



Year 3



Rocks

Statutory Requirements:

- Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
- Describe in simple terms how fossils are formed when things that have lived are trapped within rock
- Recognise that soils are made from rocks and organic matter

Working Scientifically:

- Asking relevant questions and using different types of scientific enquiries to answer them
- Setting up simple practical enquiries, comparative and fair tests
- Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables

Key Knowledge:

- Rocks are made of minerals, fragments of older rocks, or fossils.
- Fossils are formed when things that have lived are trapped within rock.
- Soils are made from rock and other organic matter.
- Igneous rocks are formed when molten rock has cooled. They contain crystals.
- Sedimentary rocks are formed when layers of sediment build up and are compressed.
- Metamorphic rocks are formed by intense pressure and heat.

Key Vocabulary:

- Rock
- Fossil
- Soil
- Organic
- Mineral
- Igneous
- Sedimentary
- Metamorphic
- Texture
- Rough
- Smooth
- Layers
- Crystals
- Sharp
- Hardness
- Permeability

Key Scientists:



Classic

**Mary Anning
(1799 – 1847)**

English fossil collector and palaeontologist.



Classic

**James Hutton
(1726 – 1797)**

Scottish chemist known as the father of modern geology.



Contemporary

Alice Roberts (1973 -)

English historian, biologist and anthropologist who studies fossils.

Preparing for the Unit:

- Research the types of rocks that can be found close to your school. The following website will help: <https://www.bgs.ac.uk/data/mapViewers/home.html> From this plan a walking route near to the school; identifying where rocks can be found in the ground and in the buildings and other structures.
- Place a map of the UK and a map of the world on display. Have small flags ready to show where different rocks, minerals, volcanoes, fault lines, etc can be found. Maybe place a desk in front of this display so that can display some rocks, and items that children bring in.
- Find information about rocks in the news. Fracking is something that has been quite controversial.
- Find out if it is possible to take your children on a trip to somewhere where they can look for their own fossils. To find out if there is somewhere near to your school use the following website: <http://www.discoveringfossils.co.uk/>
- Create an outdoor rockery made from different types of rocks. Small signposts could indicate the names of the different rocks. Over time children could study the effect of weathering on these rocks.

Notes and guidance (non-statutory):

- Linked with work in geography, pupils should explore different kinds of rocks and soils, including those in the local environment.
- Pupils might work scientifically by: observing rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time; using a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. Pupils might research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. Pupils could explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water. They can raise and answer questions about the way soils are formed.

Additional Knowledge for Teachers:

Properties

- Hardness is the most important property for classifying rocks. Hardness is the amount of resistance to scratching. Diamond is the hardest rock.
- Permeability is the movement of water through rocks and soils.

Soil - The rock the soil has developed from affects its properties.

- Clay particles feel silky when dry because they are very fine. As there are few air spaces the water cannot drain through easily. When wet, they are sticky, can be rolled into a ball, and can become waterlogged. When the clay dries out it sticks together, forming a hard layer.
- Sand particles feel gritty because they are larger with bigger air spaces so the water drains through easily. When wet they cannot be rolled into a ball.
- Chalk in soils comes from fossil shells deposited millions of years ago. The particles are very fine and do not become sticky when wet.

Additional Vocabulary:

- Names of rocks – chalk, limestone, granite, basalt, sandstone, flint, slate, shale, marble
- Types of minerals – calcite, feldspar, topaz, diamond, talc, corundum
- Processes – heat, pressure, erosion, transportation, deposition, melt, solidify
- Size of rocks – grain, pebbles
- Early areas of land – Gondwana, Pangea
- Land formations – plates, volcanoes, mountains, valleys

Objectives	Possible Activities	Assessment
<p>To be able to compare and group together different kinds of rocks on the basis of their appearance.</p>	<p>Discuss – Why do scientists study rocks? Use images and videos to look at different scientific jobs that are based on working with rocks and soils, such as palaeontologist, space geologist and geophysicist, as well as how we can use rocks; for example: limestone quarrying. http://www.bbc.co.uk/learningzone/clips/limestone-and-its-usage/2209.html</p> <p>Classify – What do the different rocks look like? Allow the children to handle a selection of rocks and look at them carefully using a hand lens. They could choose sorting criteria of their own: e.g. texture, sharpness of edges, whether or not it feels powdery, whether there are crystals in them, etc. They could visit each other's groupings and see if they can identify the criteria used.</p> <p>Identify – How can we remember the names of different rocks? As a class, find some interesting ways to remember the names of the rocks that you have. Place the pictures of the rocks on display with their names and how to remember them written underneath the picture.</p> <p>Research - Where are the rocks in the UK? Use https://www.bgs.ac.uk/data/mapViewers/home.html to introduce a geological map of the UK. Allow children time to identify where different types of rock are found in the UK.</p>	

Objectives	Possible Activities	Assessment
<p>To be able to compare and group together different kinds of rocks on the basis of their appearance.</p>	<p>Survey - Which rocks are near our school? Plan a route around an area near the school. Look for where rocks have been used in buildings and other structures. Encourage the children to think about which rocks have been formed where you found them, and which have been transported there by humans to be used in different structures.</p> <p>Record The children could record where on the walk they found rocks, what they had been used for, and why they think these particular rocks were chosen for those uses.</p> <p>Discuss – Which rock is the odd one out? Why? Odd one out – Choose three rocks and ask children to give reasons as to why one of them can be judged as the odd one out. How many reasons can they make for each of the rocks?</p> <p>Apply - Which rock would you choose to build a church? Give children a selection of images or examples of rocks and ask them to choose the most suitable with reasons.</p>	

Objectives	Possible Activities	Assessment
<p>To be able to compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</p>	<p>Discuss – How are sedimentary rocks formed? Use images to show the formation of chalk from plankton, and the following video to prompt discussion about the formation of sedimentary rock http://www.bbc.co.uk/learningzone/clips/coastlines-beach-formation/8433.html. Look at where sandstone can be found in the UK/world and add flags to a map on display.</p> <p>Model – How are sedimentary rocks formed? Fill a small shallow tray with sand or/and soil and place it on a gradient. By adding water gradually to a point at the top of the shallow tray, the children can observe how small parts of rock are eroded by the water, transported down the tray and finally deposited in the larger tray. The children could look at what has been deposited at the bottom by using a hand lens and then compare what they have found to one of the best examples of sedimentary rock we have in the UK: sandstone.</p> <p>Discuss – How are metamorphic rocks formed? These rocks are formed when other rocks experience great pressure and heat. Two examples are: shale changing to slate, and limestone into marble. Use videos such as; www.bbc.co.uk/learningzone/clips/metamorphic-rock-formation/10622.html to prompt discussion. Follow this up, by exploring how granite is made and used (www.bbc.co.uk/learningzone/clips/igneous-landscapes-aberdeen/3071.html) Look at where slate and marble can be found in the UK/world and add flags to a map on display.</p> <p>Discuss – How are igneous rocks formed? These rocks are formed when rocks melt and then solidify. This process can occur both under the ground and above it. Use videos such as www.bbc.co.uk/learningzone/clips/the-formation-of-igneous-rocks/10620.html to look at this process. Use images to relate this to some of the rock formations in the UK: basalt at the Giant’s Causeway (Northern Ireland) and Arthurs’ Seat (Edinburgh), and granite in Cornwall. Add flags for these places to a map on display.</p> <p>Model– How are igneous rocks formed? Show a nightlight under the visualiser. The children can be asked to imagine that the wax represents a rock that is experiencing a lot of heat. They should observe the wax melting and predict what will happen when the heat source is extinguished.</p>	

Objectives	Possible Activities	Assessment
<p>To be able to compare and group together different kinds of rocks on the basis of their appearance.</p>	<p>Discuss – What are the benefits of permeability in rocks? Discuss how some areas (Kent being one of them) and some rivers rely on permeable rocks for some of their water supply. Areas of land that hold water are known as aquifers. Water companies identify where the best places to have boreholes are so that they can abstract water out of the land.</p> <p>Compare – Which rock is the most permeable? The children can use pipettes to place just a few drops on each of the rocks. They can use hand lenses to look carefully at which rocks allows the water in.</p> <p>Record The children could draw their methods; i.e. how they tested the rocks and explain how the rocks compared, using their observations.</p>	

Objectives	Possible Activities	Assessment
<p>To be able to compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</p>	<p>Discuss – Why is it useful to know how hard rocks are? Show children a book of minerals. It will show how each mineral is given a number from the Mohs scale. Discuss with the children different uses of hard and soft rocks. Use images of different uses and decide whether a harder or softer rock would be better.</p> <p>Compare – How hard are different rocks? Give the children a set of rocks so they can investigate how difficult it is to scratch each of them using: their finger nail (between 2 and 3 on the Mohs scale), a 2p coin (between 3 and 4 on the Mohs scale) and a steel nail (about 6 on the Mohs scale). The children will therefore be able to give each of their rocks a rough score from the Mohs scale.</p> <p>Record Record the results in a table and suggest a use for each different rock depending on how hard it is.</p>	

Objectives	Possible Activities	Assessment
<p>To be able to describe in simple terms how fossils are formed when things that have lived are trapped within rock.</p>	<p>Discuss – What is a fossil? Show interesting images of fossils and provide children with some fossils to look at. Discuss what the children think they are based on any observations they have. Talk about Mary Anning and how she found many similar specimens around the UK – in fact the children could possibly find fossils like this themselves.</p> <p>Research– How are fossils formed? Challenge the children to find out how fossils are formed. They could use the following sites: www.discoveringfossils.co.uk/whatisafossil.htm and www.bbc.co.uk/nature/fossils#p00djfkn www.bbc.co.uk/nature/life/Ammonite</p> <p>Record Draw a flow diagram to show the stages of fossil formation.</p>	

Objectives	Possible Activities	Assessment
<p>To be able to recognise that soils are made from rocks and organic matter.</p>	<p>Identify– What are soils made from? Allow children to handle some soil samples and study them with hand lenses. Challenge them to think about what it is made from and how it was made. Show videos such as www.bbc.co.uk/learningzone/clips/what-is-soil/2215.html and http://www.soil-net.com/primary/ to help.</p> <p>Classify – What type of soil do you have? First, moisten the soils with a little bit of water and then test if they are sticky. Then see if you can roll them into balls. If it was sticky and could roll into a ball, then see if it can break easily.</p> <ul style="list-style-type: none"> o Loamy = It is not sticky but it can roll into a ball o Sandy = It is not sticky and cannot roll into a ball o Silty = It is sticky, it can roll into a ball and it can break easily o Clayey = It is sticky, can roll into a ball and won't break easily <p>Record The children could draw a yes/no classification key. They can write the names of the soils in the appropriate places.</p> <p>Observe– What are the properties of the different parts of soil? Explore separating the contents of soil. Shake soil samples in a jar of water and allow the different sized pieces of rock to settle. The larger fragments of rock material will settle quickly whilst finer particles will remain in suspension for some time. The different sized rock particles will form well-defined layers. Much of the organic matter will float.</p> <p>Record Draw their results and label the different parts.</p>	

Objectives	Possible Activities	Assessment
<p>To be able to recognise that soils are made from rocks and organic matter.</p>	<p>Discuss – Why is it useful for soils to hold water? Think about scenarios where plants are grown – gardening, farming etc. What do the plants need to survive? Do soils need to hold lots of water? What would happen if they absorbed too much water?</p> <p>Compare - How much water do different soils absorb? Cut the top third of the 2l plastic bottle and turn upside down into the remainder of the bottle. Place some filter paper in the neck of the bottle. Pour in one of the soil samples. Add water to the sample and measure how much goes through into the base.</p> <p>Record Draw a diagram of how the investigation was conducted and complete a table of results.</p>	

KNOWLEDGE ASSESSMENT	ROCKS (YEAR 3)		
Target	Below	Above	Notes
<p>Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</p>			
<p>Describe in simple terms how fossils are formed when things that have lived are trapped within rock</p>			
<p>Recognise that soils are made from rocks and organic matter</p>			

SKILLS ASSESSMENT	ROCKS (YEAR 3)		
Target	Below	Above	Notes
Asking relevant questions and using different types of scientific enquiries to answer them			
Setting up simple practical enquiries, comparative and fair tests			
Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers			
Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions			
Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables			