









Rocks: Soil Formation

<p>Aim: Recognise that soils are made from rocks and organic matter by explaining how soil is formed. I can explain how soil is formed.</p>	<p>Success Criteria: I can explain that soil is composed of different things. I can describe the 4 processes of soil formation.</p>	<p>Resources: Lesson Pack Clear plastic bottles (Round bottomed two litre bottles are best.) Thin pieces of fabric Cardboard pieces Shredded paper Fruit and vegetable scraps (cut into small pieces) Compost Small stones 5 to 6 tiger worms per group Scissors Plastic gloves Plant saucers Elastic bands</p>
<p>Key/New Words: Soil, formation, formed, rock, organic matter, animals, top soil, sub soil, base rock, additions, losses, translocations, transformations.</p>	<p>Preparation: Creating a Mini Compost Bin Instruction Sheet - 1 per group. Read through Adult Guidance Soil Formation.</p>	

Prior Learning: It would be helpful if children have practised handling plasticine 'worms' prior to this lesson.

Health and Safety: Ensure that children wash their hands after handling composting materials. Ensure that plastic bottles have plenty of air holes and there are drainage holes at the bottom. Make sure that the soil is not under or over watered. Add air holes prior to children creating their mini-compost bins, although children can still add a few of their own.

Learning Sequence

	<p>Soil: Show the questions What is soil? What is soil made from? Take children to the playing fields / school allotment or any area where there is visible soil. Children observe and feedback about what could be in soil. Point out what's around e.g. trees as well as discussing what might be living in the soil.</p>	
	<p>What Is Soil Made Of? Address errors and misconceptions arising from the lesson introduction by highlighting the relevant information on the Lesson Presentation. Layers of Soil: Show and explain the diagram of the different layers of soil present in the ground. Soil Formation: Explain the soil formation process. Compost: Read information on the Lesson Presentation explaining what compost is and why people choose to compost.</p>	
	<p>Creating Compost: Read through the instructions for creating a mini compost bin. Check children's understanding of key concepts – for example – why are using a base of small stones? Check children understand the health and safety guidelines both for them and the worms. Each group should have a copy of the Creating a Mini Compost Bin Instruction Sheet to refer to while creating their mini compost bin.</p>	
	<p>Caring for the Worms: How can we care for the worms properly? After children have fed back ideas, use the checklist to see if they have covered the main points. Go through any remaining points explaining why it will keep the worms healthy.</p>	

Taskit

Researchit: Children take a sample of soil (from a back garden or a pot plant for example) and research what type of soil it is and which rock it is formed from.

Modelit: Children create a model of the different layers of soil.

Filmit: Children create a short information film using appropriate diagrams and pictures to explain how soil is formed.



Science

Rocks



The background of the slide is a cross-section of soil layers. At the top, there are brown roots extending downwards. Below the roots is a layer of dark brown soil, followed by a thicker layer of light brown soil, and finally a layer of yellowish soil at the bottom. Several grey, rounded rocks are scattered throughout the soil layers. The title 'Soil Formation' is written in large, bold, orange letters with a black outline, centered in the light brown soil layer.

Soil Formation



Aim

- I can explain how soil is formed.

Success Criteria

- I can state that soil is composed of different things.
- I can describe the 4 processes of soil formation.



Soil



What is
soil?

What is soil
made from?





What Is Soil Made Of?

Soil is the uppermost layer of the Earth. It is a mixture of different things.

Air

Soil contains gases such as carbon dioxide, oxygen, nitrogen, methane and radon.

Water

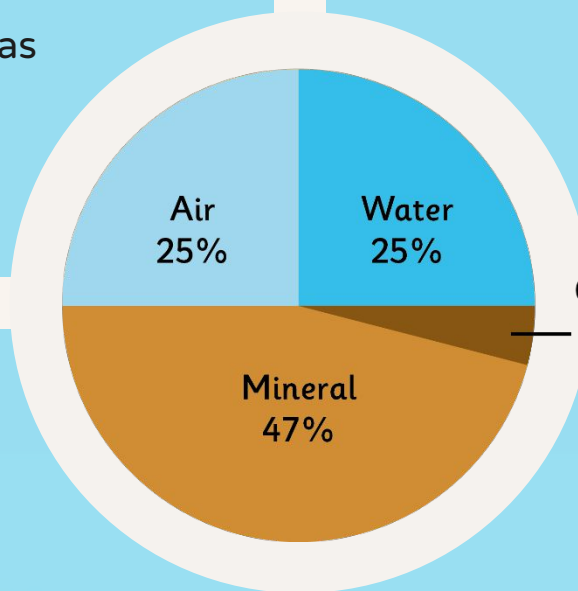
Air and water fill the gaps between particles of soil.

Mineral

The minerals in soil come from finely broken down rock.

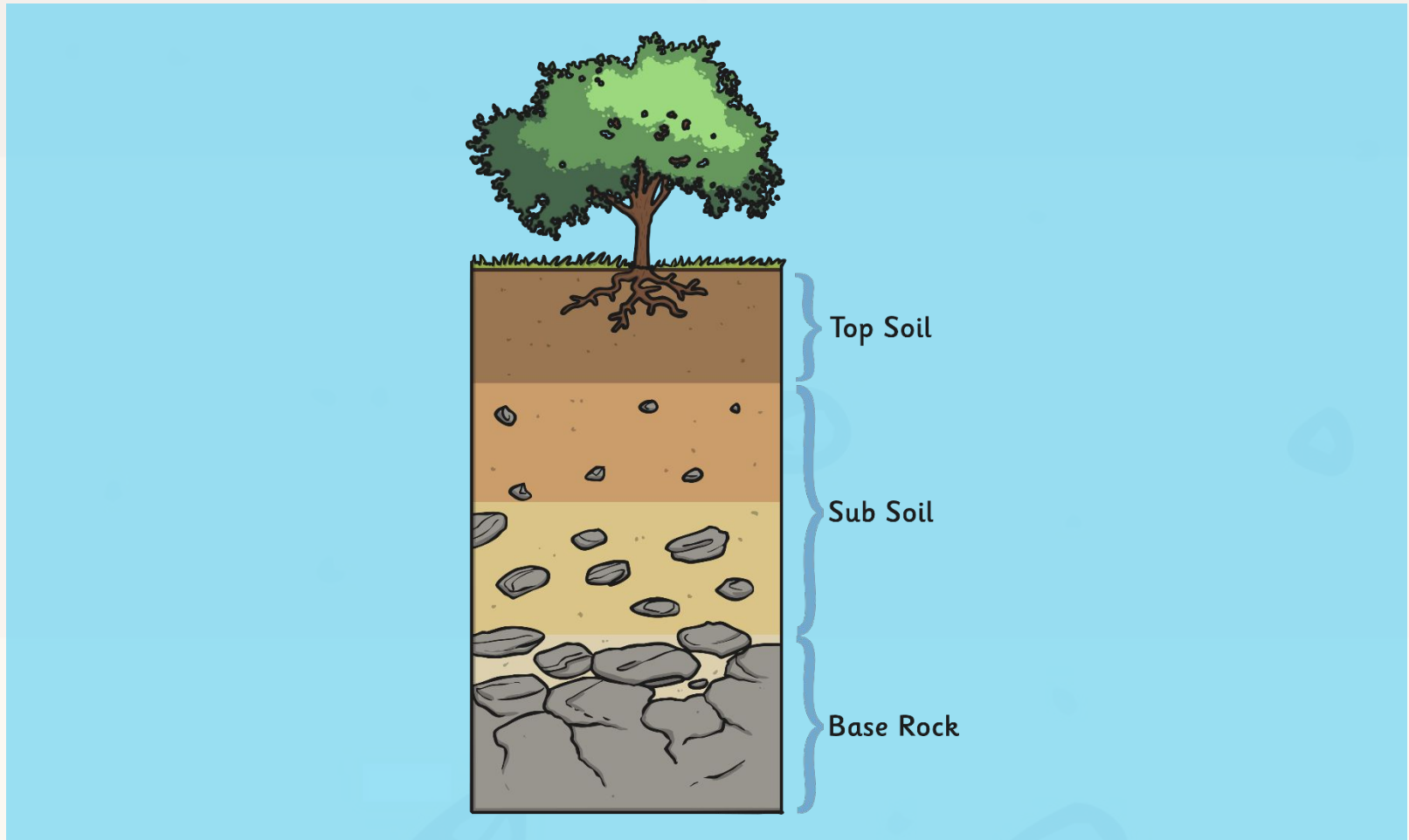
Organic Matter

Organic matter includes both living and decaying animals and plants.





Layers of Soil





Soil Formation

There are 4 main processes involved in soil formation:

Additions



Losses



Translocations



Transformations





Soil Formation

Additions

Rainfall adds water.

Dust adds minerals.

Animal waste adds organic matter and nutrients.

Decaying plants and animals add organic matter.

Humans add fertiliser. Fertilisers contain minerals and nutrients. Natural fertilisers are made from animal waste and organic matter. Human-made fertilisers are made from chemicals.





Soil Formation Losses

Water evaporates (turns into gas when hot) into the air.

Soil particles can wash away in storms.

Organic matter can turn into the gas carbon dioxide.

Nutrients and Minerals are taken up by plants and can drain into groundwater.





Soil Formation

Translocations

Translocations are movements within the soil.

Gravity pulls water down from top to bottom.

Evaporating water draws the minerals up from the bottom to the top.

Animals living in the soil move the soil around in every direction.





Soil Formation Transformations

Transformations occur when something changes into something else.

Humus is what is left when dead leaves decompose.

Weathering causes hard rock to erode and turn into smaller and smaller pieces of rock.

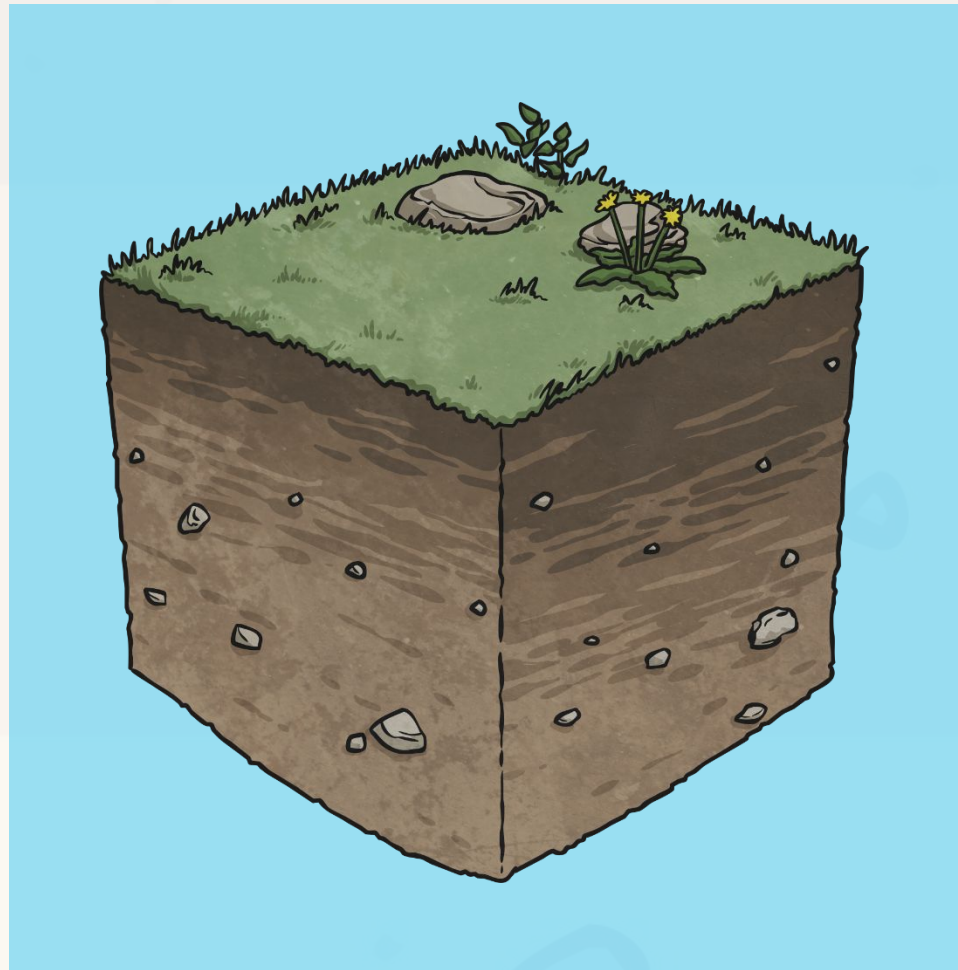
Oxygen reacts with the minerals such as iron which can make the soil look a reddish, 'rusty' colour.





Soil Formation

All four processes are taking place at the same time all the time!





Compost

Compost is organic matter that has been decomposed so that it can be recycled as natural fertiliser.

Many people choose to have a compost bin at home as they see it as more environmentally friendly to recycle waste food rather than throw it away.

It also means they can create their own fertiliser for soil in their garden or for plants, rather than buying it.

You will now have a go at creating your own mini compost bin complete with worms!





Creating Compost

Health and Safety

Make sure you handle all waste materials with **plastic gloves** as all food waste contains **bacteria** that could make you feel ill.

Just because **WORMS** don't cry or scream when they are in **pain** does not mean they don't feel it. Handle them gently and carefully.

A **health and safety monitor** in each group will check that everyone is following the rules properly.

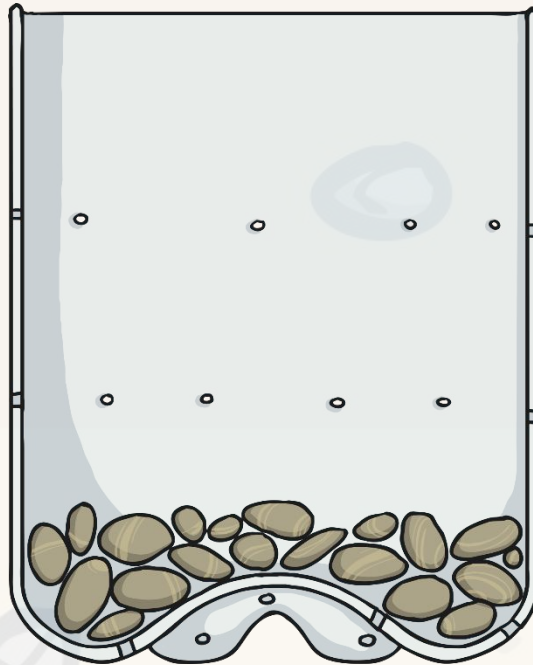


Creating Compost

Step 1



Place small stones as the first layer.



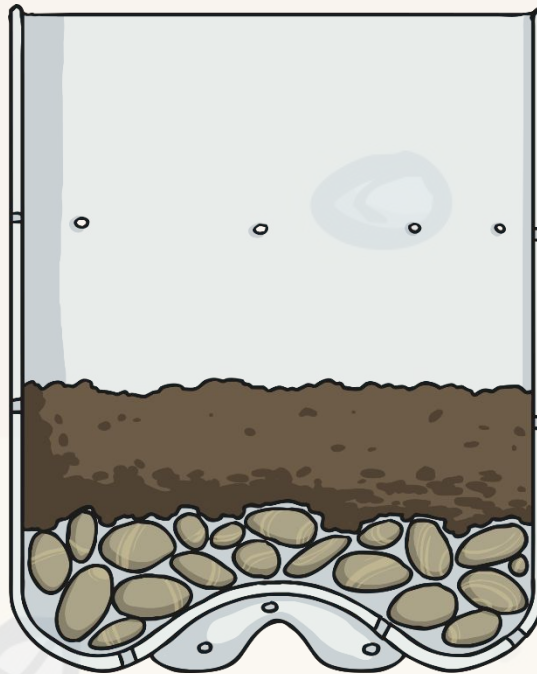


Creating Compost

Step 2



Add a layer of compost.



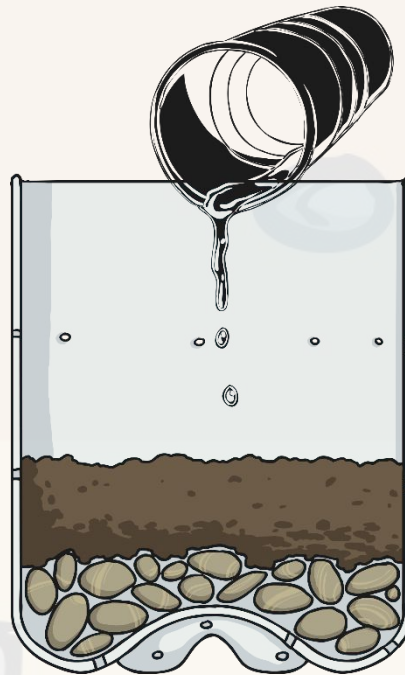


Creating Compost

Step 3



Add a small amount of water so that the compost is moist but not completely wet.



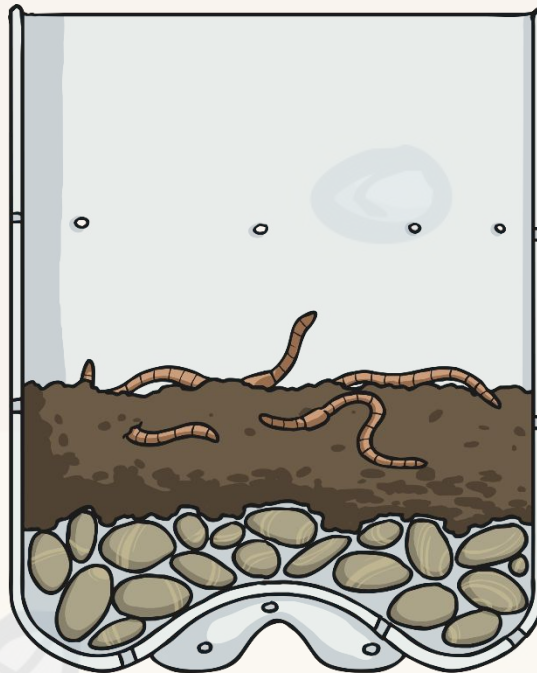


Creating Compost

Step 4



Wear plastic gloves to handle the worms. Ensure that worms are handled gently. Place a few worms gently onto the compost.



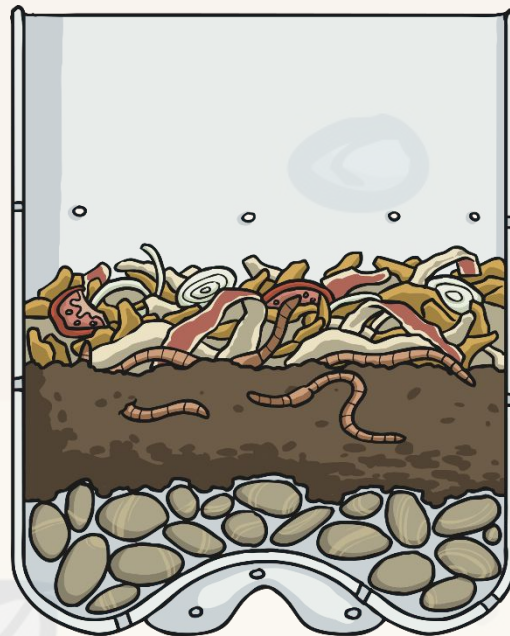


Creating Compost

Step 5



Wear plastic gloves while adding waste food. Place a handful of scraps on top of the worms. Leave it placed gently on the worms; it will fall further by itself so there is no need to push it down.





Creating Compost

Step 6



Wet the shredded paper and add it as the topmost layer of your mini compost bin.



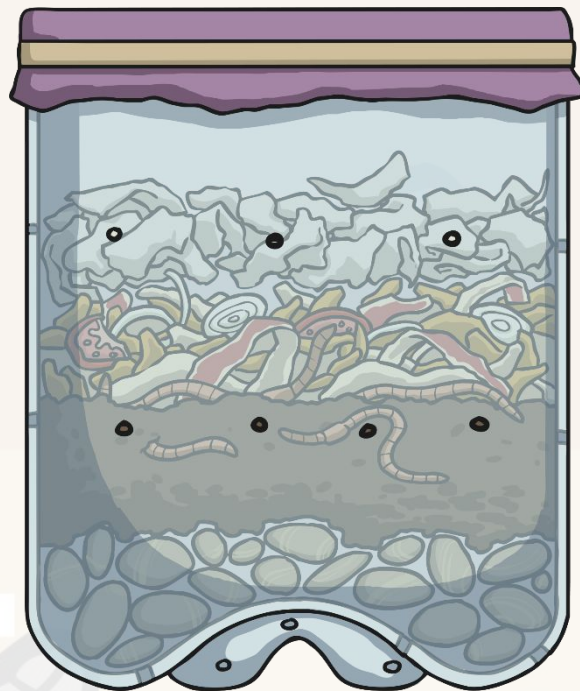


Creating Compost

Step 7



Add a thin piece of fabric over the top of the plastic bottle and secure it with an elastic band.



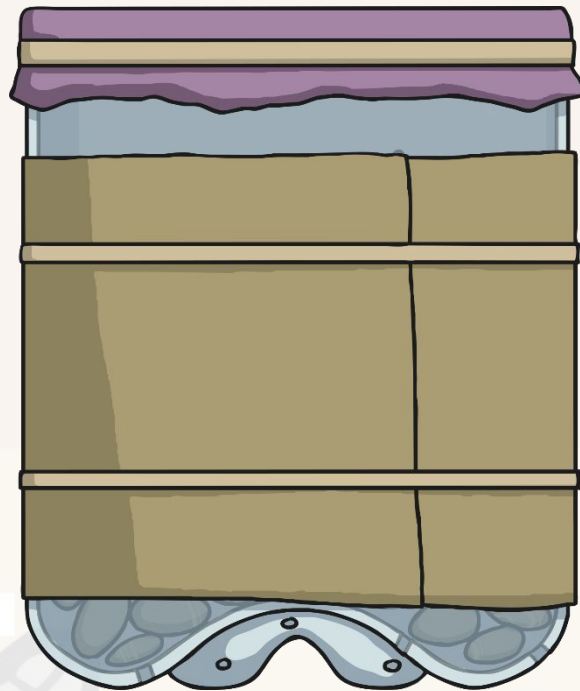


Creating Compost

Step 8



Attach long rectangular pieces of card around the bottle so that it makes it dark for the worms. They live in the dark and do not like bright lights.



Creating Compost



Now you will be creating your own mini compost bin!

Make sure to follow each step on your **Creating a Mini Compost Bin Instruction Sheet** carefully.

Creating a Mini Compost Bin

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Follow each step of the instructions carefully to create your mini compost bin.

Step	Instruction	Diagram	
Step 1	Place small stones as the first layer.		Shredded paper and add as the topmost layer of your compost bin.
Step 2	Add a layer of compost.		Place a thin piece of fabric over the top of the plastic bottle and tie with an elastic band.
Step 3	Add a small amount of water so that the compost is moist but not completely wet.		Place long, rectangular pieces of card around the bottle so that it is dark for the worms. They live in the dark and do not like light.
Step 4	Health and Safety: Wear plastic gloves to handle the worms. Ensure that worms are handled gently. Place a few worms gently onto the compost.		
Step 5	Health and Safety: Wear plastic gloves while adding waste food. Place a handful of scraps on top of the worms. Leave it alone gently on the worms, it will fall further by itself so there is no need to push it down.		



Caring for Worms



How will you care for the worms?

- Keep the mini compost bins in a quiet place.
- Keep the mini compost bins away from the sunlight and keep the cardboard pieces in place.
- Do not place anything on top of the compost bins so that enough air gets through.
- Every other day, check that the top layers of compost are damp. The worms need moist skin to breathe.
- Add only small amounts of food once the first scraps have been eaten.
- After a few weeks, return the worms to a compost bin or heap as they may not survive in the soil straight away.





Aim



- I can explain how soil is formed.

Success Criteria

- I can state that soil is composed of different things.
- I can describe the 4 processes of soil formation.





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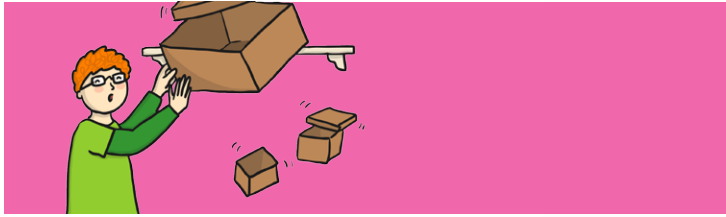
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Introduction

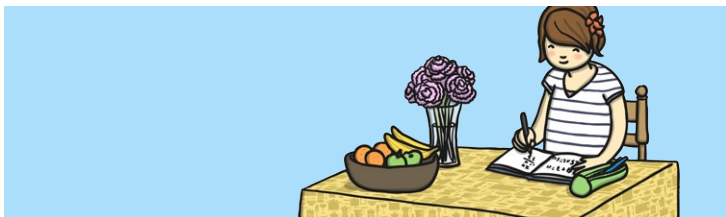
In this unit, children will discover the different types of rocks and how they are formed. Children will compare and group rocks based on appearance and simple properties. They will learn how fossils are formed and learn about the contribution of Mary Anning to the field of palaeontology. Children will understand how soil is formed and then investigate the permeability of different types of soil.



Health & Safety

Dust can make asthma worse in sufferers. If you are presenting children with rocks that may give off dust when handled, then ensure that all adults are aware who has asthma and the location of their pumps, should they need to be used. As a preventative measure it would be worth enquiring if children have any particular triggers prior to lessons 1 and 2, where they will be expected to handle rocks.

Ensure that children use plastic gloves when handling worms and waste food scraps. Hands should be washed afterwards as a precaution.



Home Learning

Dinosaur Fossil Research Activity Sheet: Children select a dinosaur and research facts including who found the fossils, where they were found and when.

Famous Palaeontologist Fact File: Building on their learning from lesson 4 on Mary Anning, children will select a famous palaeontologist and create a fact file about their life and discoveries.



Assessment Statements

By the end of this unit...

...all children should be able to:

- Children will be able to name the three different types of rocks.
- They will handle and examine rocks to identify their properties, with support.
- They will be able to state the four different types of matter that soil is composed of.
- Children will learn to make careful observations.
- They will be able to take part in and contribute towards an oral presentation of their observations.

...most children will be able to:

- Children will be able to give examples of natural and man-made rocks.
- They will be able to group rocks by their properties and identify simple similarities and differences.
- Children will be able to explain the difference between a bone and a fossil.
- They will be able to explain, using simple scientific language, how soil is formed.
- They will make and record observations accurately.

...some children will be able to:

- Children will make systematic observations.
- They will be able to explain the main processes of fossilisation.
- They will be able to identify the importance of Mary Anning's work to the field of palaeontology.
- Children will use simple scientific language accurately in oral and written work.

1. Types of Rocks

Compare different kinds of rocks based on their appearance in the context of understanding the difference between natural and man-made rocks.

- I can compare different types of rocks.

- A selection of igneous, sedimentary and metamorphic rocks



2. Grouping Rocks

Making systematic and careful observations by examining different types of rocks.

- I can make systematic and careful observations.

Group together different kinds of rocks on the basis of their simple physical properties in the context of natural rocks.

- I can group rocks based on their properties.

- A selection of igneous, sedimentary and metamorphic rocks
- A selection of books on rocks
- Computers/Laptops/Tablets
- Sandpaper
- Pipette
- A large container or plastic box



3. Fantastic Fossils

Describe in simple terms how fossils are formed when things that have lived are trapped within rock by explaining the fossilisation process and by comparing fossils to the animals they belong to.

- I can explain how fossils are formed.

- Scissors
- Glue sticks
- If available, example of real fossils or models of fossils



4. Mary Anning

Identifying changes related to simple scientific ideas in the context of theories about fossils.

- I can explain Mary Anning's contribution to palaeontology.



5. Soil Formation

Recognise that soils are made from rocks and organic matter by explaining how soil is formed.

- I can explain how soil is formed.

- Clear plastic bottles (round bottomed two litre bottles are best)
- Thin pieces of fabric
- Cardboard pieces
- Shredded paper
- Fruit and vegetable scraps (cut into small pieces)
- Compost
- Small stones
- 5 to 6 tiger worms per group
- Scissors
- Plastic gloves
- Plant saucers
- Elastic bands



6. Soil Profiles

Making systematic and careful observations in the context of investigating the permeability of different soils.

- I can observe carefully and systematically.

Recording findings using simple scientific language. Reporting on findings from enquiries, including presentations of results and conclusions. Children will present their findings using the key science vocabulary for this lesson.

- I can present my findings using scientific vocabulary.

- Samples of the different types of soil (pre-measured to ensure the children use the same amount of soil)
- Beakers
- Funnels
- Coffee filter paper
- Measuring cylinders
- Water
- Visualiser equipment or a webcam (if available)

