

Rocks: Fantastic Fossils

Aim: 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.	Success Criteria: I can explain the difference between a bone and a fossil. I can order the steps of how a fossil is formed.	Resources: Lesson Pack Scissors Glue sticks If available, example of real fossils or models of fossils
	Key/New Words: Fossil, sedimentary, fossilisation, animals, bones, chemical fossils, change, body fossils, trace fossils, layers, pressure, coprolite, trackways, footprints.	Preparation: Fossilisation Process Activity Sheet - 1 per child Fossilisation Process Cards - as required Dinosaurs and Their Fossils Sort Cards - 1 per pair

Prior Learning: Children will have learnt how sedimentary rocks form in lesson 1.

Learning Sequence

	Are Dinosaurs Real? Children discuss the question with their talk partners and explain how they know if dinosaurs are real. Children feedback. It would be useful to play devil's advocate in order to question children deeper about what they really know about the subject. End the discussion with the fact that we have discovered their bones or more specifically their fossils.	
	Bones or Fossils? / Body Fossils / Trace Fossils: Read the information on the IWB explaining the difference between bones and fossils. Fossilisation Process: Go through the fossilisation process step by step on the IWB. <i>What do you think we only find fossils in sedimentary rock? Why not igneous or metamorphic rock?</i> Children to sit in pairs with the Fossilisation Process Cards which they will order.	
	Order the Fossilisation Process: Children to use the differentiated Fossilisation Process Activity Sheets to order the fossilisation process. Children work with an adult in a small group. Mix up the Fossilisation Process Cards . Children reorder them and state what is happening in each picture. Each child writes up a sentence for a picture. Adult take pictures of the card with the sentence. All pictures for the group printed out and placed in each child's book. Children order the pictures in sequence and match the correct sentence with each picture describing the fossilisation process. Children order pictures and write a corresponding sentence.	
	Dinosaurs and Their Fossils: In mixed ability pairs children match animals and their fossils using the Dinosaurs and Their Fossils Sort Cards . Ask a selection of children to explain how they came to their conclusion. <i>Why do we have fossils for some animals and not others?</i>	

Taskit

Modelit: Children make a model using clay, mock rock or any other suitable material. The model should include both the rock and the fossils.



Science

Rocks



Fantastic Fossils



Aim

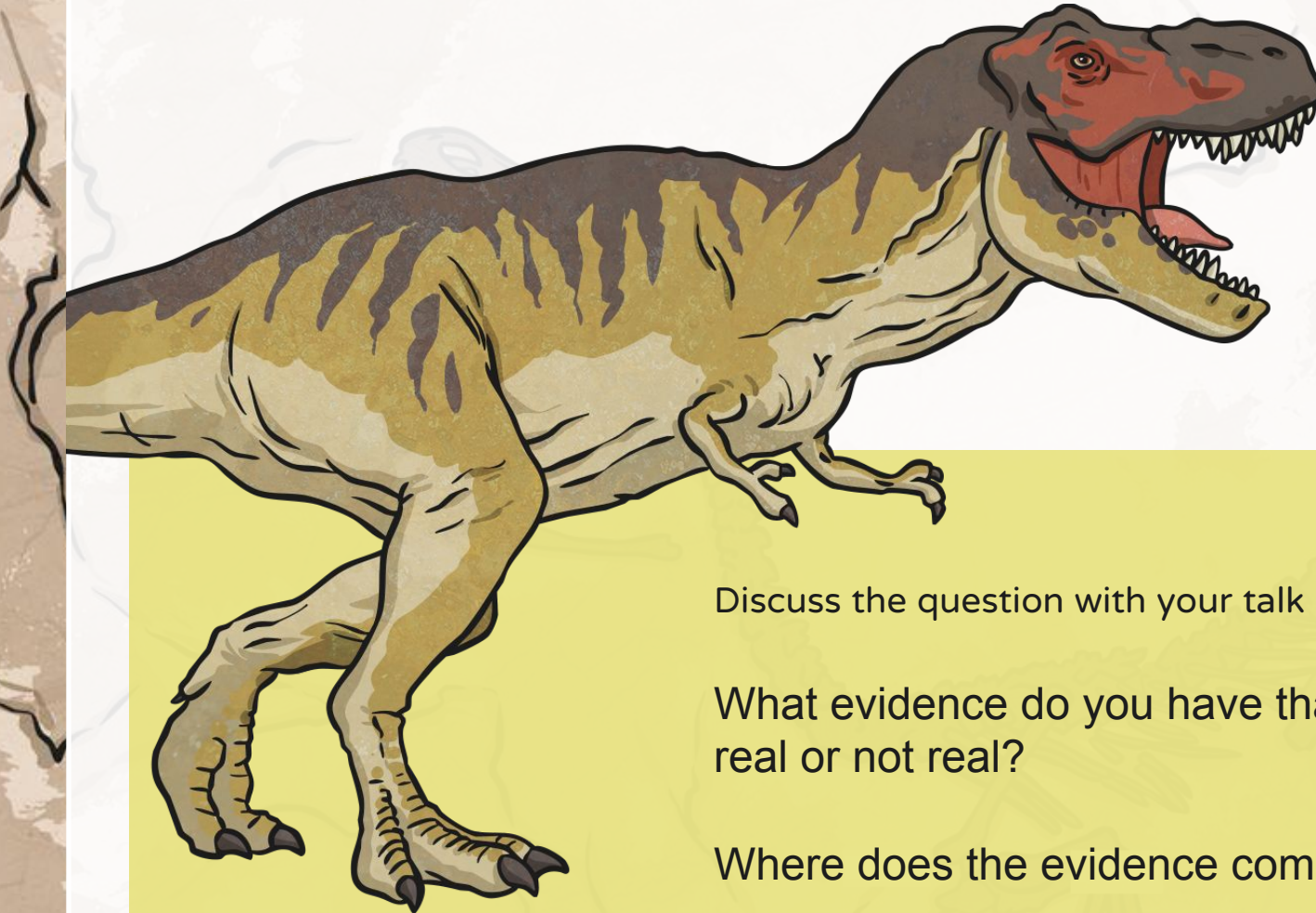
- I can explain how fossils are formed.

Success Criteria

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Are Dinosaurs Real?



Discuss the question with your talk partner.

What evidence do you have that they are real or not real?

Where does the evidence come from?



Are Dinosaurs Real?



It is believed that dinosaur fossils have been found for centuries and these gave rise to some of the mythical creatures in ancient cultures. However, without documented evidence we can not know this for sure.

What we do know is that our current knowledge of dinosaurs and **palaeontology** (the study of fossils) started in the 1800s. So we really have only known about them for the last 200 years! We know about dinosaurs due to the discovery of fossils and fossilised skeletons.





Bones or Fossils?

There are some key concepts we need to know before moving on.

What is the difference between bones and fossils?

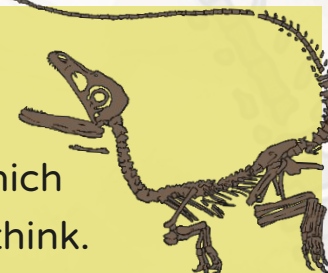
Bones

Bones are any piece of the hard whitish tissue that makes up the skeleton in animals including humans.



Fossils

Fossils are more than just ancient bones, which is what many people think. There are three types of fossils — body fossils, trace fossils and chemical fossils.



Chemical fossils

Chemical fossils contain carbon, which is proof that they must be formed from once living things. Examples of chemical fossils include coal, petroleum oil and natural gas.





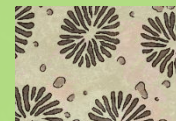
Body Fossils

Body fossils are the remains of an animal or plant such as bones, shells or leaves. There are three types of body fossils:

Mould and Cast Fossils

Mould fossils form when all the parts (including the bones) have decayed and all that is left is the mould of the animal.

Cast fossils form from mould fossils as the mould fossil is filled up with sediment – so it is not made up of the original matter of the animal or plant.



Replacement Fossils

Replacement fossils form when water dissolves the original hard matter of the bones and replaces them with mineral matter – this is what we think of when we discuss dinosaur fossils. They still look like the original bones but are not made up of the same matter.



Whole Body Fossils

Whole body fossils form when the original body has been preserved – for example a woolly mammoth in ice or a mosquito in amber.



Trace Fossils

These are fossils that record the activity of an animal including:

Footprints



Trackways



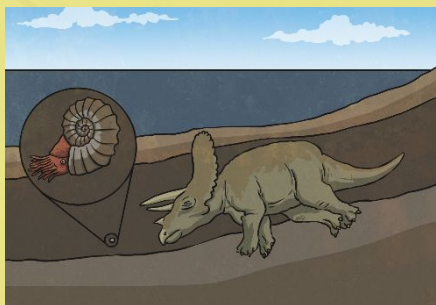
Coprolites
(fossil faeces)



Fossilisation Process

There are many different ways that fossilisation occurs. However, you will focus on how fossils form in rocks (both body and trace fossils).

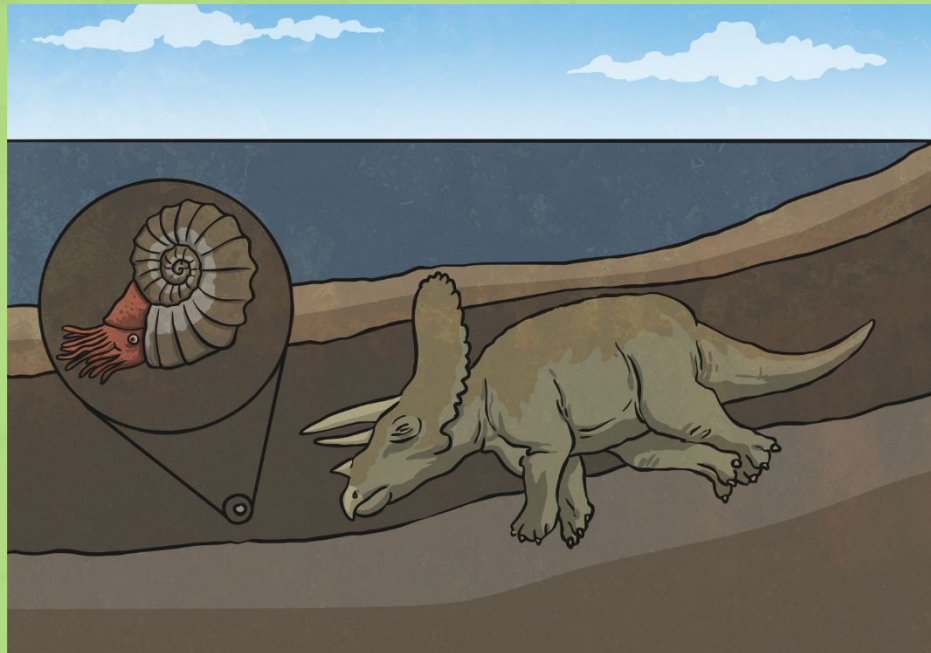
Fossilisation only takes place in sedimentary rocks as the heat from the lava that creates igneous rocks and changes the structure of metamorphic rocks would be too high for fossils to survive.





Fossilisation Process; Step 1

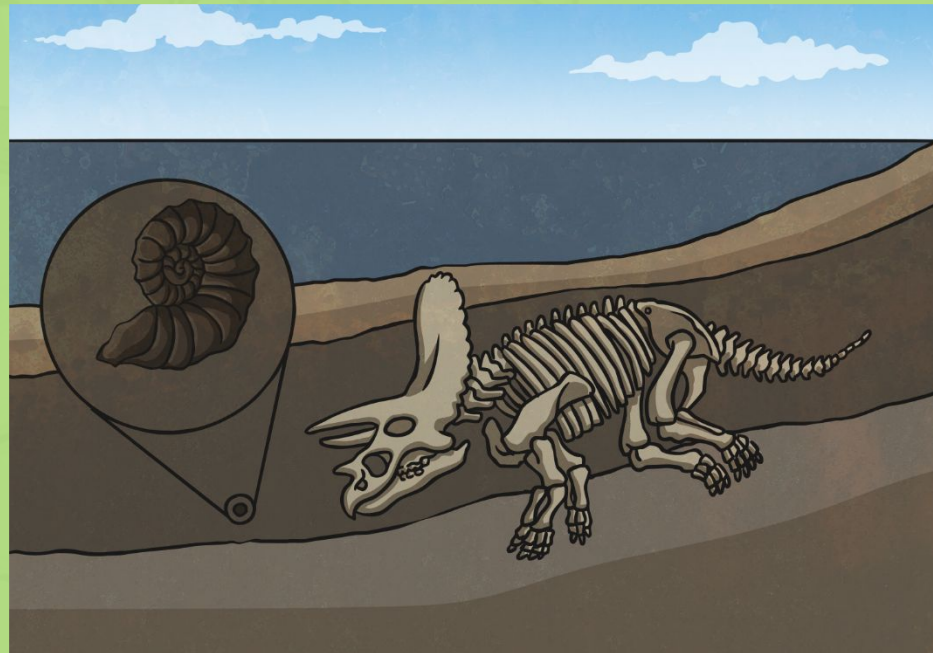
An animal or creature dies on land or in the sea and it gets covered by a layer of sediments (e.g. plant material and tiny parts of rock or soil etc). Over time, through compaction and cementation (solidifying), these eventually form a layer of rock.





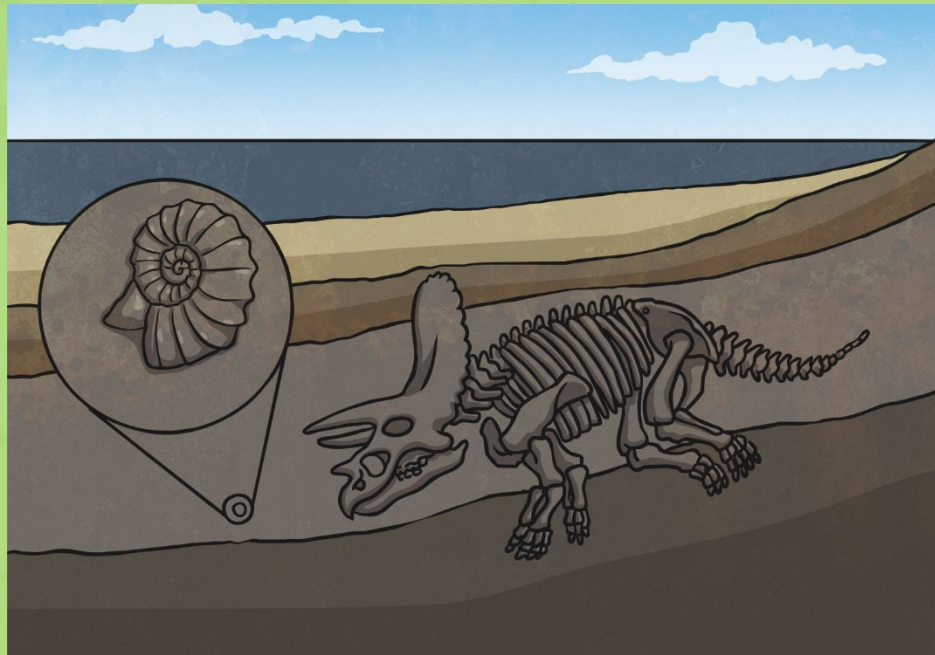
Fossilisation Process; Step 2

Over time more layers of rock are formed which cover it and by this time the only thing to remain of the organism would be the hard parts such as bones, shells and teeth.



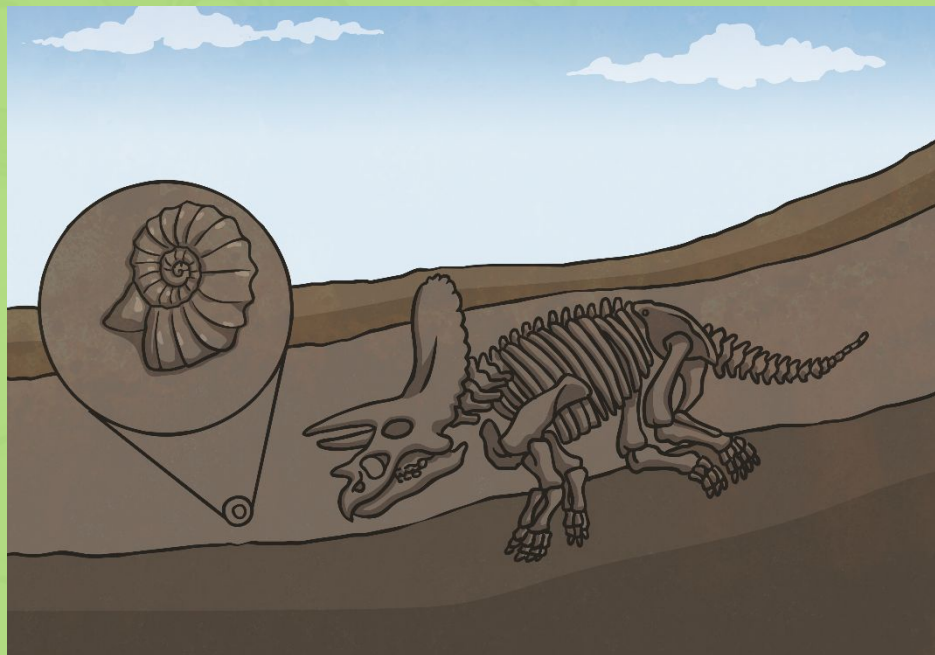
Fossilisation Process; Step 3

Over thousands of years the mould fossil might become a cast fossil with sediment entering the mould. In the case of replacement fossils, the original bone matter changes to mineral matter but this does not affect the shape of the bones.



Fossilisation Process; Step 4

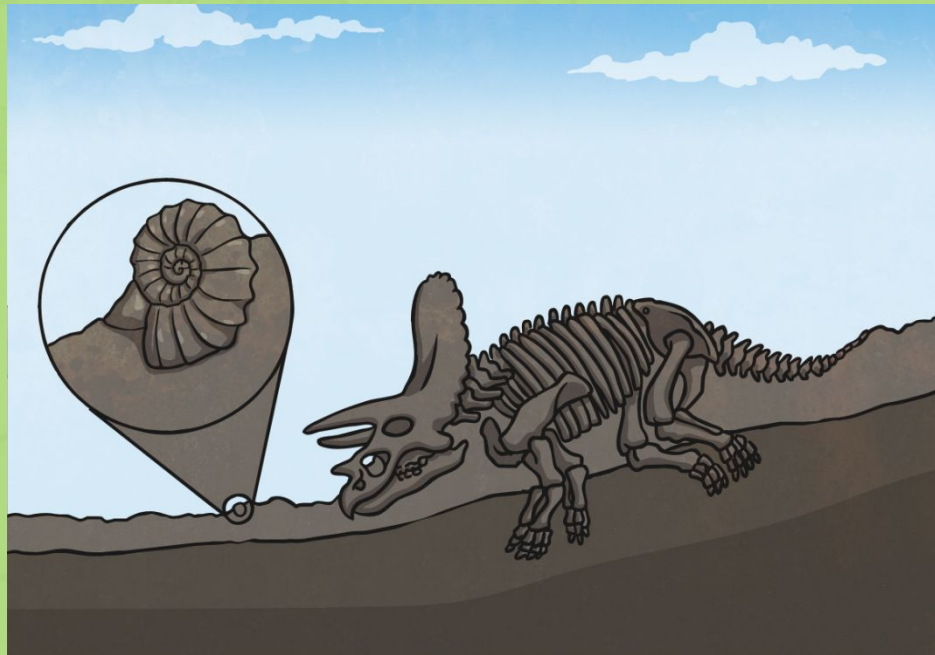
Over a long period of time the sea will recede in certain places. The sea level could also be changed quickly through earthquakes and volcanic eruptions.





Fossilisation Process; Step 5

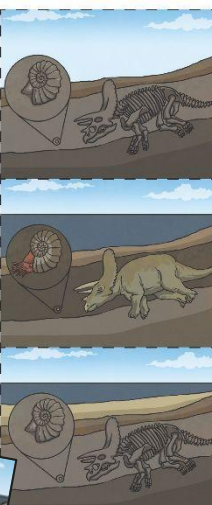
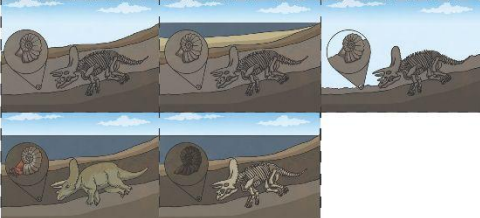
As erosion and weathering takes place, eventually the fossils become exposed.





Order the Fossilisation Process



Fossilisation	Fossilisation Process
	<div data-bbox="1188 549 1690 778">  </div> <div data-bbox="1188 821 1690 1092"> <p>As erosion and weathering takes place, eventually the fossils become exposed.</p> <p>Over a long period of time the sea will recede in certain places.</p> <p>Over time more layers of rock cover it and by this time the only thing to remain of the animal would be its bones (except in the case of mould fossils where the bones would also be decayed).</p> <p>An animal or creature dies and ends up in the sea. It gets covered by a layer of rock.</p> <p>Over thousands of years the mould fossil might become a cast fossil with sediment entering the mould. In the case of replacement fossils, the original bone matter changes to mineral matter but this does not affect the shape of the bones.</p> </div>



Aim



- I can explain how fossils are formed.

Success Criteria

- I can explain the difference between a bone and a fossil.
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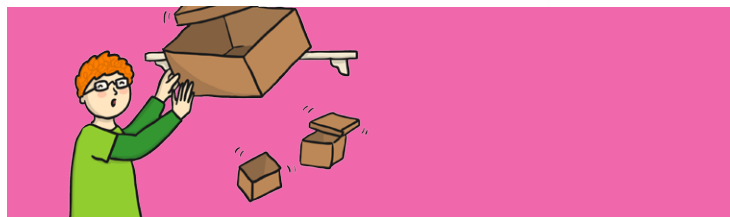
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Introduction

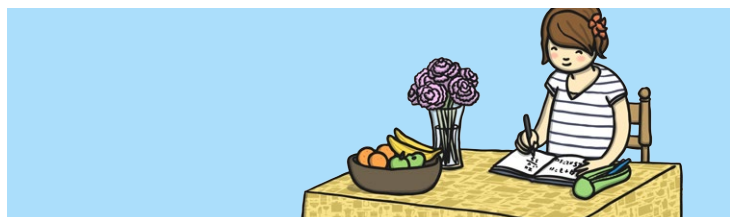
In this unit, children will discover the different types of rocks and how they are formed. Children will compare and group rocks based on appearance and simple properties. They will learn how fossils are formed and learn about the contribution of Mary Anning to the field of palaeontology. Children will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

