Subject Knowledge Organiser

Science – Rocks

Year 4

What I have already learnt

Properties of Materials (Year 3): You have learned to identify different materials (wood, metal, plastic) and their properties like hardness, transparency, and flexibility.

Rocks (Year 3): You learned that there are three types of rocks (igneous, sedimentary, and metamorphic), how fossils are formed, and that soils are made from tiny rock particles and organic matter.

What I will have learnt by the end of this unit

I will be able to describe the differences between igneous, sedimentary, and metamorphic rocks.
I will understand how rocks are formed and how they change over time through the rock cycle.
I will know how fossils are formed and what they tell us about the history of life on Earth.
I will recognize different types of soil and their properties, including how they are formed from rocks and organic matter.
I will be able to conduct experiments to investigate the properties of rocks and soils, such as permeability and hardness.

Key Knowledge

Types of Rocks:

- Igneous Rocks: Formed from cooling magma or lava (e.g., basalt, granite).
- Sedimentary Rocks: Made from layers of sediment compacted over time (e.g., limestone, sandstone).
- Metamorphic Rocks: Formed when rocks are subjected to heat and pressure (e.g., marble, slate).

Rock Formation and the Rock Cycle: Rocks are constantly being formed, broken down, and transformed through processes such as weathering, erosion, and the effects of heat and pressure. The rock cycle shows how each type of rock can change into another type over time.

Soils: Soils are made from rock particles, organic matter, water, and air. There are different types of soils (clay, sand, loam), each with distinct properties that affect how well they can support plant life.

Fossils: Fossils are the remains or traces of ancient organisms preserved in rocks, usually sedimentary rocks. They provide evidence of past life and help scientists understand how life and Earth have changed over millions of years.

Rock and Soil Properties: Rocks and soils have different properties, including hardness, permeability, texture, and colour, which determine how they can be used and where they can be found.

My Skills and Knowledge that I may use from other subjects

Maths:
Measuring rock size, mass, and other properties during investigations. Recording data in tables and graphs to analyse results.

Geography:
Understanding how rocks and soils contribute to the formation of landscapes, such as mountains, valleys, and rivers. Learning how natural forces like wind and water shape the Earth's surface over time.

History:
Learning how ancient civilizations used different types of rocks for construction and tools. Understanding how fossils help historians and scientists learn about past environments and extinct species.

Art and Design:
Using rocks as inspiration for creative projects, such as sculptures or texture rubbings. Exploring how different cultures used rocks for decorative and structural purposes.

English:
Writing scientific reports and explanations using the correct scientific vocabulary. Practicing clear and detailed descriptions of observations and findings during investigations.

Computing:
Using digital tools to research rocks, soils, and fossils. Creating presentations or digital reports of scientific findings.

What I will have learnt by the end of my Key Stage

- I will have a strong understanding of how rocks, soils, and fossils form part of the Earth's systems.
- I will be able to explain the rock cycle and how rocks are continually formed, weathered, and recycled over time.
- I will understand how fossils provide evidence of ancient life and how the Earth's surface has changed over millions of years.
- I will have developed an understanding of the importance of soil in ecosystems, agriculture, and the environment.

Wider opportunities
Diversity and Cultural Capital

Geology Field Trips: Visiting geological sites, museums, or quarries to see rocks, fossils, and soil types first-hand.
Cultural Significance of Rocks: Learning about how different cultures and civilizations have used rocks for construction, tools, and art, such as ancient monuments (e.g., the Great Pyramids of Egypt, Stonehenge).
Global Environmental Awareness: Understanding the importance of soils for global food production and how soil erosion and degradation affect ecosystems and human life around the world.
STEM Careers: Introduction to careers in geology, palaeontology, environmental science, and archaeology.

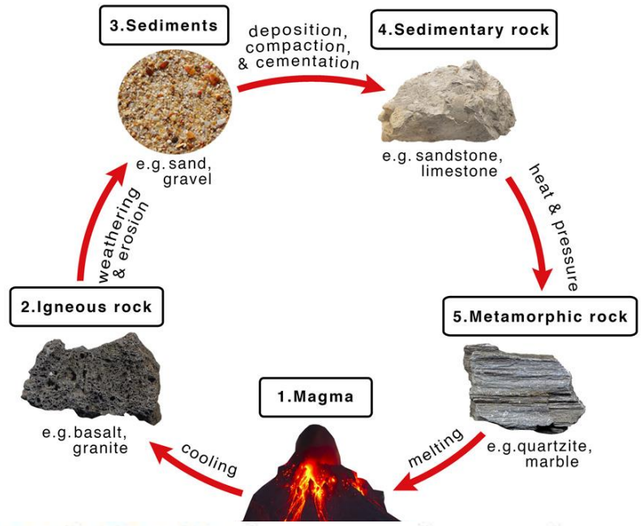
Key Skills I will learn/use

Observation and Classification: Observing and classifying rocks and soils based on their properties.
Scientific Inquiry: Conducting simple experiments to investigate properties like hardness and permeability in rocks and soils.
Critical Thinking: Analysing and drawing conclusions from observations and experiments.
Recording and Reporting: Recording data from experiments, making predictions, and reporting findings in a scientific way.
Collaboration: Working in groups to conduct experiments and present findings.

Recall and Remember

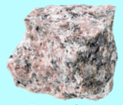
What are the three main types of rocks?
Igneous, sedimentary, metamorphic.
How is sedimentary rock formed?
It is formed by layers of sediment being compressed over time.
What is the rock cycle?
The process by which rocks are continually formed, broken down, and transformed over time.
What are fossils, and why are they important?
Fossils are remains of ancient life preserved in rocks, and they provide evidence of past organisms and environments.
How are soils formed?
Soils are formed from rock particles and organic matter mixed with air and water.
What does permeable mean?
A material that allows water to pass through.
What is erosion, and how does it affect rocks?
Erosion is the wearing away of rocks by wind, water, or ice.
How can rocks change over time?
Rocks can change through processes like weathering, heat, and pressure as part of the rock cycle.

Steps of the Rock Cycle

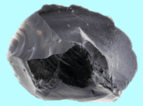


Types of Rocks

Igneous
- Forms from magma or lava solidification
- Hard, no layers


Granite

Intrusive slow magma cooling


Obsidian

Extrusive rapid lava cooling

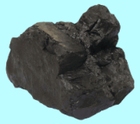
Sedimentary
- Forms from sediment compaction
- Crumbly, layered


Sandstone

Clastic compacted broken rocks


Limestone

Chemical compacted dissolved minerals


Coal

Organic compacted biogenic matter

Metamorphic
- Forms by transformation of other rocks
- Relatively hard, may or may not have layers

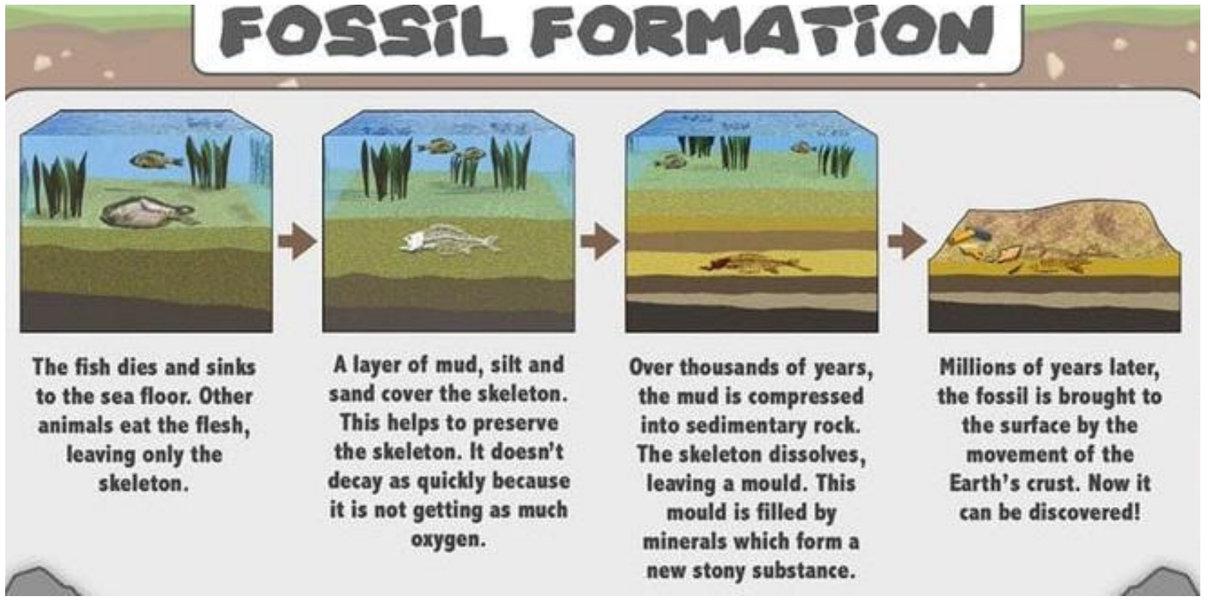

Slate

Foliated has layers


Marble

Non-Foliated no layers

Body fossils show us what a plant or animal looked like. They are the fossilised remains of an animal or plant, like bones, shells and leaves.



Key Scientific Concepts

Biology

Chemistry

Physics

Scientific enquiry

Science for the future

Key Vocabulary

Igneous Rock: Rock formed from cooled magma or lava.

Sedimentary Rock: Rock made from compressed layers of sediment.

Metamorphic Rock: Rock changed by heat and pressure.

Fossil: Remains or traces of ancient life preserved in rock.

Erosion: The process by which rock is worn away by wind, water, or ice.

Weathering: The breakdown of rocks into smaller pieces by natural forces.

Rock Cycle: The ongoing process of rock formation, change, and recycling.

Permeable: Allows water to pass through.

Organic Matter: Decayed plants and animals found in soil.

Sediment: Small particles of rock and other materials carried by wind or water and deposited in layers.