

LESSON PLAN

CREATED FOR TEACHERS BY EDEN'S EDUCATION TEAM

The Great Fossil Hunters

Overview: Ever wondered what it might be like to be a fossil hunter? How would you excavate a fossil without damaging it and how would you identify the fossil? How is a fossil formed? In this practical science activity your students create their own fossils encased within a sedimentary rock and then have the responsibility of carefully excavating and identifying each other's work. Have your class got the skills and patience?

Who: Year 3-6 Science

How long: 2, 1-hour sessions with a day in-between and a home learning opportunity.

Objectives and curriculum links

These lessons enable students to:

- Consider how living things have changed over millions of years (evolution)
- Be able to describe how fossils are formed.
- Explain what we can learn from fossils.
- Use practical skills and creativity to make a model that describes a scientific idea.

We have designed these lessons to help teachers cover the following areas in KS2 Science:

- Year 3 - pupils should learn about rocks. They should compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. They should be able to describe in simple terms how fossils are formed when things that have lived are trapped within rock. Pupils should recognise that soils are made from rocks and organic matter.
- Year 6 - pupils should learn about evolution and inheritance recognising that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. Pupils should also find out about the work of palaeontologists such as Mary Anning.

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Resources for making and excavating fossils

For making and excavating your fossils your class will need:

- A4 paper or thin card (pre-cut into 3-4cm wide strips along the longest edge, 1 per child) Access to Sellotape
- Plaster of Paris (a few teaspoons per child)
- Fist sized lump of air-drying clay (1 per child)
- Beakers of water (1 per table)
- Yogurt pots or similar (1 per child)
- Wooden stirrers (1 per child)
- Sand (1 tablespoon per child)
- Large selection of small shells and other suitable objects (less than 4cm diameter) to make moulds from. Each item must be clearly numbered.
- Selection of 'tools' suitable for children to use to safely excavate a fossil. These should be items found around school or at home. For example, spoons, various brushes, small wooden or plastic hammers, magnifying glasses, pipe cleaners, cocktail sticks and wooden stirrers.
- Magnifying glass (several per table)
- Ruler (several per table)
- Washing up liquid (a few ml per table)
- Goggles
- Disposable gloves
- Cocktail sticks (several per table)

Other resources:

- Computer, projector, speakers, internet access – YouTube.
- Whiteboard and wipeable pens (several colours)
- A3 plain paper
- Felt tips.



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Part 1

Getting Started 0 - 10 minutes

Share the challenge with the class.

Today you are going to become Fossil Hunters (palaeontologists).

Your challenge is to:

- *be able to explain what fossils are, how they are formed and why they are important.*
- *create your own mould and cast fossil.*
- *excavate a fossil safely and in one piece using carefully selected tools.*

Begin by asking the class if they know what fossils are? This could be done using 'think, pair, share' with the class.

Using their ideas create an accepted class definition of the meaning of the term fossil and write it on the board. For example, 'fossils are the traces of animals and plants that were once alive, preserved in rock.'

How are fossils made? 10-25 minutes

Give each a group a big piece of sugar paper and some pens. Ask them to discuss and then draw pictures to show how they think fossils are formed. There is more than 1 way. Ask each group to elect a spokesperson and then collect feedback from each group. You are likely to get a variety of answers some relating to animals getting trapped in ice or insects trapped in amber, trace fossils such as footprints and mould and cast fossils.

The animation explains in simple terms 3 ways in which they are formed and might be useful for them to watch:

<http://www.planet-science.com/categories/under-11s/our-world/2011/10/what-makes-fossils.aspx>

This series of diagrams provides a simple explanation as well:

<http://www.oum.ox.ac.uk/thezone/fossils/intro/form.htm>

Making your Fossil 25 - 50 minutes

Explain to the class that they are now going to have a go at creating their own fossils within some rock. Later they will then have to carefully excavate the fossil like real palaeontologists.

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Demonstrate how to make a fossil by modelling the process to them and using the pictures on the slide show to help you explain. It may be best to guide them through the process a step at a time rather than explaining the whole thing in one go.

Ensure each table has enough resources to make their fossils. It's really important that each child records the number of the object they are going to use to make their fossil. Each rock must be left somewhere warm and dry and needs to be labelled with the child's name. Out in the sun on a hot day is great. They will need to dry out for at least a day or until it is clear that the clay has dried out.

Health and Safety

A few suppliers classify plaster of Paris as irritating to eyes, respiratory system and skin (R36/37/38) but most do not. Even so, prolonged or repeated direct skin contact may cause irritation and attempts at removal may cause abrasion. Therefore ensure that your students have disposable gloves to wear and goggles for mixing up the plaster. The dust from plaster of Paris can cause mild breathing difficulties and so it should be controlled when being used. The children will only need a very small amount (few teaspoons) of plaster of Paris each to make their fossil. Therefore, you could give this to them in their yogurt pots so there is no need for them to be spooning the powder and this will minimise any dust created. Ensure that the room is well ventilated. Any splashes of plaster of Paris on the skin should be washed off immediately.

Read the CLEAPPS guidance on plaster of Paris here:

science.cleapss.org.uk/Resource-Info/PS072-Using-plaster-of-Paris-in-schools.aspx

We have included an example of a risk assessment for this practical activity that we would use at Eden. Please read it and edit accordingly to suit your circumstances.

Disposal: Mixtures of plaster of Paris with water which have been allowed to set are low hazard, but can no longer be disposed of in the solid waste. Plaster of Paris can now only be disposed of either via a Hazardous Waste contractor or via the special section for Plaster of Paris & Gypsum at your local waste centre.

Finally: Reflection 50-60 minutes

Explain that you noticed that everyone in the class had parts of the fossil making process that they found easy and other aspects that they found more difficult to complete. Ask each student to reflect upon their making experience. Which part of the process went really smoothly for them? Why do they think this was? Which part



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of the process was most tricky to complete? How could they improve on this if they were to make another fossil? How could they adjust the method to make it easier next time?

As a class briefly review the challenge set at the beginning of the lesson to assess progress.

Home learning opportunity

Ask the children to find out what a palaeontologist does. You could also perhaps ask them to find out about the work of Mary Anning. The children could research the kinds of tools that palaeontologists use to carry out their work. They could draw/print pictures of the tools they use and explain how each is used. It's great fun to get the children to bring in tools that they think are similar to/or can be used like the real tools palaeontologists use. For example: brushes of various types, shapes, sizes, things for scraping like spoons, cocktail sticks, mini hammer (wood or plastic), magnifying glass, pencil, notebook, goggles and gloves. Explain clearly that they are not to bring in anything sharp or dangerous and everything they bring in will be checked before they use it in the next lesson.

Information for children about Mary Anning can be found here:

http://www.bbc.co.uk/schools/primaryhistory/famouspeople/mary_anning/

Part 2

Excavation of the fossils 0-5 minutes

** Before you begin this lesson ensure that the clay surrounding the fossils has dried out properly.*

Review the challenge with the class that was set in the last lesson identifying which parts of the challenge have been covered already.

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Ask the children to put their palaeontology research and the tools that they collected for the home learning task out in front of them. Then let the children take a moment to collect and look at their own 'rocks' created in the last lesson.

Review of the home learning opportunity 5 – 20 minutes

Working in their groups ask the pupils to share their research about what palaeontologists do and the tools that they use with each other. Can they explain why they think various tools would be useful?

Check that the items the students have bought in are safe to be used and free of sharp edges and blades.

Give the students the opportunity to walk around the room from table to table and have a look at the research and tools that other students have created and collected and consider how best they could be used. You could ask the children to stop in a place where they think there is a tool that might be particularly useful or where they have read something interesting. Then ask a selection of students to explain their choices to each other.

The Excavation 20 - 45 minutes

Send the children back to their seats and distribute the rocks created in the last lesson amongst the children in the class so that each child has another child's work. Try to ensure that this is done in such a way so that they have no idea what was used to create the fossil inside the rock in front of them. However, it's very important that they write down whose rock they have been given because they will have to give the fossil back once it has been excavated.

Obviously, the children could excavate their own fossil but this isn't as challenging, authentic or intriguing because they already know the shape, and form of the fossil that they are searching for.

Extension: What skills does a palaeontologist need to be good at their job? Show them the video clip below of palaeontologists at work and as they watch it ask them to record a list of skills that they must have.

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

Collect feedback about the important skills required for this kind of work. They need to bear this in mind for the excavation task.

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Set the children the task of excavating the rock in front of them. Emphasise to them that fossils are delicate so they need to be careful. In addition remind them that they are actually working on someone else's fossil which they would like back in one piece! They need to wear goggles and gloves and they need to take care with their tools. Ensure they have the rock with the correct side facing them so that as they dig down the fossil starts to appear.

The excavation challenge is to:

- excavate the fossil without damaging it using the tools.
- clean the fossil up – removing rock and dirt
- identify the fossil. To do this the children need to be given the opportunity to compare their fossil with all of the numbered items used to create them in the first lesson. They could compare the fossil with the shells by looking carefully with a magnifying glass and measuring various dimensions with a ruler. Ask the students to record the number of the item that they think was used.

When they have finished go around the room asking each child whose fossil they had and the number of the item they think was used to make it. Check with the fossils creator if they are right. This can be tricky depending on how carefully the fossil was made and excavated so if the students get it wrong it isn't a big deal – real palaeontologists find it hard to identify fossils all the time. If they can't identify the exact item used to make the fossil perhaps they might be able to say at least what kind of item made the fossil. For example, they may be able to identify it as a limpet or cockle shell. They must then give the fossil back to its maker.

Plenary 45 - 60 minutes

Scientists spend a great deal of time searching for fossils, investigating them, cataloguing them and painstakingly putting them back together, but why?

Ask the children to discuss in groups why they think fossils are important and what they can tell us. They could record their ideas on post-its and stick them on the board perhaps. Collect feedback from each group.

Key ideas you might like to discuss include:

- fossils show the types of animals and plants that were on the earth at different times in the past. This helps us learn how the earth and the



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- creatures on the earth, including our own ancestors and their relatives, have changed over time. So, fossils are evidence for the theory of evolution.
- by studying fossils we can understand how different life forms are related to each other.
- fossils can tell us about how plants and creatures in the past grew, what they ate, how they interacted with each other.
- fossils help us to learn about what the climate/weather was like in the past.
- fossils help us build a picture of what different environments looked like at particular periods from the past.
- fossils can give us information about where in the world human life originated.
- fossils can tell us how long life has existed on earth. Some rocks are very old. If fossils are found in very old rocks, life must be very old too.

This webpage explains some of the reasons why fossils are important:

<http://www.oum.ox.ac.uk/thezone/fossils/intro/proof.htm>

As a class review the challenge set at the beginning of the lesson and assess the progress made.

Further work

The children could use poster paint to decorate their fossils and make them appear more realistic.

These guides to Fossil Hunting are useful if you want to go and search for some real fossils:

<https://www.nationaltrust.org.uk/features/a-beginners-guide-to-fossil-hunting>

<http://jurassiccoast.org/discover/things-to-do/fossil-hunting/>

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science.cleapss.org.uk/Resource-Info/PS072-Using-plaster-of-Paris-in-schools.aspx