is the mantle. This is made of rock that is so hot that it is melted! We call this molten rock or magma. It is thick and runny, like syrup.

Below the mantle is the Earth's core, which is even hotter.

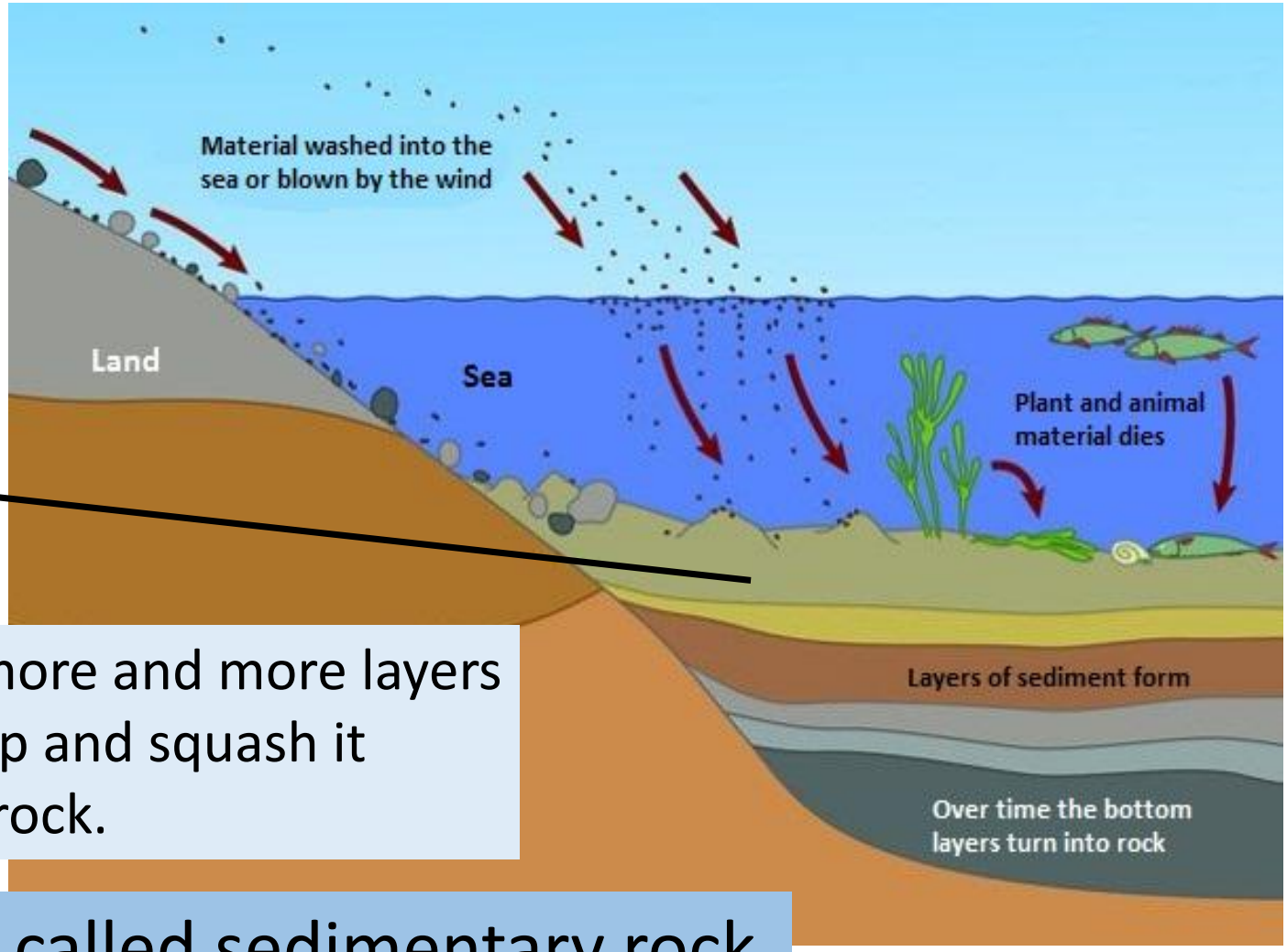
Sometimes magma comes to the surface when a volcano erupts. As the magma cools it forms a rock.

Sometimes magma cools to make rock just below the surface. Rock that forms from magma contains crystals.



This type of rock is called Igneous rock

Another type of rock is made when tiny bits of rock and soil, as well as the bodies of dead creatures, settle at the bottom of the sea to form a layer of sediment.



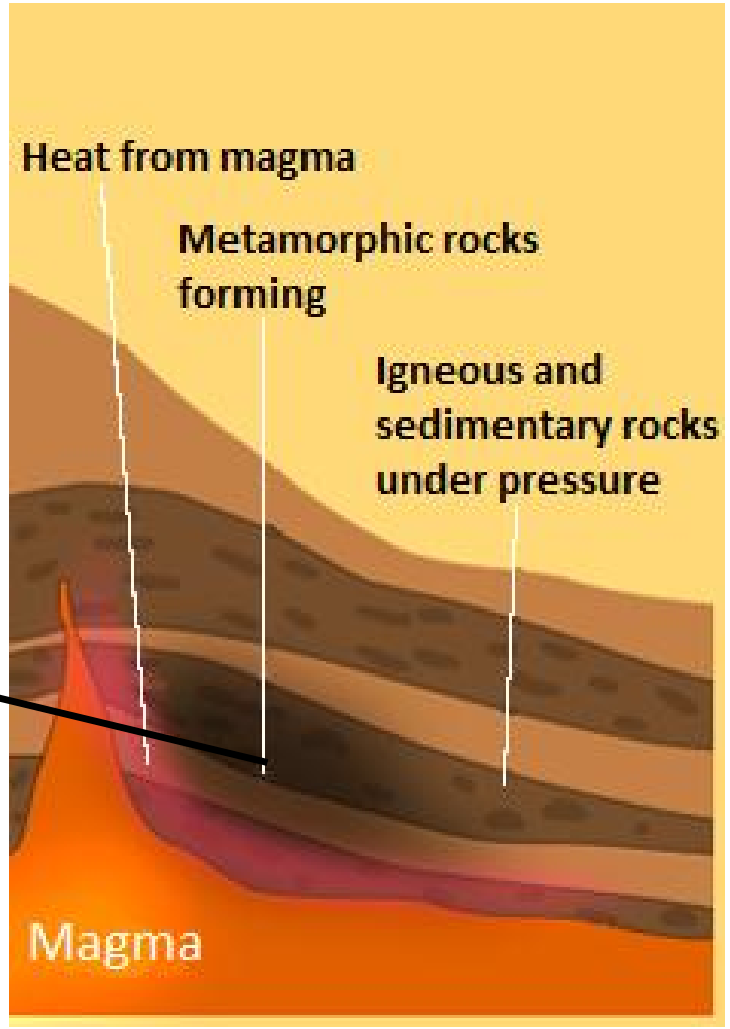
Over millions of years, more and more layers of sediment settle on top and squash it down until it turns into rock.

This type of rock is called sedimentary rock

There is one more type of natural rock that is made by extreme heat and pressure inside the Earth.

Massive heat and pressure can change igneous and sedimentary rocks into a new type of rock.

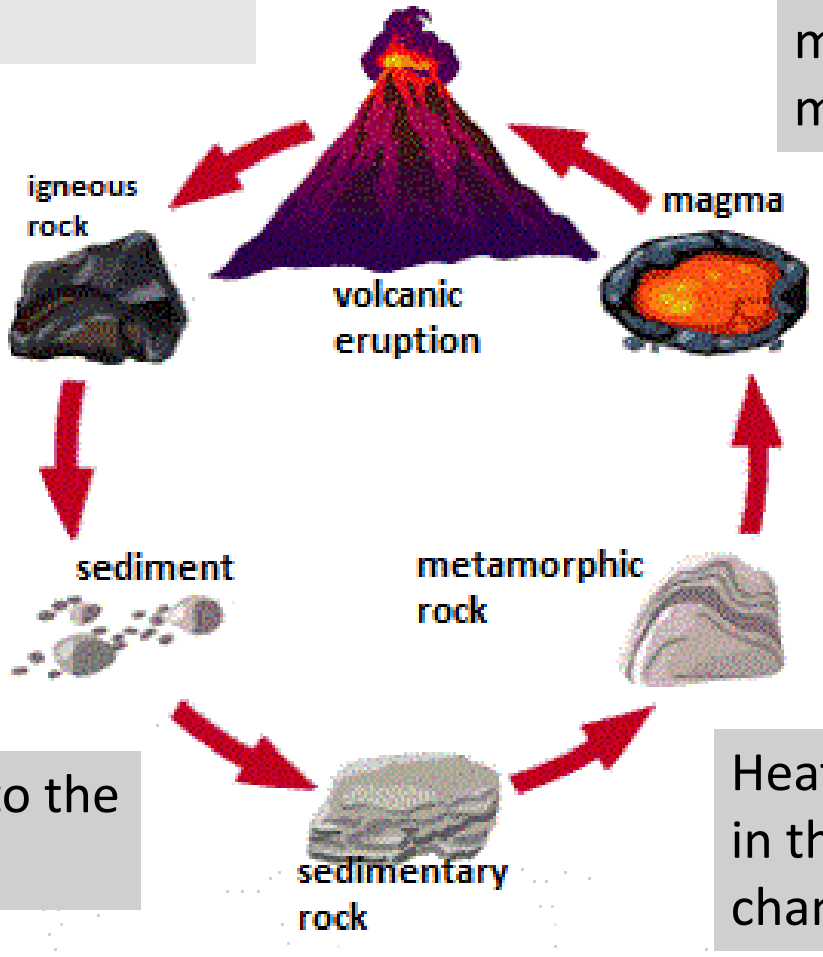
This type of rock is called metamorphic rock



Rocks are always changing although it can take millions of years!

Rocks that reach the hot core can melt to become magma

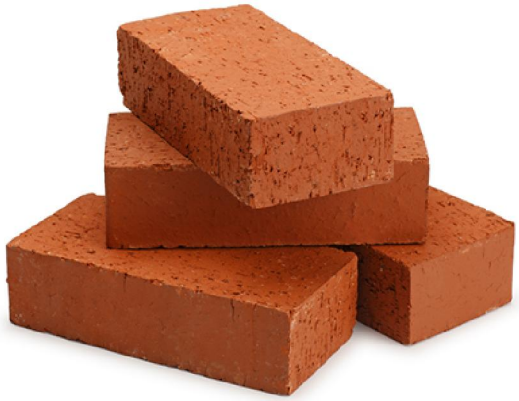
Wind and rain can gradually wear down rocks (this is called erosion)



The tiny pieces will wash into the sea to form sediment

Heat and pressure in the Earth can change rocks

All these rocks are natural to the Earth. But there are also rocks that are made by people. We call these man-made rocks. Can you think of any?

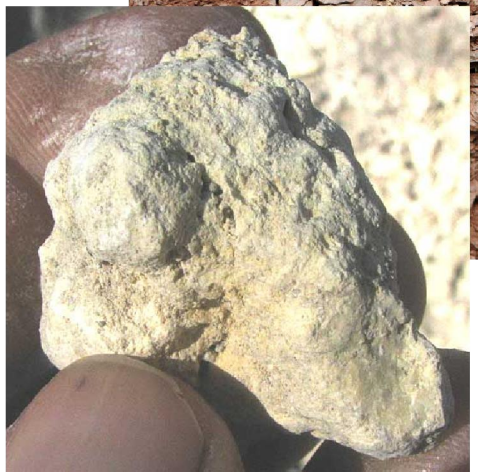


These man-made rocks are made from natural rocks and soils like clay and sand. They are really useful for building!

Rock Detectives

Clue 1

How hard is the rock?



Some rocks are soft and crumbly whilst others are very hard and strong

Try a hardness test on your rock samples

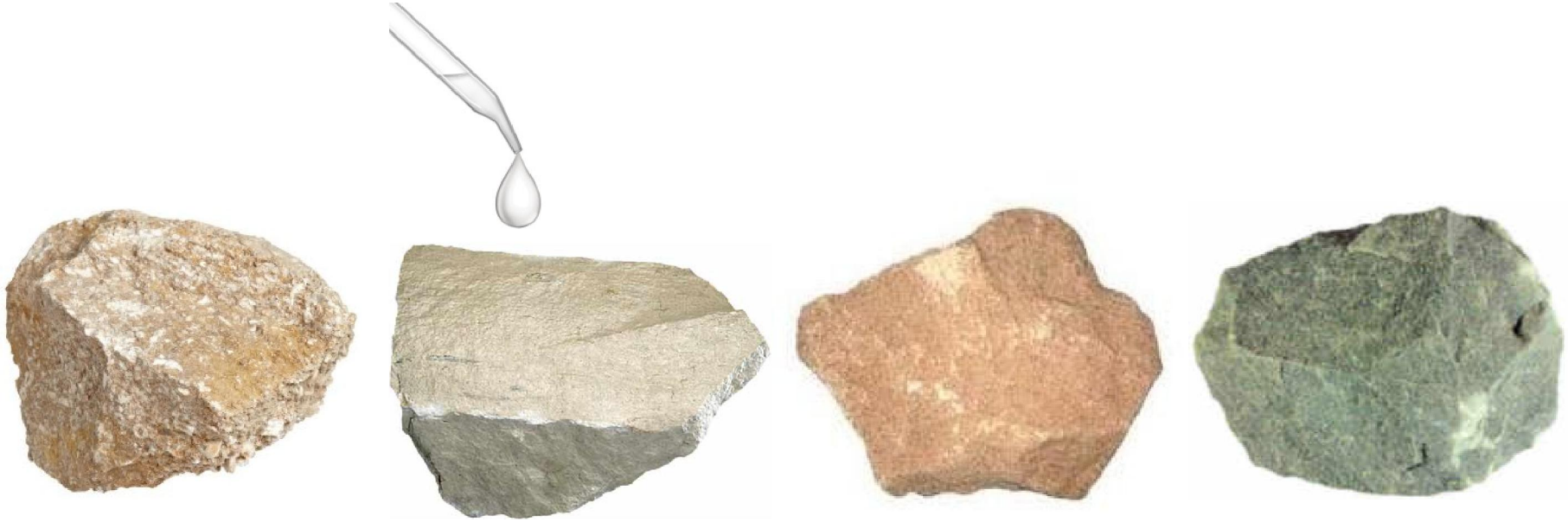
- Can you scratch them with different items?
- Which items will scratch them and which will not?
- Can you crumble them?
- Can you put them in order from the softest to the hardest?

What will hardness tell you?

Sedimentary rocks are usually a lot softer than igneous and metamorphic rocks

Clue 2

Will water soak into it?



Try dropping a small amount of water on your rock samples and watch to see if it soaks in

What will this tell you about your rocks?

If water can soak into a rock or pass through it, we say it is a permeable rock. Sedimentary rocks are usually permeable.

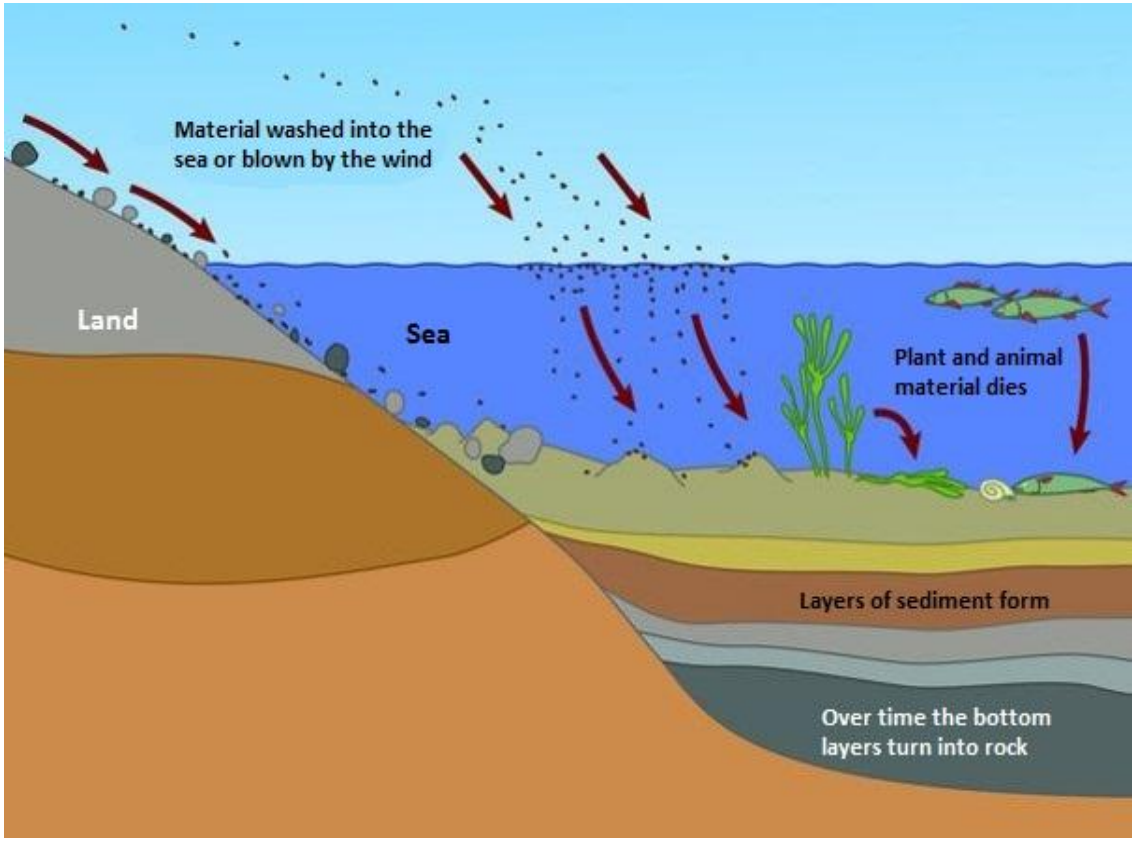
If water cannot soak into a rock, the rock is said to be impermeable. Metamorphic and igneous rocks are often impermeable.

Clue 3

The acid test

Vinegar is an acid. Try dropping a small amount of vinegar on your rocks. Then look carefully to see if it fizzes.

What will this tell you about your rocks?



Remember that sedimentary rocks can contain the bodies of sea creatures that died long ago. Their shells dropped into the muddy sediment and became buried. After millions of years they were turned to rock.

If a rock was once the shells of creatures, it will fizz when acid is dropped onto it.

Some metamorphic rocks will fizz too if they were once sedimentary rocks that contained shells and were then changed by great heat or pressure.

Clue 4

What is it like close up?

If your rock has stripes or layers it will probably be a sedimentary rock

Some landscapes show the layers of sediment that have turned to rock. You may have seen them at the seaside.

But some metamorphic rocks may also have layers if they used to be sedimentary rocks but were changed by heat or pressure!

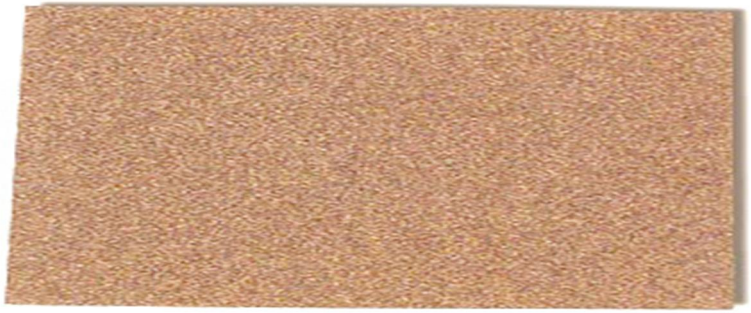
If your rock has crystals it will probably be an igneous rock or an igneous rock that has become a metamorphic rock because it has been changed by heat or pressure.

Rock Scientists (Petrologists) find out about their rock samples by looking closely at them and by doing tests on them.

If your teacher gives you a test, they make it fair by making sure everyone has:

- **The same instructions**
- **The same equipment**
- **The same length of time to do it**

Scientists have to make sure their tests are fair too!



Suppose a scientist decided to test rocks for hardness by rubbing them on sandpaper. They rubbed one rock 20 times and another 10 times and then compared the amount of rock dust, would that be fair?

How could they make the test fair?

When you test rocks, you will need to think about how to make your tests fair!

It’s time to become rock detectives!

Chalk	Limestone
Sandstone	Granite
Marble	Slate

I can design a fair test

Name

The Hardness Test

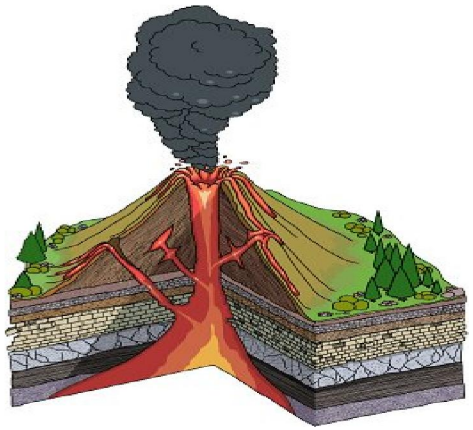
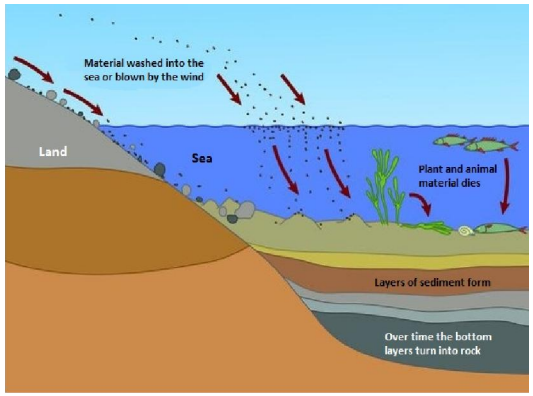
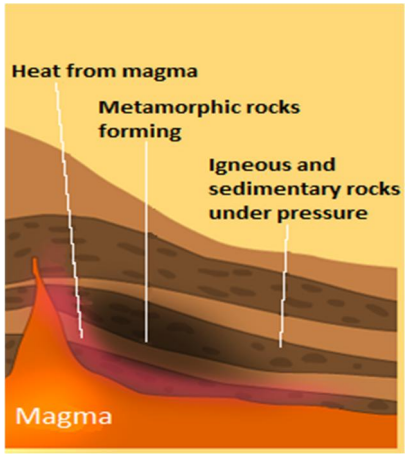
For our test we will

It will be fair because

Our Results

Rock Sample	Chalk	Granite	Limestone	Slate	Sandstone	Marble	
Observations							
Rank order of rocks for hardness (1 for the softest rock, 2 for the 2nd softest and so on)							
What type of rock might it be?							

Rock Reminders

Type of rock	Igneous	Sedimentary	Metamorphic
How it's formed	 Made from magma (melted rock) that has cooled	 Made from layers of sediment (including the dead bodies of creatures) that have dropped to the bottom of the sea and built up over millions of years	 Made from igneous and sedimentary rocks that have been changed by great heat or pressure inside the Earth.
Appearance	Contains crystals	Contains layers	May contain crystals or layers
Hardness Test	Usually hard	Usually soft and crumbly	Usually hard
Water Test	Usually impermeable	Usually permeable	Usually impermeable
Acid Test	Does not fizz	Often fizzes	Sometimes fizzes

I can design a fair test Name

The Water Test

For our test we will

It will be fair because

Our Results

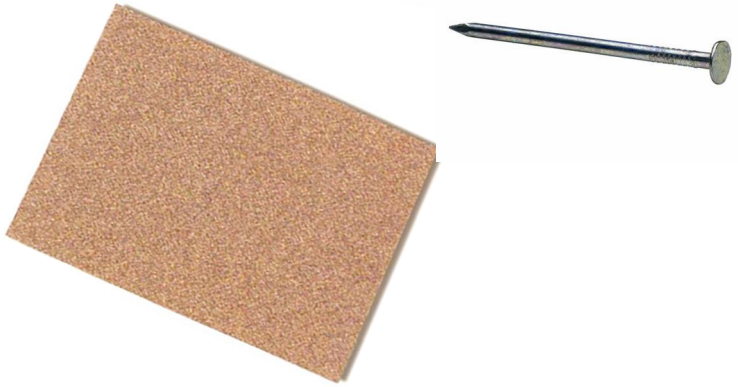
Rock Sample	Chalk	Granite	Limestone	Slate	Sandstone	Marble	
Observations							
Is the rock permeable? (It allows water to soak in)							
What type of rock might it be?							

Let’s share our results

The Hardness Test

There are lots of ways to test hardness. What did you do to make it fair?

Which rocks were the hardest?



Which rocks were the softest?

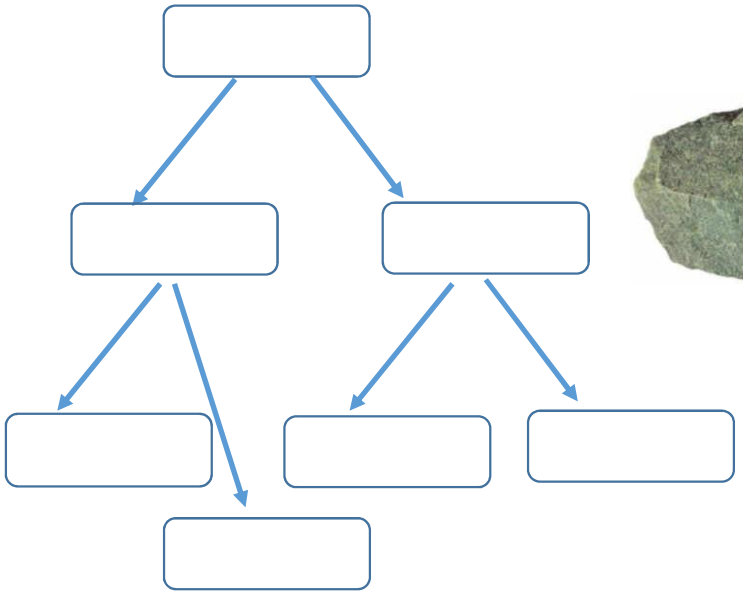
The Water Test

How did you make it fair?

Which rocks were permeable?

Which rocks were impermeable?

The Rock Identification Key



Which of our rocks fizzed when you added acid?

Probably chalk, limestone and marble

What does that tell us?

These rocks are made from the shells of animals that lived long ago!

Look at your Key

Which of our rocks are sedimentary?

sandstone, chalk, limestone, shale and conglomerate

Which rocks are igneous?

granite, pumice and basalt

Which rocks are metamorphic?

marble and slate

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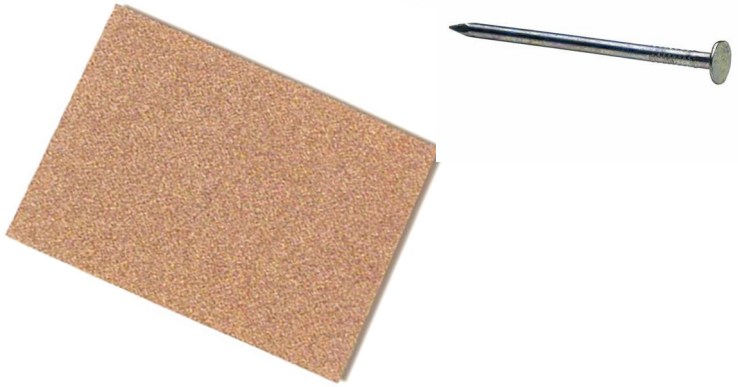

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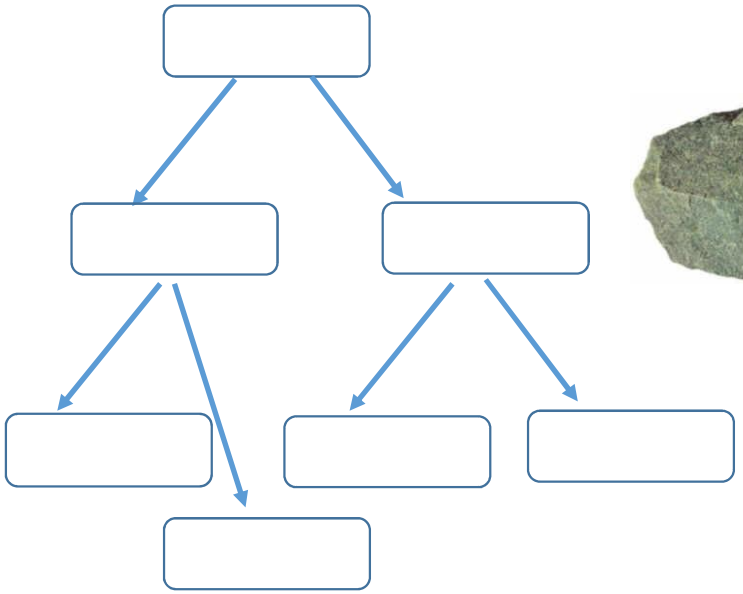

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