

YEAR 3 Unit 1: Earth Rocks (Rocks)

Enquiry Question: How have rocks changed over time?

Related units: Year 2 unit 2: Material Monster: how to identify everyday materials.
Year 4 unit 3: States of matter: What happens to materials if they are heated or cooled?

Unit overview

National Curriculum Link Year 3: Rocks

Pupils will compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. They will describe in simple terms how fossils are formed when things that have lived are trapped within rock and they will recognise that soils are made from rocks and organic matter.

This builds on what children already know: how to identify everyday materials including rock (Year 1); and how to identify and compare everyday materials including rock (Year 2). Children also know how to identify everyday materials including rock and perhaps soil/compost (Year 1); how to identify and compare everyday materials including rock (Year 2); and how to identify different habitats and growing plants (Year 2).

Scientific vocabulary

- Mineral
- Crystal
- Extinct
- Paleontologists
- Humus
- Sediment
- Magma
- Ore
- Metamorphic
- Sedimentary
- Igneous
- Permeable
- Impermeable

Working Scientifically

- Observing rocks, including those used in buildings and gravestones, and explore 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.
- Researching and discussing the different kinds of living things whose fossils are found in sedimentary rock and exploring how fossils are formed.
- Exploring different soils and identifying similarities and differences between them.
- Investigating what happens when rocks are rubbed together or what changes occur when they are in water.
- Raising and answering questions about the way soils are formed.

Assessment (Expectations)

1. Explain what soil is and why it isn't all the same
2. Describe how some fossils are formed
3. Describe 2 ways in which rocks are made
4. Name 4 properties of rocks

Cross-curricular links

English: Plan and write up an investigation

Maths: Gather, record and present data in different ways

History: Links to Stone Age topic

Teacher knowledge

Rock is a natural material that is found in the Earth's crust. The Earth is at least 4,800 million years old and the oldest rock is about 4,000 million years old. The age of a rock can be judged by radioactive decay and nearby fossil types. Younger rocks are usually on top of older ones. Some rocks can be glassy, some have crystals and some are aggregates. Rock is made from one or more minerals. Different rocks can be identified by their properties, e.g. their colour, texture, hardness and permeability. Rocks come in different sizes and there are lots of everyday words used for them, e.g. boulder, stones, pebbles, gravel and sand. A mixture of small bits of rock and dead organisms (humus) makes soil. The characteristics of the soil depend on the rock it is formed from. Did you know that we eat rock too? Minerals from rocks are found in breakfast cereals (iron and zinc), bread (limestone), ice creams and cheese (gypsum). Salt is dissolved from rocks and even water contains minerals from rocks.

There are three main types of rocks: igneous, sedimentary and metamorphic. Igneous rock is very hard, dark and heavy. It often contains crystals or holes but no fossils. It is formed from molten rock (magma or lava), which can cool above (extrusive) or below the ground (intrusive), e.g. basalt, granite, pumice. Sedimentary rock is formed as a result of weathering (the action of water, wind or ice) and erosion (moving the small weathered particles of rock away, perhaps in a river). The small particles or pieces of bone/shell settle as sediment, which is compressed into layers in rivers, seas and deserts. They may contain fossils, have grains 'cemented together', and are usually light in weight and colour, e.g. shale, limestone. Metamorphic rock is sedimentary rock changed by heat or pressure – a bit like cooking a cake! It often makes a high pitched 'clink' when tapped, and has light and dark bands as well as large interlocking grains. Any fossils are destroyed or distorted e.g. slate, marble. The rock cycle is complex. It shows that rocks change over time into other rocks as they recycle. Soil is formed by weathering, which breaks the rocks into small particles of rock/mineral that are then mixed with dead plants and animals (humus). Sandy soils drain well but leach minerals; clay soils will waterlog but hold onto minerals.

Fossils are the preserved remains of ancient corals, animals and plants. They are usually found in sedimentary rocks. This is because the heat that creates igneous and metamorphic rocks would destroy them. Animal and plant remains turn into fossils if their remains are buried quickly by mud or sand, which protects them from the weather and prevents oxygen from decaying them. Sediment then builds up on top of the remains. For example: A dead animal falls to the bottom of a sea, river or lake. The soft parts of the animal – the skin and muscles – rot away, leaving the harder bones and teeth, which are buried, as sand and mud is washed over them. Over time, the hard parts are buried deeper by the sediment. The weight of the layers of sediment causes it to compact and turn to hard rock. Millions of years later, the rock is brought to the surface by natural rock moving processes. It is then weathered by wind and rain and the fossil is exposed. Most fossils form under water because more than 70% of the Earth's surface is covered in water. Fossils on land usually form in dry deserts and caves. Some fossils are frozen, e.g. mammoths and Ötzi the ice man. And some fossils are mummified (dried out) in arid conditions e.g. Sternberg dinosaur mummy. One modern paleontologist is Jack Horner who found out that some dinosaurs cared for their young.

Did you know?

- There are 1,400 earthquakes in the world every day.
- 4% of your body is made from minerals.
- The oldest fossils (microscopic life forms) are 3,700 million years old.
- The biggest dinosaur fossil is Sauroposeidon – it's about 18m tall and as heavy as nine elephants.

Common misconceptions:

- Children might think that all rocks are large, heavy and jagged. In fact, stones and gravel are actually smaller pieces of rock.
- Children might think that rocks are made of one substance. In fact, some rocks contain crystals and are made of more than one mineral.
- Children might think that humans can make rocks. In fact, rocks are naturally occurring.
- Children might think that rocks form when pebbles stick together; In fact, they can be formed on land, e.g. desert sandstone.
- Children might think that dinosaurs, humans and cavemen all lived at the same time. In fact, humans appeared 59 million years after dinosaurs.
- Children might think that humans were responsible for killing of dinosaurs. This isn't true – see above!
- Children might think that fossils are only formed in sedimentary rock. Most are, but some are formed in amber, frozen or mummified.

Resources

<http://www.ve34.lgfl.net/>

<https://www.j2e.com/blank.html>

<https://prehistoric.lgfl.org.uk/>

www.sciencekids.co.nz/gamesactivities/rockssoils.html

www.bbc.co.uk/schools/scienceclips/ages/7_8/rocks_soils.shtml

www.funkidslive.com/features/geology-rocks/

