

<b>Subject: Science</b>		<b>Year Group: 3</b>			<b>Unit: Rocks</b>	
<b>First- hand experience:</b>						
<b>Observations of rocks, crystals and other minerals; digging around school; “Getting hands dirty!”</b>						
<b>NC Objectives to be addressed:</b>				<b>Prior Learning required:</b>		
<p style="text-align: center;"><b>Rocks</b></p> <ul style="list-style-type: none"> <li>• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.</li> <li>• Describe in simple terms how fossils are formed when things that have lived are trapped within rock.</li> <li>• Recognise that soils are made from rocks and organic matter.</li> </ul>				<ul style="list-style-type: none"> <li>• Distinguish between an object and the material from which it is made. (Y1 - Everyday materials)</li> <li>• Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials)</li> <li>• Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials)</li> <li>• Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)</li> <li>• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)</li> </ul>		
<b>Biology</b>		<b>Chemistry</b>		<b>Physics</b>		
<b>Working scientifically</b>						
<b>Comparative and fair testing</b>		<b>Pattern seeking</b>	<b>Observing over time</b>	<b>Secondary sources</b>	<b>Classifying and grouping</b>	
				<b>Where next?</b>		
				<b>Y5 Victorians – properties of materials</b>		
<b>Key Vocabulary:</b>						
<b>Rock</b>	any natural material, hard or soft (e.g. clay), having a distinctive mineral composition			<b>texture</b>	the feel of a surface or substance	
<b>stone</b>	non-metallic mineral matter of which rock is made			<b>absorb</b>	take in or soak up a liquid	
<b>pebble</b>	a small stone made smooth and round by the action of water or sand			<b>soil</b>	the upper layer of earth in which plants grow	
<b>boulder</b>	a large rock			<b>fossil</b>	the remains or impression of a prehistoric plant or animal embedded in rock and preserved in form.	
<b>grain</b>	a small hard particle of a substance such as salt or sand			<b>marble</b>	a hard crystal metamorphic form of limestone, typically white	
				<b>chalk</b>	a white, soft, earthy limestone	
<b>crystal</b>	a clear hard mineral that is either colourless or very light in colour			<b>granite</b>	a very hard, grainy igneous rock	
<b>layers</b>	sheets of material that have been built up over time			<b>sandstone</b>	sedimentary rock consisting of sand or quartz grains cemented together	

<b>hard</b>	solid, firm, and rigid	<b>slate</b>	a fine-grained grey, green, or bluish-purple metamorphic rock
<b>soft</b>	easy to mould, cut, compress, or fold; not hard or firm to the touch	<b>peat</b>	a brown deposit resembling soil, formed by the partial decomposition of vegetable matter

### Sequence of learning:

#### Lesson 1

Some rocks (e.g. marble and granite) are very hard and need special tools to cut them. Other rocks (e.g. clay and chalk) are easily moulded or cut

Rocks that allow water to soak into them are called permeable rocks. Those that don't are called impermeable rocks

Durable rocks are more resistant to being eroded by rain or wind. These rocks are usually hard and impermeable

Density is how tightly packed the rock molecules are. Dense rocks are usually heavy and will sink quickly in water. Less dense rocks will usually be lighter and will sink slowly or even float in water

A hypothesis guides an investigation; it is what you are looking to prove or disprove.

If bubbles are created, when rocks are placed in water, the water is able to 'pass through' and is permeable, if no bubbles, it doesn't and is therefore impermeable.

Children will know how to record data in a data table

Rock	Observations	Hypothesis – permeable or impermeable	Was my hypothesis correct? ✓ or x

#### Lesson 2

A hard material cannot be easily broken, bent or cut (y1 rev)

You can **test** how **hard** a rock is by **scratching** it with a **metal nail** (scratch test)

Control variables are the variables in a fair test that remain the same

Children will know the features of a science write up plan including:

That scientific diagrams have to be done in pencil, and labelled.

That instructions for carrying out the practical need to be extremely detailed

That any scientific plan needs a discussion of the risks involved in the experiment, and they will have discussed how to take account of these risks.

#### Lesson 3

Slate – roof tiles are made from slate which is easy to split into layers, is hard, durable and impermeable

Chalk – is soft and crumbles easily (not durable) so is perfect for writing on blackboards

Granite – is dense, hard, durable and impermeable so is perfect for construction

Children will know how to record data in a data table

Rock	Group hypothesis – will it break?	Did it break?

Children will know that an evaluation is where you decide how fair a test is, and how to make improvements.

#### **Lesson 4**

Beneath the surface of the Earth is a layer of rock, and beneath that is a layer of super-hot liquid rock called magma

Igneous rock (granite, basalt) is formed when magma, or lava from volcanoes, cools down. Most igneous rock is very hard

Sedimentary rock (chalk, sandstone) is formed over millions of years when tiny rocks and animal skeletons are pressed together (some contain fossils)

Metamorphic rock (slate, marble) is formed when other rocks are changed due to pressure or extreme heat (not enough to melt the rock)

#### **Lesson 5**

Fossils tell us what the animal looked like, what they ate and when they lived

Fossils (mould fossils) are usually formed when an animal dies and is covered by a layer of rock. The soft parts rot away leaving only the skeleton. Over thousands of years the skeleton leaves a permanent imprint in the rock which may then be discovered millions of years later!

Cast fossils are made when, for insects get trapped in tree sap and the amber hardens

Trace fossils are made when footprints harden and are then covered in different rocks

#### **Lesson 6**

Soil is a mixture of rock particles, dead plants and animals, air and water. It provides a habitat for a variety of mini-beasts.

#### **Lesson 7 – Assessment**

Knowledge organiser - <https://drive.google.com/file/d/1Ok8ohZVYQVjRnZ7Y9DalzzjhBkEAMUV/view>

Assessment - [https://drive.google.com/file/d/1xEHcsLXRyEuht7vAGUg\\_ZhCN8IM-Qid0/view](https://drive.google.com/file/d/1xEHcsLXRyEuht7vAGUg_ZhCN8IM-Qid0/view)

### **Resources and teacher subject knowledge:**

Rock is a naturally occurring material. There are different types of rock e.g. sandstone, limestone, slate etc. which have different properties. Rocks can be hard or soft. They have different sizes of grain or crystal. They may absorb water. Rocks can be different shapes and sizes (stones, pebbles, boulders). Soils are made up of pieces of ground down rock which may be mixed with plant and animal material (organic matter). The type of rock, size of rock pieces and the amount of organic matter affect the property of the soil.

Some rocks contain fossils. Fossils were formed millions of years ago. When plants and animals died, they fell to the seabed. They became covered and squashed by other material. Over time the dissolving animal and plant matter is replaced by minerals from the water.

### **Possible misconceptions**

- rocks are all hard in nature
- rock-like, man-made substances such as concrete or brick are rocks
- materials which have been polished or shaped for use, such as a granite worktop, are not rocks as they are no longer 'natural'
- certain found artefacts, like old bits of pottery or coins, are fossils
- a fossil is an actual piece of the extinct animal or plant
- soil and compost are the same thing

- Discuss and look at the different types of fossils – mold fossils, cast fossils, trace fossils, true form fossils.
- Use a range of resources to understand how the different fossils are created.
- Allow time, before performing scripts and recording on ipad etc.
- Other children watch, and ask questions at the end, about any information the group has missed.

### **Possible lesson ideas**

#### **Lesson 1 – Create a detailed hypothesis**

- Understand what a hypothesis is, and look at examples.
- Explain that the hypothesis guides an investigation; it is what you are looking to prove or disprove.
- Look at a range of rocks to determine some of their properties, in particular if they allow water through them (permeable), or if they do not (impermeable).
- Make a hypothesis based on the observations, using sentence stems to support LA if necessary
- Carry out a fair test to investigate if water travels through rocks

- Place rocks in water, if bubbles are created, the water is able to 'pass through' and is permeable, if no bubbles, it doesn't and is therefore impermeable.
- Reflect on hypotheses, and complete table.

Rock	Observations	Hypothesis – permeable or impermeable	Was my hypothesis correct? ✓ or x

### Lesson 2 – Devise a fair test to investigate rock hardness

- introduce the principles of a fair test and the word variables. Discuss meanings of independent variable, controlled variable, and the dependent variable.
- Independent variable – the factor in a fair test the is changed – in this case the rocks.
- Controlled variable – the factors in a fair test that remain the same
- Dependent variable – the factor that is being tested in the fair test – in this case rock hardness.
- Allow children time to discuss potential investigations in small MA groups and draw out what they could do, how they are going to test hardness, and still control the other variables.
- Groups pitch their ideas to the rest of the class and ask questions to challenge whether it is a fair test or not.
- Lean children towards test where they drop rocks from a height (controlled) to a hard surface, and see whether they break or not.
- Create a shared **plan** for the investigation, focussing on identifying the variables involved.

### Lesson 3 –Carry out an investigation.

- Carry out the plan about.
- Make observations and feel the rocks they are
- Within groups children make a joint hypothesis and record.
- Carry out the fair test and record findings in table

Rock	Group hypothesis – will it break?	Did it break?

- Reflect on learning – was it a fair test? Why? Did anything compromise the fair test? Could be completed as a self-assessment. Use sentence stems to support.

#### **Lesson 4 – Classify rocks based on their properties**

- Learn about a range of different rocks (in vocabulary section above) and their properties.
- Learn about the different types of rock – metamorphic, igneous and sedimentary
- Gather some rocks from the local area, and have supply from school.
- Introduce children to Venn or Carroll diagrams and explain how they can be used to classify anything – in science and maths in particular.
- Observe a selection of rocks.
- As a class, sort rocks into Venn or Carroll diagrams based on particular properties, e.g those in vocab box above.
- Children then complete sorting activity, using sorting hoops/circles, to create a Venn or Carroll diagram based on properties of their choosing.
- Share classifications with the rest of the class, and see if peers agree with the sorting.

#### **Lesson 5 – Understand how fossils are formed**

- Discuss what fossils are
- Discuss and look at the different types of fossils – mold fossils, cast fossils, trace fossils, true form fossils.
- Use a range of resources to understand how the different fossils are created.
- Children to make notes on each, to enable them to do task below.
- In small MA groups, children to create a play script explaining – like in a documentary – how fossils are made.
- Allow time, before performing scripts and recording on ipad etc.
- Other children watch, and ask questions at the end, about any information the group has missed.

#### **Lesson 6 – Investigate what soil is made from.**

- Explain what soil is, without going into great detail about what it is made up of.
- Get outside into a school field, veg garden, wild area etc, and dig.
- Make observations on what children can see in the soil in situ, using magnifying glasses, recording what they can see.
- Take a range of samples from different areas, back to the classroom. First sieve the samples, over the tables and see what happened when the soil is separated. Following that, run the samples under water to see what appears. Take pictures and make detailed notes of what was in the soil.

#### **Lesson 7 – Assessment**

Assessment - [https://drive.google.com/file/d/1xEHcsLXRyEuht7vAGUg\\_ZhCN8IM-Qid0/view](https://drive.google.com/file/d/1xEHcsLXRyEuht7vAGUg_ZhCN8IM-Qid0/view)