Herbert Learning

Rock Stars

A Teaching Resource

Herbert Art Gallery & Museum. Coventry
www.theherbert.org/learning

RENAISSANCE WEST MIDLANDS
museums for changing lives

Herbert Learning

Rock Stars KS2: Contents

Visiting: Active Learning Session - Rock Stars 01

INTRODUCTION

Session length: 1 hour 30 minutes plus an optional 30 minute independent visit to the galleries.
Session Description: KS2
For costs and booking information please see the website.

Are you a Rock Star? Pupils work in teams to discover more about rocks from our collections. They will explore the rock samples, arranging them into groups, using magnifying lenses to focus on detail and discover similarities and differences. Pupils will conduct experiments to learn the hardness and permeability levels of the rocks and then complete a challenge to match images of everyday uses of rocks to the examples in front of them.

This teacher's resource pack has been designed to support the KS2 school curriculum.
Within the pack you will find a selection of cross curricular activities supporting the development of key skills and other useful resources to complement your work in the classroom. The activities are suitable to be carried out pre or post visit to the Herbert and we strongly recommend a visit to the museum to get the most out of your pack.

Learning Outcomes
Through attending this session your children will build on the following skills:

- Improved speaking and listening, through group discussion and interaction
- Increased skills for investigative planning
- Further consideration and evaluation of evidence
- Grouping and classifying materials

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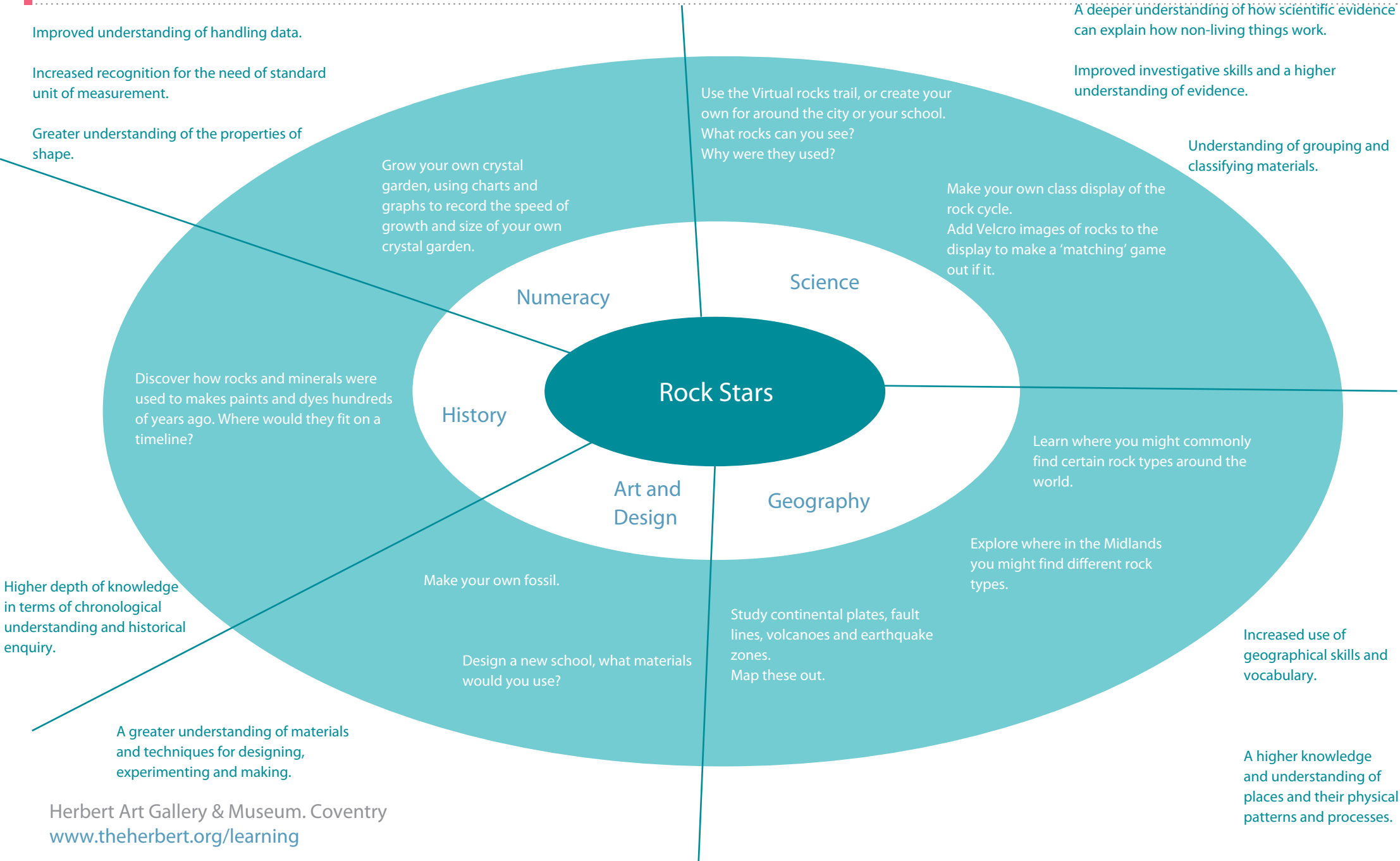
Curriculum Connections and Learning Outcomes 02



Improved understanding of handling data.

Increased recognition for the need of standard unit of measurement.

Greater understanding of the properties of shape.

Grow your own crystal garden, using charts and graphs to record the speed of growth and size of your own crystal garden.

Use the Virtual rocks trail, or create your own for around the city or your school.
What rocks can you see?
Why were they used?

A deeper understanding of how scientific evidence can explain how non-living things work.

Improved investigative skills and a higher understanding of evidence.

Understanding of grouping and classifying materials.

Make your own class display of the rock cycle.
Add Velcro images of rocks to the display to make a 'matching' game out if it.

Discover how rocks and minerals were used to makes paints and dyes hundreds of years ago. Where would they fit on a timeline?

Learn where you might commonly find certain rock types around the world.

Explore where in the Midlands you might find different rock types.

Higher depth of knowledge in terms of chronological understanding and historical enquiry.

Make your own fossil.

Design a new school, what materials would you use?

Study continental plates, fault lines, volcanoes and earthquake zones.
Map these out.

Increased use of geographical skills and vocabulary.

A greater understanding of materials and techniques for designing, experimenting and making.

A higher knowledge and understanding of places and their physical patterns and processes.

Rock Stars KS2: Teacher's Notes 03

ROCK TYPES

Key points:

There are three types of rock; sedimentary; metamorphic; and igneous. These rocks are formed naturally in a process known as the rock cycle.

Sedimentary Rocks

Sedimentary rocks are formed when particles of sand, shells, pebbles, and other fragments, known as sediments, settle in layers at the bottom of lakes and sea beds, over long periods of time. During this time the layers build pressure upon themselves causing them to cement together. This process is known as compaction and cementation. This rock type tends to be soft and easy to break or crumble. Sedimentary rock is almost the only rock type to contain fossils.

Metamorphic Rocks

Metamorphic rocks develop in the Earth's crust, through a process known as metamorphism. Within the crust, intense heat and pressure builds up, causing the sedimentary rocks which are embedded there to transform. The heat and pressure causes physical and chemical changes, resulting in rocks that often have shiny or crystallized layers, formed by minerals growing slowly over time.

Igneous Rocks

Intense heat within the Earth's mantle melts metamorphic rock, reaching incredible temperatures, creating magma. As magma flows, huge amounts of pressure build up, eventually causing a volcanic eruption. The erupted magma forms two types of igneous rock. Intrusive igneous rocks are formed within the Earth's surface, as magma escaped through opening that lead up to the surface. These rocks are coarse grained, and the minerals contained within them are usually clear to the naked eye. Extrusive igneous rocks are formed when the magma explodes onto the surface, known as lava. The dramatic change in temperature causes the lava to cool quickly. Extrusive igneous rocks become very smooth, shiny and sometimes glass-like in appearance. You can often see smooth flowing lines running through extrusive igneous rocks, displaying the course in which the lava flowed.

Rock Stars KS2: Imagebank 03

SEDIMENTARY ROCK- Limestone

Limestone is generally white in colour, although certain impurities, such as iron oxide and carbon, can alter the colouring to make it red, brown, yellow, grey, black, and even blue.
The texture varies from rough to fine, and it is mostly formed from the consolidation of skeletons from marine animals, leaving limestone with high calcium content.

Examples of limestone are used in the Rock Stars Active Learning Session.

Rock Stars KS2: Imagebank 03

SEDIMENTARY ROCK- Chalk

Chalk is a very pure form of limestone, completely formed from marine animal skeletons. This is because during the Cretaceous Period (around 65-145 million years ago) almost all of the British Isles were under water, allowing the skeletons to settle in layers, forming the vast expanses of chalk cliffs we see present today. Chalk is a soft white rock, which can easily break and wear away, making it ideal for use on blackboards. It is also a key ingredient for making cement.

Examples of chalk are used in the Rock Stars Active Learning Session.

Rock Stars KS2: Imagebank 03

SEDIMENTARY ROCK-
Sandstone

Sandstone is formed from mineral and sand grains, particularly quartz and feldspar.
Like sand we see on beaches, sandstone can be any colour, but common colours are tan, brown, orange, red, yellow and white. It is a common building tool as it can be easily cut and shaped, however, overtime obvious signs of erosion are visible.

Examples of sandstone are used in the Rock Stars Active Learning Session.

Rock Stars KS2: Imagebank 03

METAMORPHIC ROCK- Slate

Slate is formed from shale, and like shale, it is most often found in shades of grey. It can be easily split, making it an ideal material for using as roof, floor and wall tiles. It can be easily marked with a hard object and the marks can then be easily wiped away with damp cloth. Due to this, slate was commonly used in the early 20th century as writing boards in school classrooms.

Examples of slate are used in the Rock Stars Active Learning Session.

Rock Stars KS2: Imagebank 03

METAMORPHIC ROCK- Marble

Marble is formed from limestone, with a highly polished appearance. It is commonly used for buildings, kitchen and bathroom surfaces or floors, and sculpting.
During the metamorphism of marble undergoes a dramatic change in appearance due to a completely new crystalline structure forming. The intense heat and pressure required to create marble destroys all evidence of sedimentary rock layers and any fossils that may have been present.

Examples of marble are used in the Rock Stars Active Learning Session.

Rock Stars KS2: Imagebank 03

IGNEOUS ROCK-
Granite

Granite is an intrusive igneous rock, with a medium to coarse texture, and can vary in colour from pink to dark grey to black. It is almost always large, and very tough, so it has gained a common use for construction.
It is also popular for rock-climbing due to how it forms in very steep declines, its crack-systems and friction, allowing for climbers to grip easily.

Examples of granite are used in the Rock Stars Active Learning Session.

Rock Stars KS2: Imagebank 03

IGNEOUS ROCK- Pumice

Pumice is a term for a volcanic rock formed from solidified lava and water mixing together. The bubble-like texture effect is the result of the intense heat of the lava being rapidly cooled by the impact of the water.
It is very light in weight, making it ideal to use for breeze blocks in building, and because of its rough, yet soft texture, it is commonly used to remove rough skin from the heels of feet.

Examples of pumice are used in the Rock Stars Active Learning Session.

Rock Stars KS2: Imagebank 03

Ammonite

Fossil example embedded in rock. The Ammonite is an extinct group of marine animals. From fossils of Ammonites it is possible to link the layer of rock it is found embedded in to a specific geological time period. In the case of the Ammonite, it is believed they became extinct around 65 million years ago.

This ammonite is part of our collection and can be seen in the Elements gallery.

Rock Stars KS2: Imagebank 03

Labradorite

Generally a dark, dull looking mineral, however it contains beautiful shining sections that glow under the light. It can contain intense colours, ranging from blues and violets, through to greens, yellows and oranges. Some rare specimens contain all of these colours simultaneously. The colours are a result of rays of light entering between the layers of the mineral and then refracting back and forth between each layer. This mineral commonly occurs in igneous rocks, such as basalt and gabbro.

This piece of labradorite is part of our collection and can be seen in the Elements gallery.

Rock Stars KS2: Imagebank 03

Red Flame Jasper

The word 'Jasper' generally refers to a semi-precious opaque gemstone, usually quartz based. 'Red Flame' simply refers to the colour of this particular stone.
Jasper stones are usually red, brown, yellow, green, or a mixture of these colours.
It is considered a sacred stone with Native American traditions and believed to contain healing powers.
Red Jasper stones are thought to protect, give beauty and grace to women, cure fevers, and induce freshness of ideas.

This piece of red flame jasper is part of our collection and can be seen in the Elements gallery.

Rock Stars KS2: Imagebank03

Haematite

Haematite is the mineral from iron oxide, ranging in colour from black to grey, brown to reddish-brown, and red.
It is harder than pure iron, but much more brittle.
Large deposits of Haematite are found in distinctive rock types, called banded iron formations, which are present in sedimentary rock. Banded iron formations date from around 3000 million years ago.
This mineral can solidify out of water and settle in layers at the bottom of a lake, spring, or other standing water.
Good examples of Haematite come from England, Mexico, Australia, Canada and America.

This piece of haematite is part of our collection and can be seen in the Elements gallery.

Rock Stars KS2: Imagebank03

Bismuth

Bismuth is a chemical element, which is heavy and brittle, with a pink tinge.
Its compounds are used in cosmetics, medicines and medical procedures.
China was the top producer of Bismuth, with around 40% of the world's bismuth coming from there.
The crystals formed from bismuth form extremely unique shapes, as apparent in the image opposite.

This piece of bismuth is part of our collection and can be seen in the Elements gallery.

Rock Stars KS2: Imagebank03

Landscape Limestone

This form of limestone is often found in Bristol, and is very unique in appearance, as this specific type of limestone appears to have landscape images painted onto the rock. However, these patterns are formed through natural processes, allowing for the rock to form very decorative pieces when cut to shape around the landscape patterns.
Limestone makes up about 10% of all sedimentary rocks.

This piece of landscape limestone is part of our collection and can be seen in the Elements gallery.

Rock Stars KS2: Supporting Documents 03

VIRTUAL ROCKS TRAIL

Be creative with the following images, create your own, or make a day trip out of it to explore the city centre and discover where you can find the different rock types for yourself.

The virtual rocks trail gives you and your class the opportunity to discover where different forms of rock are present in an area that might be familiar to you and your pupils.

The following images display Coventry City centre, and it is an easy way to create a rocks trail in your classroom, with either the resources provided, or with your own.

Explore what rock types might be present in the images.

Use the clues at the side of each image to encourage pupils to think about the different materials they have already studied and discussed.

This will allow your pupils to expand their thinking and understanding of how natural products play such a vital role in our everyday lives.

Rock Stars KS2: Supporting Documents 03

VIRTUAL ROCKS TRAIL

What do you think the roof tiles on these buildings are made of?

Rock Stars KS2: Supporting Documents 03

VIRTUAL ROCKS TRAIL

Whar type of rock do you think was used for the bricks that this church is made from?

The rocks in the foreground are remnants of the old Coventry Wall. Can you find out what this was made from?

Rock Stars KS2: Supporting Documents 03

VIRTUAL ROCKS TRAIL

The lower precinct uses a lot of shiny, smooth rock for the flooring, what do you think this could be?

Rock Stars KS2: Supporting Documents 03

VIRTUAL ROCKS TRAIL

Shop door ways in the Lower Precinct are surrounded by a dark rock, what do you think this might be?

It is the same type of rock that is used on the flooring.

Rock Stars KS2: Supporting Documents 03

VIRTUAL ROCKS TRAIL

The fountain in Coventry city centre is made of material commonly used in kitchens and for gravestones. What type of rock could this be?

Rock Stars KS2: Supporting Documents 03

VIRTUAL ROCKS TRAIL

The Old Cathedral is made from a rock that is usually red and fine grained. What could this type of rock be?

Rock Stars KS2: Supporting Documents 03

ROCKS IN THE UK

Millions of years ago the British Isles were almost completely under water, with the exception of the highest peaks in Scotland.

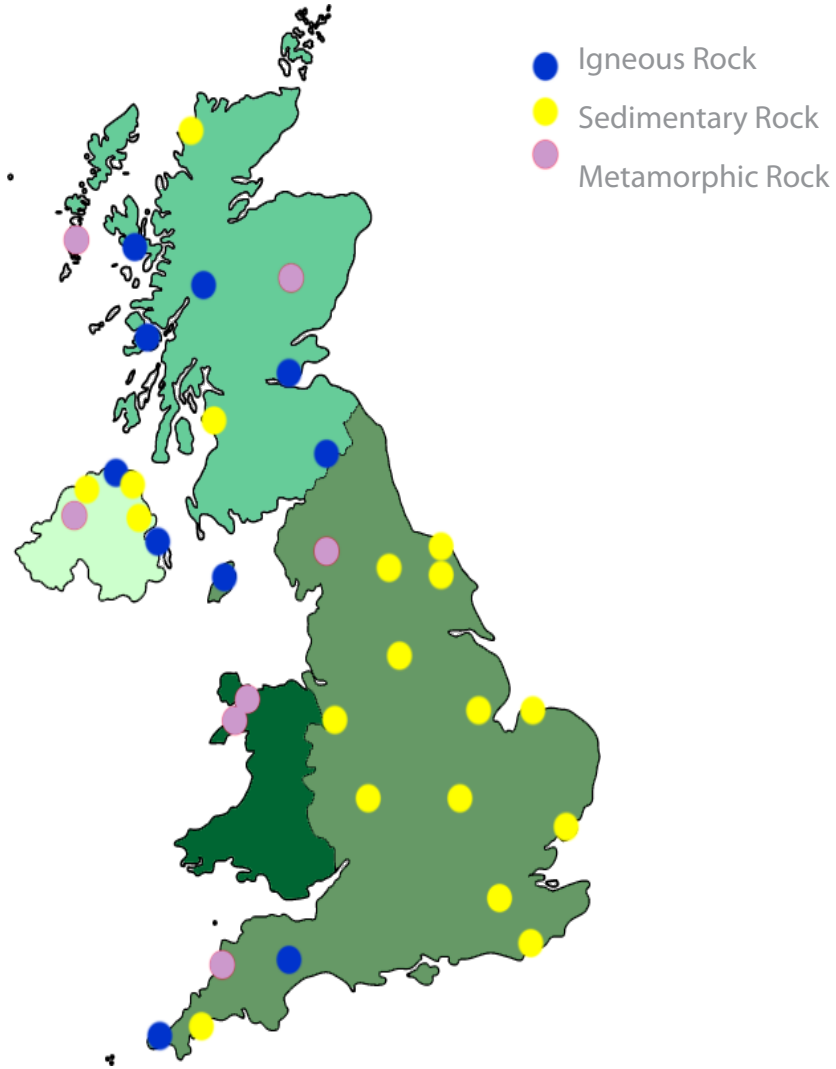
During this time, the seven continental landmasses that we know today were slowly moving around the globe, and continue to do so. Over these millions of years as the British Isles passed around the world they experienced extreme changes in climate, changing from arctic to dessert temperatures and conditions, and eventually to the climate we are accustomed to today.

These events led to Britain undergoing severe volcanic explosions and earthquakes, causing Britain to have large deposits of all three types of rock; especially when compared with other areas of the world that are similar in size.

The map opposite displays where large deposits of particular rocks can be found in Britain.

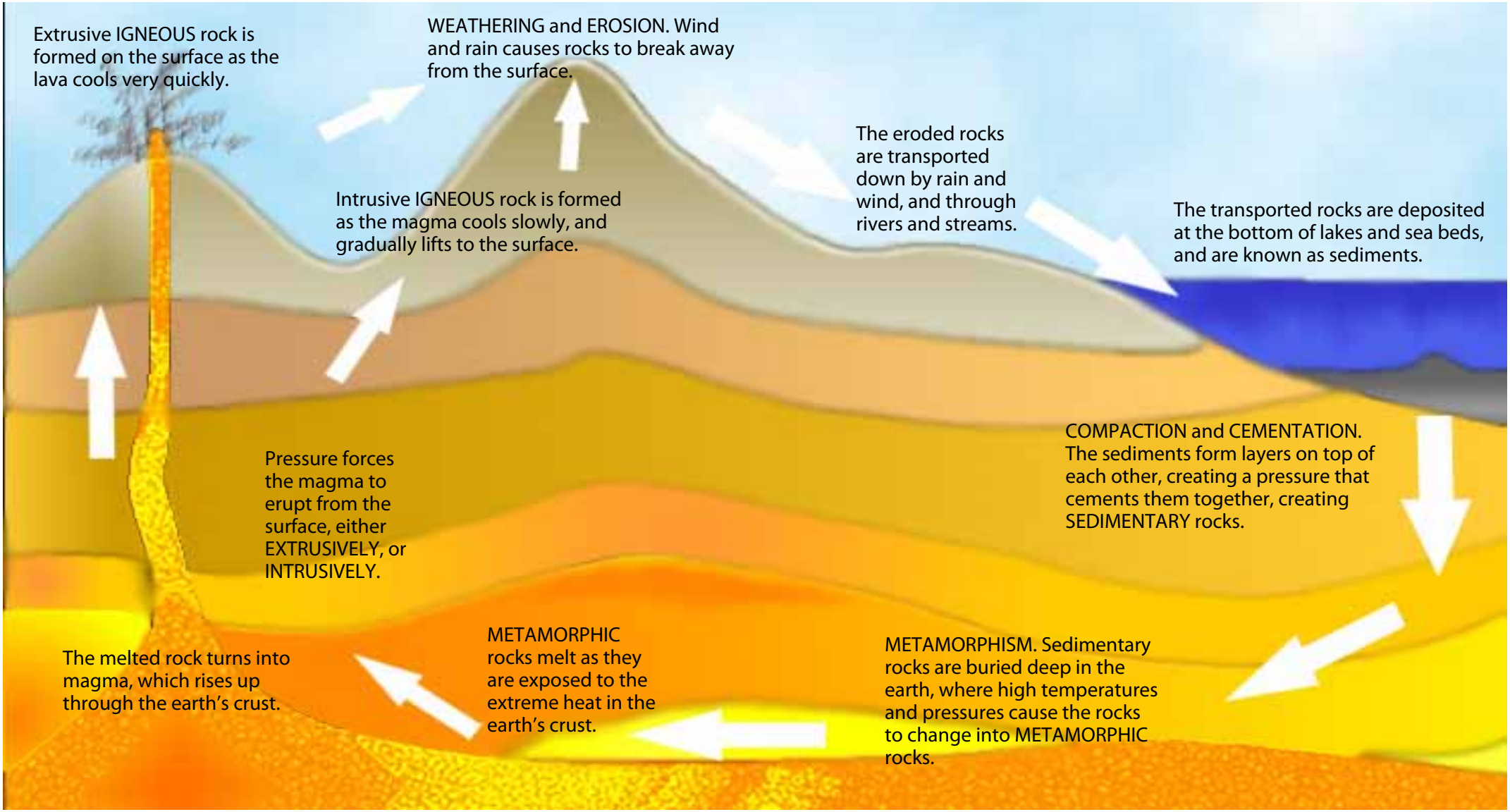
Questions

- What types of sedimentary, metamorphic and igneous rocks might be found in these areas?
- Does anyone recognise where these areas might be?
- Has anyone been to these areas and seen good examples of rock deposits?



Rock Stars KS2: Supporting Documents 03

THE ROCK CYCLE



Rock Stars KS2: Supporting Documents 03

NATURAL DYES AND PIGMENTS

We rarely think about why our clothes are available in different colours, we just accept that we can buy blue jeans, or red dresses, and that we are surrounded by a whole manner of objects possessing a multi-coloured sense of style. Due to the technological advances that allow us to mass produce synthetic dyes and pigments in a cheap, fast and durable way, we take advantage of it and neglect the hardship that once went in to producing coloured items through natural processes.

Dating back to prehistoric times, and all the way up to the 1800s, dyes and pigments could only be sourced from natural products, such as leaves, flowers, berries, stems of roots or plants, from insects and shellfish and a number of minerals.

From the prehistoric era there is evidence in the cave paintings discovered, which show that iron oxide was used for painting. This natural dye would have also been used to add colour to fabrics for clothing and could also be used on the body for decoration. Despite these findings, the first recorded instance of dyeing was during the Bronze Age in Europe (2500-800 BC).

Using natural dyes and pigments became a skill of the ancient Egyptians whose techniques were widely adopted by the Romans and Greeks.

Minerals used for dyes include:

Iron oxide - makes a reddish-brown-orange colour

Chromium and lead - red

Chromic acid and lead - yellow

Iron and cyanide - blue

Rock Stars KS2: Supporting Documents 03

FASCINATING FACTS

Rocks, minerals and the metals that are extracted from them are a part of our everyday lives in almost everything we do. We very rarely pay any attention to that fact, despite it playing such a huge role in how we work, learn and play.

Here are some facts about some of the rocks, minerals and metals that are apparent in our everyday activities, even where you might not expect them:

Lead - used to protect radiation from escaping through our television sets.

Copper - runs through all electric wires, making us able to use cars, computers, stereos, lights, telephones and other electrical appliances.

Clay - used in the products that coat magazines, books and newspapers to stop the ink from running.

Limestone - properties from limestone are used in toothpaste due to its calcium content.

Phosphate - this is used in fizzy drinks to give them that 'tingly' feeling.

Sandstone - this can be used in grit that we put on snow and ice to stop us from falling over.

Silica - sweeteners that are used in place of sugar are generally around 95% silica, ground together so finely that it will dissolves in liquids.

Pumice - when rubbed on denim, pumice creates the stonewash effect on jeans.

Obsidian - used for surgical scalpels because it remains perfectly smooth and even when cut into small pieces, compared to the typical metal scalpel, which when held under a microscope appears jagged compared to obsidian. Because of this quality, scars on patients, when having been operated on with an obsidian scalpel, heal much smaller, with less occurrences of inflammation.

Rock Stars KS2: Supporting Documents 03

CREATE YOUR OWN CRYSTAL GARDEN

RESOURCES REQUIRED:

- Laundry bluing/washing blue (available from large supermarkets or local laundrettes)
- Table salt
- Household ammonia (the kind with no soap added)
- Cardboard (non-corrugated)
- Small mixing bowl
- Water
- Measuring spoon
- Food colouring (optional)
- Liquid proof base (this will be what your garden grows in)

LENGTH OF ACTIVITY:

1 hour plus growing time.

Step 1

Using the tree templates on the following pages, or using your own, cut out two tree templates per tree you wish to crystallize using your non-corrugated cardboard.
Cutting half way down one tree template and half way up the other, slot them over each other which will allow them to stand.

OR

You can grow your crystals on sponges if you do not want to use tree shapes.

Step 2:

Add drops of food colouring to the edges of your trees to create coloured crystals.

Step 3:

Mix together 1tbsp of water, 1 tbsp of salt, 1 tbsp of bluing, and 1/2 tbsp of ammonia. (This is the amount you will need per 4 inch tree - increase the mixture for multiple or larger trees accordingly.
Place your base, in which the crystal garden will grow, in a suitable area where you can watch it grow.
Stand your trees up in the base and pour the mixture in around the base of the trees.

Step 4:

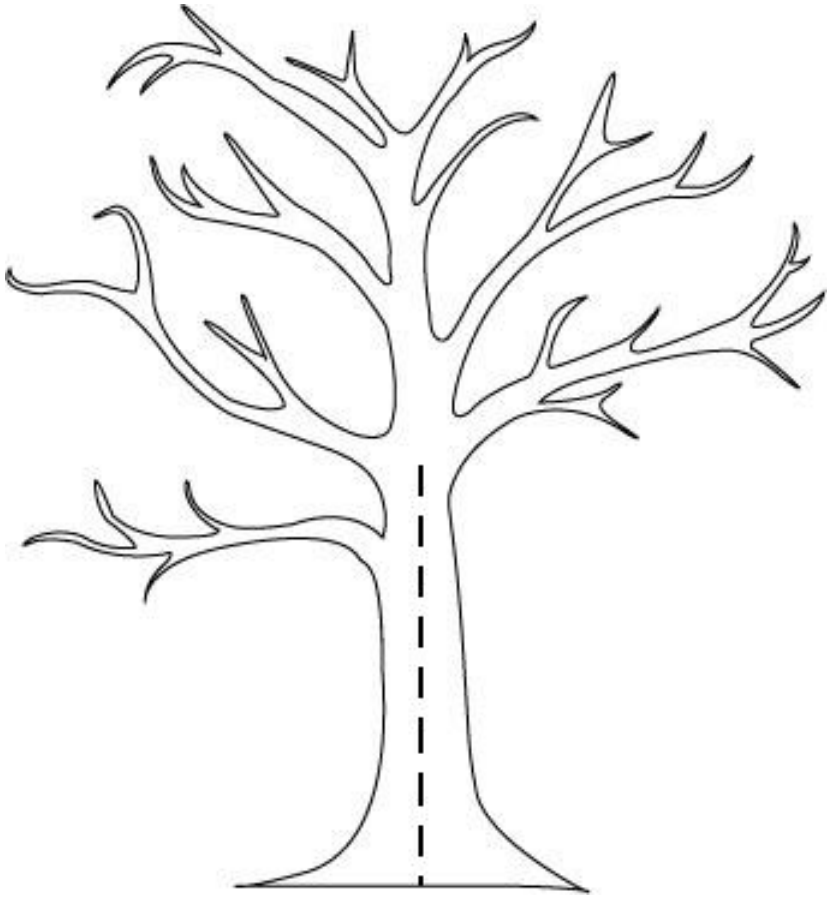
For the final step you will need a little patience. The crystals should begin to grow within an hour or two, but they will fully form around 6 hours later.
You can continue to grow your crystals further by adding more solution to the base - think of it as watering your garden!

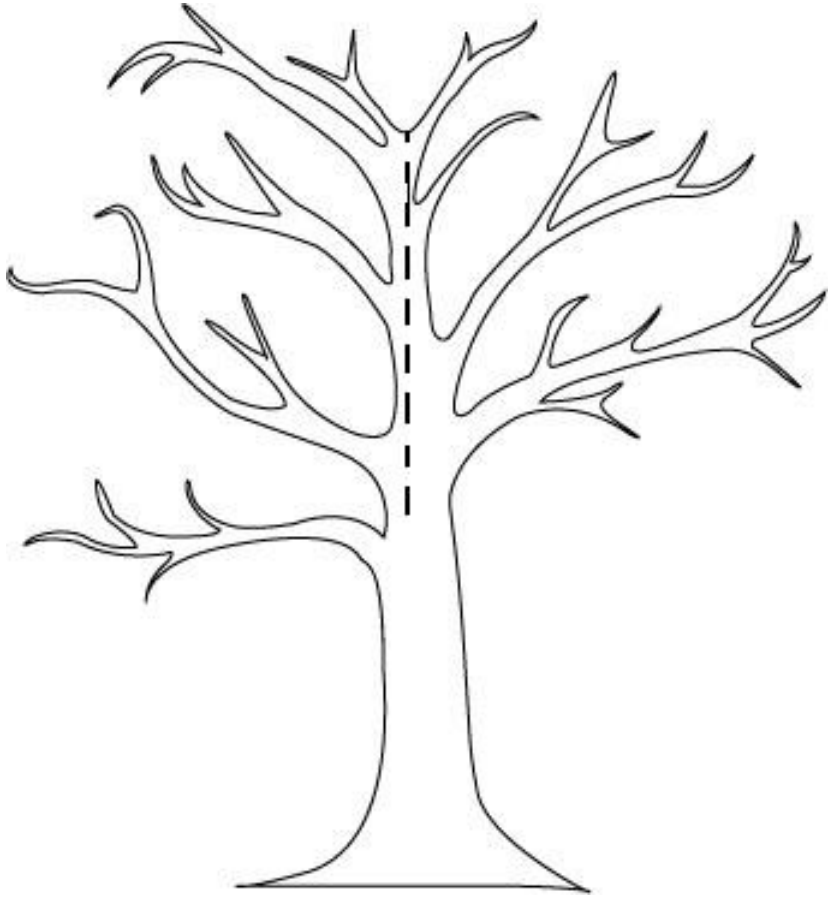
Extension:

As you wait, monitor how fast the crystals grow by measuring the sizes they grow to, recording the results hourly, daily or weekly. Record these results using charts and graphs.

Rock Stars KS2: Supporting Documents 03

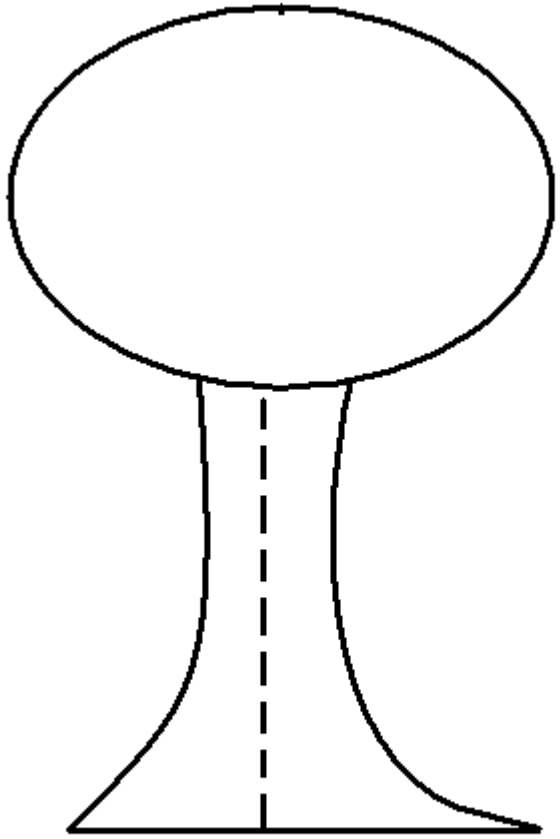
CREATE YOUR OWN CRYSTAL GARDEN
Detailed template

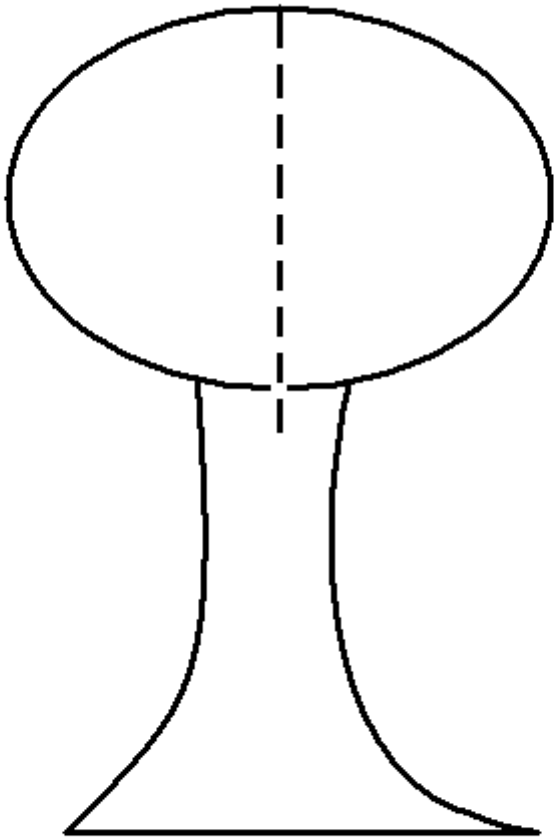




Rock Stars KS2: Supporting Documents 03

CREATE YOUR OWN CRYSTAL GARDEN
Simple template





Rock Stars KS2: Supporting Documents 03

CREATE YOUR OWN FOSSIL

RESOURCES REQUIRED:

- An object to fossilize
- A saucepan
- Oven hob
- Mixing spoon
- 1 cup of water
- 1 cup of plain flour
- 1/2 cup table salt
- 2 tbsp cream of tartar
- 2 tbsp vegetable oil
- Food colouring (optional)

LENGTH OF ACTIVITY:

1 hour 30 minutes plus drying time

Step 1

Firstly you will need to find an object to fossilize. This will work better if the object has lots of relief edges, like a leaf, coin, or shell.

Step 2:

To make the dough that will become your fossil, mix all of the dry ingredients together in a saucepan, and then form a well in the centre of the mixture. Add a small amount of water into the well and then mix together the contents of the saucepan to create a smooth, creamy consistency.
If the mixture is too runny add a little more flour to thicken it up.
If the mixture is too dry add a little bit more water to make it creamy.
You can also add food colouring at this point to make a coloured fossil.
Once the consistency is just right, add the vegetable oil and mix evenly.

Step 3:

Now the mixture is ready, turn the heat on the oven hob to a low setting. As the mixture heats up, constantly stir it until it starts to form a more solid ball of dough.
Once the mixture has formed into a ball, remove it from the oven hob, being careful to turn the hob off, and then leave the dough ball to cool on a plate or cooling rack for 30 minutes.

Step 4:

After the dough has cooled down, knead it out until it is flattened out into your chosen shape, making sure it is at least 1cm thick. (The bigger your object for fossilizing is, the thicker your dough should be).
Place your fossil object onto the dough and press down into it.

Step 5:

To create the best fossil possible, you will need to leave your mould to dry out for a couple of days. It is a good idea to start this project on a Friday afternoon, and then by Monday morning your fossil will be ready to be discovered.

When the fossil is completely dry, remove the object slowly and carefully.

Extension:

Working together with another class, hide the fossils around the school grounds (being careful to make a note of where they have been left) and then get the other class to explore for the fossils and become archaeologists for the day.

Rock Stars KS2: Glossary 04

Sedimentary Rock: Rocks which form in layers over time from segments and particles broken away from the earth's surface.

Metamorphic rock: Rocks which are formed from sedimentary rocks buried within the earth's surface, which change as heat and pressure build up around them.

Igneous rock: Created as magma and lava cool after a volcanic eruption.

Weathering: When rain, wind, snow and hail cause damage to igneous rocks.

Erosion: As rocks become damaged by weathering they begin to break away from each other in small pieces - this is known as erosion.

Sediments: Particles such as pebbles, sand, shells, and other fragments that settle in layers to form sedimentary rocks.

Compaction: The process where layers of sediment build up on top of each other.

Cementation: When compacted layers of sediments are forced together by pressure causing them to cement together.

Metamorphism: Meaning 'change of form', it describes the process of change as metamorphic rocks are created.

Magma: Created from melted metamorphic rock deep within the earth's crust due to intense heat.

Lava: When magma erupts onto the earth's surface it is known as lava.

Intrusive: This type of igneous rock forms within the earth's surface when magma cools slowly.

Extrusive: This type of igneous rock form on the earth's surface when lava cools quickly.

Crystal: They are made up of a regular pattern of atoms, and can form when water is evaporated or when magma cools and hardens.

Mineral: A naturally occurring solid structure made up of a particular pattern of atoms, containing a specific crystalline structure. Minerals are present in rocks when the correct chemical compound is present.

Fossil: The name given to objects discovered in rocks, most commonly in sedimentary rocks. The objects become trapped between the layers of sediments, where they become imprinted into the rock.

Earth's Surface: The outer layer of the Earth, 70% of which is covered by water, with the remaining 30% being covered with the 7 continental landmasses. The land that lies beneath the water and the landmasses is known as the Outer Layer of the surface, which is formed from rock-hardened lava that cooled around 4.5 billion years ago.

Earth's Crust: The layer of Earth just beneath the surface. The crust is broken up into what are known as Tectonic Plates.

Tectonic Plates: These lie within the Earth's crust and move around 1inch per year. Around 250 million years ago, the 7 continents were joined together as one huge landmass, separating slowly as the plates have moved.

Rock Stars KS2: Useful Links 05

If you are interested in finding out more detailed information about rock, minerals and metals take a look at these websites.

- Information about Rocks around Britain
  http://www.geolsoc.org.uk/gsl/education/rockcycle/page3447.html
- BBC KS2 Rocks and Soils
  http://www.bbc.co.uk/schools/ks2bitesize/science/activities/rocks_soils.shtml
- Volcanoes for Children
  http://www.weatherwizkids.com/volcano1/htm
- Science Facts for Children
  http://www.sciencekids.co.nz/sciencefacts/earth.html
- The Rock Cycle
  http://www.oum.ox.ac.uk/thezone/rocks/index.htm