Rocks (Chemistry/Earth Science)

Year 3

End Points:

- Rocks have different names and can be sorted into groups according to their properties
- There are three main groups of rock called sedimentary, igneous and metamorphic
- Sedimentary rocks are formed by layers of sediment under the sea
- Metamorphic rocks are formed under immense heat and pressure
- Igneous rocks are formed by volcanoes
- Rocks can have small air spaces in them allowing water to pass through them
- If a rock allows water to pass through, it is called permeable rock
- If a rock doesn't allow water to pass through, it is called impermeable rock
- Fossils are formed when rock forms around things that once lived
- Fossils are rare and take thousands of years to form
- Scientists who study fossils are called paleontologists
- Soil is made from rocks and organic matter
- Organic matter is made from the decaying remains of living things

This unit introduces key knowledge of rocks including their appearance and simple physical properties. It introduces key substantive knowledge, particularly recognising different types of rock. The unit also introduces disciplinary geology knowledge and how geologists work to find out more about rocks on earth and beyond. Pupils will learn that a geologist is a scientist who studies rocks and will be introduced to some of the things that geologists might study, such as properties of rocks, composition of rocks, and what rocks can tell us about life on earth long ago. When learning about how sedimentary rock forms, children will learn that fossils form when things that have lived are trapped within rock and how this process allows us to learn about plants and animals from thousands and millions of years ago. Within this unit there is an opportunity to study soil closely and to recognise that soils are made from rocks and organic matter (decaying things that have lived).

In the first lesson of this unit, pupils are introduced to rocks, linking their knowledge from History of the Stone Age and how rocks were used as tools by early humans. Pupils will learn that rocks can be very different and are asked to look closely at some rock samples, noticing the different properties rocks have. They will be introduced to the idea that rocks contain different 'ingredients', different combinations of minerals.

Pupils can use a microscope, or a magnifying glass to look at the rocks, discussing what they see. The unit then progresses on to studying the three groups that geologists sort rocks into; sedimentary, igneous and metamorphic. Studying the ways in which rocks can form helps pupils to recognise the difference between rocks, the properties they have and to further understand the landscapes on earth.

One of the properties pupils will study closely is permeability. They will recognise that understanding the permeability of a particular rock is useful for geologists to make decisions about what that rock should be used for. This thinking draws on understanding from Year 1 and 2 Materials, where pupils considered the properties of materials and their purpose. For example, slate is a fine grained, metamorphic rock that does not allow water to pass through it, so it is often used for roof tiles.

Building on their knowledge of sedimentary rock, pupils will learn that due to the process of its formation, fossils are most often found in sedimentary rock layers. Pupils will learn that palaeontologists are scientists who study fossils. They will be introduced to the process of fossilisation and will understand that fossils are a record of things that lived on earth many thousands or millions of years ago. They will look closely, where possible, at fossil samples, or images of fossils including those of plants.

Finally, pupils will build on their understanding of different rock types and will look closely at the composition of different soils. Ideally with real samples, children will use microscopes and magnifying glasses to look at soil and find out what it is made from. They will learn that scientists use the term ‘organic matter’ to mean a substance made up of decaying plants, animals and insects. Noticing any small rocks within the soil sample, the pupils will be able to describe the samples and compare them, recognising that like rocks, soils can be different.

Pupils will complete an essay (extended piece of writing) to answer this question: what can rocks tell a geologist about our planet? This will give pupils an opportunity to reflect on each lesson of this unit and create a piece of coherent scientific writing that may include labelled diagrams.

Lesson Sequencing:

In lesson one, pupils will learn that there are different types of rocks and that rocks can be sorted into groups by their properties. Lesson two will develop this understanding by looking at the three main types of rocks and how they are formed. In lesson three, pupils will learn about permeability and test whether rocks are permeable or not. Using what they have learnt so far, pupils will learn in lesson four that fossils are formed when rock forms around things that once lived. In lesson five, pupils will look at soil and what it consists of. In the assessment lesson, pupils will use what they have learnt to write about what a geologist can learn from studying rocks.

Misconceptions:

- Man-made substances such as concrete and brick are rocks
- All rocks are hard
- Rocks have to be big as smaller ones are stones or pebbles
- Minerals are precious, shiny stones

- Rocks are always dull colours
- All rocks are heavy and are solid with no holes
- A fossil is an actual piece of the animal or plant
- Artefacts like pottery or coins are fossils.
- Soil and compost are the same thing

Working Scientifically criteria met in this unit:

- 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
- Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- Identifying differences, similarities or changes related to simple scientific ideas and processes
- Using straightforward scientific evidence to answer questions or to support their findings.