



Sedgwick Museum
of Earth Sciences

Investigating rocks activities

A good starter activity

Give each group or table a knotted handkerchief/napkin bundle containing pebbles, rock fragments, sand grains, assorted crystals and fossils (laminated pictures or replicas will do). Label the bundle “Things a rock might contain”.

- Ask the children to sort and name the objects in the bundle.
- Have they seen these things before? Where?

Sorting, grouping and classifying rocks activity

1. Give each group of children a varied collection of rocks.
2. Ask them to think about ways in which they could sort the rock samples.

What features (criteria) did they use to sort their rocks? Why? How else could you have grouped them?

Think about which properties are scientific (colour, texture, grain size, whether they are made from interlocking crystals or grains that are stuck together) and which properties might be less useful to a scientist (eg the size of the sample is probably determined by the person who collected it!)

Can you draw up a classification key for the rock samples so that others can classify them in the same way? Swap the set of rocks and the key with another group to find out.

Lava Recipe

To simulate lava, and to model a volcanic eruption, mix red food dye, a dash of washing up liquid, a ¼ teaspoon of bicarbonate of soda and some vinegar for a frothy, flowing eruption. Mix in a film canister placed inside the crater of a model volcano— great for bringing models to life!

Wax volcano

Lava lamps are a great way of demonstrating how hot molten magma rises upwards through colder denser rock. If you don't have lava lamp try this.

Put a 2-5cm layer of red or orange wax at the bottom of a large glass beaker. Cover with sand until the beaker is half full. Top up with water until three-quarters full. Heat the beaker over a tea-light or Bunsen. As the wax melts it starts to rise up through the colder, denser sand and “erupts” at the surface of the water.



Photo: Peter Kennett

Modroc Mountains

This is much quicker and easier than papier mache. Use a large polystyrene tile or cardboard based. Use scrunched up newspaper stuck down with masking tape to get the overall shape. Cover with a layer of Modroc (plaster of Paris bandages). Paint when dry.



Dispose of the soaking bowl water carefully as the plaster will block sinks and drains. A less messy way to build models quickly is to use plasticene on small wooden boards. Use cocktail sticks for detail and to make flags to label various parts.

Magma → vesicular (bubbly) lava, the fizzy pop model

Deep inside the earth rocks and magma (hot, molten rock) are under tremendous pressure. As magma rises up towards the earth's surface the pressure decreases (just like taking the lid off of a bottle of lemonade). Gasses dissolved in the magmas start to bubble out of the liquid. If this magma is suddenly erupted (out of a volcano) it cools so quickly it solidifies trapping the bubbles. This forms a holey rock called vesicular lava. The extreme version of this rock type is pumice, which is often less dense than water.

Sedimentation

This is a quick and simple way of demonstrating how sedimentary rocks are deposited. Half fill a bottle (ideally a clear plastic one) with soil, sand, stones and small shells. Fill to the top with water. Shake the bottle to get all the particles into suspension.

- What happens when you stop shaking?
- Which particles sink fastest?
- Compare the particles at the bottom with those at the top. What do you notice? Can you suggest why this might be?

When sedimentary rocks have been deposited in flowing water or by wind, eg a river channel, we see a similar pattern with the larger grains being deposited first.

This photo by Ian West, a geologist at Southampton University shows this very clearly.

Ian has produced a very comprehensive guide to the geology of SW England (the Jurassic Coast) which is an excellent source of information and images: <http://www.soton.ac.uk/~imw/index.htm>



Metamorphism and deformation demonstration

Press shells or leaves into plasticene – these simulate fossils in a rock. Remove the shells leaving the outline and texture in the clay. Now stretch and squeeze the plasticene.

- What happens to the shell shapes?
- Do they stay the same shape and size?
- How do the shapes change?

Geologists use deformed fossils to help them to work out the amount of strain that has been applied to a rock.



Sand Art Stratigraphy

Have you seen those glass bottles filled with layers of coloured sand making patterns and pictures? Try making simple sand art as an introduction to stratigraphy (the study of layers of rocks).

Remember in sedimentary rock the layers are called “beds”. The ones at the bottom are the oldest as they were laid down first.



Sometimes there are breaks in deposition of a sequence of rocks. These can last for thousands or even millions of years, and can include periods of erosion, uplift and tilting (due to folding and faulting) of the lower layers of rock. This break is called an unconformity. In a sequence of rocks it is usually visible as a change in the angle that beds lie relative to each other, or a sudden change in the type of sediment that is being deposited.

Can you create a sand art unconformity by having a set of beds lying in one direction, overlain by different set of beds lying in another direction? Try tilting the bottle to build up layers in a different orientation.

Which beds are the oldest?

Sandwich stratigraphy and folding

- Make sandwiches with different types of bread representing different rock types.
- Squeeze the sandwiches from the sides and watch how they crumple, fold and distort. This is what happens to layers of rocks when continents collide and fold mountains (like the Alps and Himalayas are formed).

Imagine the huge pressure (and temperatures) necessary to deform rocks. This is how metamorphic rocks are made.

Introduction to classification keys – design a key activity

This is a useful starting activity before trying to classify rocks, minerals or fossils. Provide children with pots with containing about ten different objects, such as pasta, a paper clip, a drawing pin, rice etc.

- In small groups children must produce a key for that set of objects.
- First divide objects into two groups by asking a question such as “Is it metal?” or “Is it edible?”
- Then the group continues to divide or classify the objects until they are isolated as individually identifiable objects.

Now test the key, by swapping keys with other groups to see if it works (a nice example of peer assessment).



KS2 Extension

Hand out 2 or 3 new objects e.g. a plastic ruler, different types of existing objects e.g. differently shaped pasta. This not only tests key but starts to intro the idea of natural variation at species level.

KS3 Extension

Have different types of screws (or same objects to classify from start) – this requires really detailed observation noting both similarities and differences at different classification levels.

Class Museum Display

Ask children to look for, and bring in, geological samples they may include things they've found like pebbles or fossils (if you're lucky) from the beach or garden or that they have bought.

Display these along with hand lenses for close observation work. Tell the children that they are curators, and that it is their job to help other people to learn from their objects. Ask the children to design and complete their own display cards which include useful information about the specimen. This could include: name, a brief description, where it came from (encourage them to find out the area/country rather than writing "a shop"), and a paragraph about why they find it interesting/beautiful/strange etc. Include the name of the collector (their name) on the card. If you get a really good display you could invite other classes to visit your mini-museum.

Use this as a way in to learning about museums and collecting, and also caring for objects.

Investigating soils activities

What is soil?

Soil is millions of years old. It is made up of tiny pieces of rock and the decayed remains of dead organisms.



There are generally three layers of soil:

- Topsoil composed of decayed animal and plant material, called humus,
- Subsoil composed of humus and rock particles
- Bedrock the underlying rock from which the soil formed. Weathering, erosion and freeze-thaw cycles cause the rock to break down and for pieces to break off. In time these fragments become smaller and smaller and eventually become soil.

Animals that live in the soil (worms, bacteria, moles etc) all help to create more soil by eating and breaking down organic matter.



Comparing soils activity

Look at different soils in shallow dishes. Use hand lenses/magnifying glasses/microscopes to study them closely. Compare the samples.

- What does the sample contain (rock fragments, sand, plant matter)?
- What bedrock do you think they formed over?
- How would you describe them? Sandy? Chalky? Peaty?

What evidence do they need to look for to help them to answer these questions?

Soil drainage investigation

Provide a selection of soils.

- Which of these soils will retain water?
- Which soil do you expect to drain most easily?

Test to see if your prediction was correct.

Place a sample of each soil in a funnel lined with filter paper. Place the funnel in a beaker. Pour water onto the soil. Record how much water passes through to the beaker. Which drains quickest? Which holds retains the water? Which soil would be best for gardening? Why?

How can you ensure this is a fair test? (Think about sample size, dryness at start, amount of water used).

Comparing soil profiles

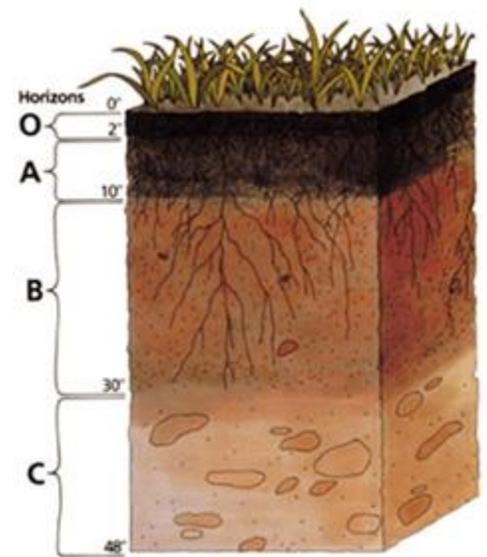
Study pictures of various soil profiles. There are plenty of photographs and diagrams available on the internet!

1. What do you notice about the thickness of the soil in some places?

The thickness varies a lot in different environments; desert soils tend to be thin with little organic matter, bogs tend to have deeper, wetter, more organic, peaty soils.

2. What do you notice about the colour variations?

Colour can indicate the environment a soil originated in as well as reflecting mineral content e.g. red soils often have higher iron content



Visit a geology museum

Try to visit a museum and make use of their viewing, handling and loan collections. Many local museums have geological collections. For information about the Sedgwick Museum contact the Education Coordinator: museumeducation@esc.cam.ac.uk or www.sedgwickmuseum.org

