ROCKS AND SOILS

Key concepts

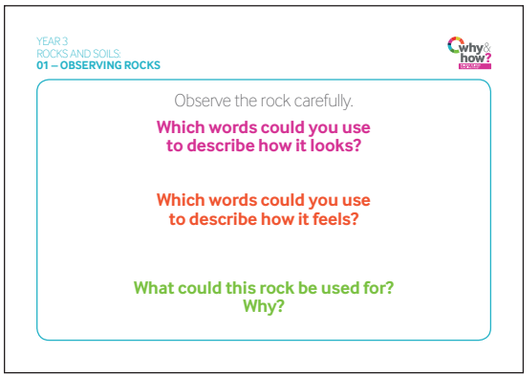
- Rocks can be grouped together on the basis of their appearance and simple physical properties.
- Fossils are formed when things that have lived are trapped within rock.
- Soils are made from rocks and organic matter.

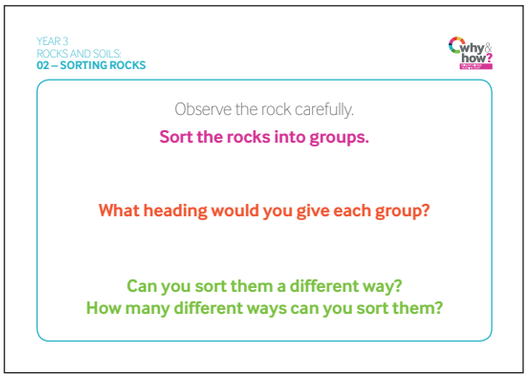
Key vocabulary:

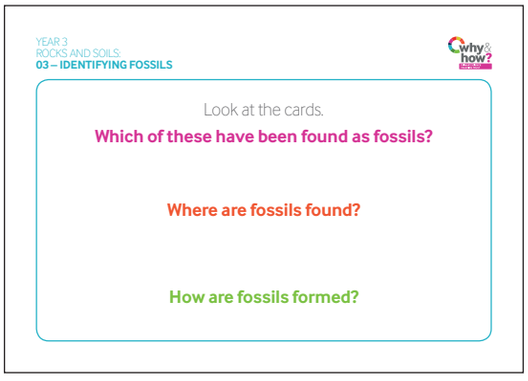
Rock	Fossil	Marble
Sedimentary	Grain	Chalk
Igneous	Crystal	Granite
Metamorphic	Hard	Sandstone
Smooth	Soft	Slate
Rough	Texture	Sand
Light	Permeable	Clay
Soil	Impermeable	Peat

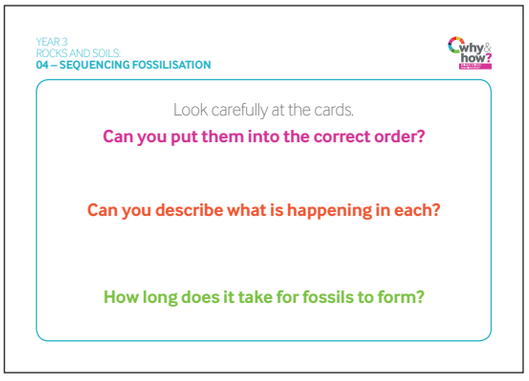
Activity	Resources required	Background knowledge	What to look out for
01	**Two or three samples of the same rock, hand lenses.**	Rocks are naturally occurring objects containing more than one mineral. Different rocks have different physical properties depending on their composition and how they were formed.	Are children using words such as 'hard/soft', 'grains', 'crystals', 'light/heavy', 'layers', 'sandy', 'opaque', 'translucent', 'smooth/rough'?
02	**A selection of different rocks, hand lenses.**	Rocks can be classified by comparing their appearance: • layers (foliation) • colour • grain size and their properties: • reflection of light (lustre) • hardness • permeable/impermeable.	As above.
03	**Resource sheet ROCKS AND SOILS 3 or real examples of each item shown.**	A fossil is the preserved remains or traces of a dead plant or animal. The process by which a fossil is formed is called 'fossilisation'. Things like footprints, eggs and even poo can be fossilised too (it is then called coprolite). Manmade items cannot be fossilised.	Children can confuse historical artefacts and fossils. They can also be unaware that fossils of plants, insects, birds and other living things have been found – not just fossils of dinosaurs.
04	**Resource sheet ROCKS AND SOILS 4**	After an animal or plant dies, the soft parts decompose leaving the hard parts behind, e.g. an animal's skeleton. This becomes buried by small particles of rock called sediment. As layers of sediment build up on top, the sediment around the skeleton begins to compact and turn to rock. The hard parts are gradually dissolved by water seeping through the rock. Minerals in the water replace the hard parts, leaving a rock replica of the original, called a fossil.	Can children sequence the cards correctly? Can they describe the process?
05	**Soil sample, not dried. Hand lenses. *Wash hands thoroughly after this activity.**	Soil is a mixture of tiny particles of rock, dead plants and animals (humus), air and water. Different soils have different properties depending on their composition. Sandy soil is pale, that little humus and large particles which create lots of small air gaps. Water drains through them easily. Clay soil is full of humus, with small particles. It contains very few air gaps, so water does not drain through it easily. Chalky soil is light brown and often stony and free draining. Peat does not contain any rock particles. It's made from very old decayed plants and is dark, crumbly and rich in nutrients.	Do children know that soil is made of different materials? What words are they using to describe the soil?
06	**Two different soil samples, not dried. Hand lenses. (Check garden centres if samples cannot be sourced locally.) *Wash hands thoroughly after this activity.**		

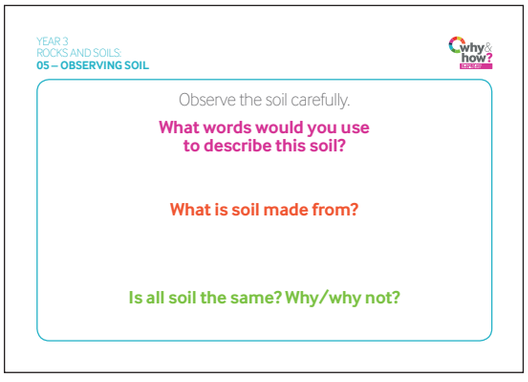
LESSON ACTIVITY CARDS:

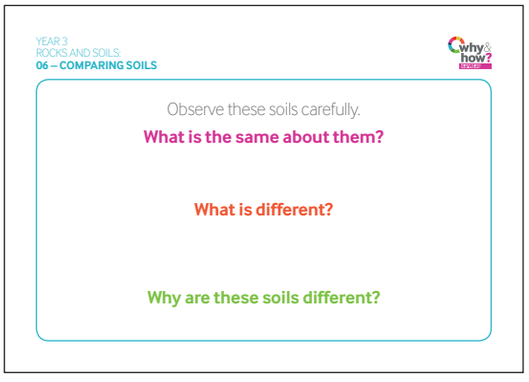












CHALLENGING MISCONCEPTIONS:

1) The word 'hard' is used differently in everyday language and children can be shown that there are degrees of hardness using the Mohs hardness scale. Rocks such as chalk and soapstone are considered soft rocks.

- If a rock can be scratched by a fingernail, it has a hardness of <2.5 Mohs. If a rock cannot be scratched by a fingernail but can be scratched by a copper penny (1982 or earlier), it has a hardness of >2.5 Mohs but < 3 Mohs. If a rock cannot be scratched by a fingernail or a copper penny but can be scratched by a steel nail, it has a hardness of between 3 and 5.5 Mohs. If a rock cannot be scratched by a steel nail, it is harder than 5.5 Mohs.

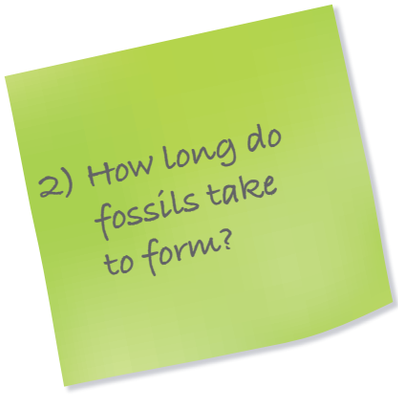
2) Fossils are traces of living things... animals, plants, footprints, poo and eggs. Historical manmade objects excavated from the ground are called artefacts.

- Hold a spoof quiz – 'artefact or fossil ' – to embed this difference and reinforce the language, showing a range of pictures such as those in the assessment task. Children to hold up Historical Artefact OR Fossil depending on picture shown. Discuss answers.

3) Soil is a mixture of rock particles, humus, water and air. Compost is a mix of humus, water and air.

- Soil surveys are great for illustrating differences in soils, which may seem quite similar to children. Tests include observations on colour and texture plus tests on drainability, pH, water content and presence of calcium carbonate.
- Use a digital microscope to observe particles in the soil.
- Dissolve soils in water and observe the different sediments formed.

QUESTIONS CHILDREN MAY ASK:



1) There are three main rock types – sedimentary, igneous and metamorphic. Each of these are formed in different ways as part of the rock cycle.

- Represent the rock cycle using Starburst sweet.

Sedimentary rocks are formed when particles of rock that have been eroded from larger rocks are carried in streams and rivers to lakes and seas and sink to the bottom as sediment. As more and more layers of sediment piles on top, the weight of the sediment and water compresses the particles to form sedimentary rocks. Weather or erode particles of rock by snipping small pieces from the Starburst. Once the sweets have been weathered/eroded and piled up, press the particles with your hand against a table to form sedimentary rock.

Metamorphic rocks are formed when the movement of the Earth's crust drags rocks beneath and they are exposed to extreme heat and pressure. Create extreme pressure and heat by squeezing your sedimentary rock between both hands until it warms and the particles fuse together.

Igneous rocks are formed in volcanoes. The rock melts due to extreme heat to form magma. Igneous rocks can cool underground, or be formed when lava cools after a volcanic eruption. Use a microwave oven to melt the metamorphic rock and then leave to cool. (Adults only)

The Starburst rocks share many similar features with the rocks they represent.

2) There is no precise time frame for fossilisation and it depends on the size of the remains and the prevailing conditions. Fossils are defined as the remains or traces of organisms that died more than 10,000 years ago. Therefore, by definition the minimum time it takes to make a fossil is 10,000 years.

3) See strategies for misconception 3 on page 35.

03 – IDENTIFYING FOSSILS

YEAR 3
ROCKS AND SOILS:
03 – IDENTIFYING FOSSILS

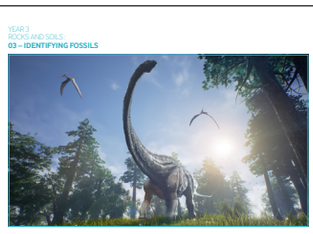
Look at the cards.

Which of these have been found as fossils?

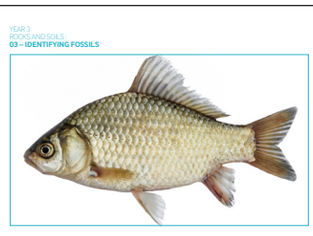
Where are fossils found?

How are fossils formed?







04 – SEQUENCING FOSSILISATION