

Subject: Science Year 3: Rocks

NC/PoS:

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

Prior Learning (what pupils already know and can do)

Before starting this unit, check the children can recall their learning about materials from the units [Science, Year 1, Materials: Everyday materials](#) and [Science, Year 2, Materials: Uses of everyday materials](#):

Know the difference between an object and a material. Can classify materials based on their properties and explain why they have been grouped that way. Know rock is a natural material. Know the properties hard/soft and permeable/impermeable.

End Goals (what pupils MUST know and remember)

- Know there are three main types of rocks and give an example – sedimentary (chalk, limestone, shale, sandstone), metamorphic (slate, marble, quartzite, anthracite) and igneous (basalt, granite, pumice, obsidian)
- Know that rocks can be grouped based on physical properties and can give examples – hard/soft, permeable/impermeable or durability
- Know that fossils are formed when a plant or animal dies in a watery environment, the plant or animal is buried in mud and silt, soft tissues quickly decompose leaving the hard bones or shells behind, over time sediment builds over the top and hardens into rock.
- Know that soil is made from rocks and organic matter – clay, sandy, loamy, peaty
- Know that soil can help plants grow

Key Vocabulary: metamorphic, igneous, sedimentary, basalt, granite, pumice, obsidian, minerals, fine-grained, chalk, limestone, shale, sandstone, crystalline, slate, marble, quartzite, anthracite, texture, colour, hard, soft, durable, permeability, permeable, impermeable, dense, density, fossil, formation, silt, decompose, organic matter, rock particles, loamy, clay, sandy, peaty

Session 1: Use resources from Kapow Lesson 1: Rocks: Appearance

Review prior learning:

- Identify and name a variety of everyday materials.
- Describe the simple physical properties of these materials.
- Compare and group together these materials based on their simple physical properties.
- Understand how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
- The uses of materials.

LO: To group rocks using their appearance.

Use the **Attention Grabber** to establish the difference between rock, minerals and man-made materials such as brick, cement. Clarify that rocks are natural materials that have never been alive; they are a combination of more than one thing; they can contain minerals, other rocks and **organic matter** (something that used to be living).

In the **Main Event** section and play the *Pupil video: Rock formation*; children learn there are three types of rock. Sedimentary rocks are formed from the broken remains of other rocks that become joined together. Metamorphic rocks are formed from other rocks that are changed because of heat or pressure. Igneous rocks are formed from molten rock that has cooled and solidified. Children write a definition for rock and write/draw some examples.

Vocabulary: metamorphic, igneous, sedimentary

Session 2: Continue to use resources from Kapow Lesson 1: Rocks: Appearance

Recap: How are rocks formed?

Working scientifically LO: To observe the appearance of rocks closely, using a magnifying glass.

Children learn examples of igneous rocks are basalt, granite, pumice, obsidian, and they all contain minerals, can be fine-grained or coarse-grained and often have a glassy texture. Examples of sedimentary rocks are chalk, limestone, shale, sandstone and are not crystalline but grainy. Examples of metamorphic rocks are slate, marble, quartzite, anthracite and are crystalline.

Suggested activities:

- <https://www.youtube.com/watch?v=iDnkliPVK5o>
- <https://www.youtube.com/watch?v=drYhfxv6inE> properties of rocks (1.37-4.12)
- sort a collection of rocks into igneous, sedimentary, and metamorphic
- record observations of different types of rock

Model how to use a magnifying glass to **observe** (look carefully) the appearance of a rock closely. Show them that some rocks contain visible **grains** (such as granite or sandstone), which are the little pieces from which rocks are made. Some rocks contain **crystals** (for example, marble or quartzite).

Allow all groups to observe at least five rock samples and then collect them and display them at the front of the classroom. Ask the children to discuss and list different ways to **group** the rocks. For example:

- Crystals or no crystals.
- Colour.
- Large or small grains.
- Visible holes or smooth.
- Shiny or dull.

Take feedback from the class, making sure that 'crystals' and 'no crystals' are discussed as a way to group rocks.

As a class use the *Presentation: Rock classification key* in the **Wrapping Up** section to classify marble, granite, chalk, obsidian, sandstone and slate.

Vocabulary: basalt, granite, pumice, obsidian, minerals, fine-grained, chalk, limestone, shale, sandstone, crystalline, slate, marble, quartzite, anthracite, texture, colour

Session 3: Over the next 2 sessions you will be looking at and investigating the properties of different rocks using resources from Kapow Lesson 2: Rocks: Physical properties

Recap: Name rocks which are igneous, metamorphic, or sedimentary.

Display the *Presentation: Rock classification key*, arrange the children in groups of three and hand out a whiteboard and pen to each group. Demonstrate how to use the key to identify the first rock on the left (pumice) by answering the questions and following the 'yes' or 'no' path.

LO: To group rocks using their physical properties.

Working scientifically LO: To make predictions, suggest improvements and explain observations over time.

Explain that over the next two sessions the children will be testing the physical properties of rocks. Children learn some rocks are harder so are difficult to scratch or break up (granite, flint, marble) and some rocks are softer so can be easily scratched (chalk, pumice). Some properties of rocks are hard/soft and durability.

Children test a variety of rocks as follows and record their observations:

1. Use a nail to scratch the surface of the rock.
2. Carefully observe the surface of the rock with a magnifying glass, looking for scratches.
3. Scratches indicate the rock is being worn away.

N.B. Some rocks need to be cut or split with tools because they are so hard (e.g. granite) but others are soft and can be moulded (e.g. clay).

In Session 4: Use the *Presentation: Changing rocks* from the **Attention Grabber** in Kapow Lesson 3 to look at how rocks can be broken down by many different factors. Move on to the suggested activities (from lesson 2) for testing reaction to acid rain:

1. Use a dropper to add a few drops of vinegar to the rock.
2. Carefully observe the surface of the rock with a magnifying glass, looking for bubbles.
3. Bubbles indicate the rock is reacting to the acid rain and will be worn away over time.

And testing for absorbency:

1. Use a dropper to add a few drops of water to the rock.
2. Carefully observe the surface of the rock with a magnifying glass, looking for water sitting on it, rolling off or absorbing into it.
3. Water sitting on the surface or rolling off the rock indicates the rock is impermeable.

Children should record their observations (provide stem sentences to support).

Use the *Presentation: Testing physical properties* to establish understanding and address misconceptions.

N.B. Rocks which are resistant to erosion last longer and are more durable. Buildings are often made with these (e.g. limestone). Density – if the particles in the rock are tightly packed then it has a high density. These rocks would sink in water (e.g. basalt)- if time allows children could predict which rocks would sink and teacher could drop them into a container of water.

Vocabulary: hard, soft, durable, permeable, impermeable, erosion, absorbency, density

Session 5:

Recap and recall: Use the *Presentation: Rock identification* and look at the properties of each rock in order to identify it.

LO: To describe the process of fossil formation.

Working scientifically LO: To present research on fossil formation.

Use the **Main Event** section of the lesson to study the process of fossil formation.

Children learn that some rocks contain fossils (more common in types of sedimentary rocks) Fossils are the remains of living things from millions of years ago. The stages of fossil formation (plant or animal dies in watery environment, is buried in mud and silt, soft tissues quickly decompose leaving hard bones or shells behind, over time sediment builds over the top and hardens into rock)

Play the *Pupil video: Fossil formation*, which shows the stages of the model and how they relate to fossil formation. Ask the children to write down key phrases from the video to help them write an explanation as to how fossils are formed (choose children to present their explanation).

- Vocabulary: fossil, formation, silt, decompose

Session 6: Use resources from Kapow lesson 5 and 6: Soil formation and soil layers

Recap and recall: Display the *Presentation: Agree or disagree?* and discuss the statement: A fossil is an actual piece of an animal or plant.

LO: To know how soils are formed

Working scientifically LO: To draw and label a diagram.

Use the **Attention Grabber** from lesson 5 to model soil formation.

Use the *Presentation: Soil types* to discuss different soil types.

Move on to the *Presentation: Sedimentation*, from Lesson 6, which shows a diagram of a

sedimentation jar. If possible, have actual examples of the different types of soils that have been shaken in jars with water at the start of the lesson and allowed to settle. Explain the process of sedimentation and children draw/label the 4 jars shown on slide 2 (adaption- children choose one of the jars to draw and label).

Complete the unit quiz but omit the question on earthworms.

Vocabulary: organic matter, sandy, clay, peaty, loamy, sedimentation

Link to career:

palaeontologist

geologist <https://www.youtube.com/watch?v=1RL-MJPJtP4> (read to children)

Scientists who have helped develop understanding in this field: Mary Anning

<https://www.youtube.com/watch?v=Of5sk8p2rZY>