

KS2 EARTH SCIENCE INVESTIGATION - KS2 – National Stone Centre

Recommended preparation prior to field work:

At an early stage, it is advisable to contact the National Stone Centre to arrange a date for the visit and book the practical activities available on site. These include “gem” panning, fossil casting and fossil rubbing. Full details are given at the time of booking and are available on the website. A preparatory visit to the site is essential.

It is assumed that, prior to this visit, schools will have already undertaken class-based activities related to rocks and possibly soils. The following packs, published by ESTA, were written to support the QCA Guidance, Unit 3D Rocks & Soils. These, and the additional activities listed, will give teachers and pupils a useful vocabulary and introduce Earth Science concepts in a practical way. Many can then be put into context by investigating the ancient world largely hidden in the rocks beneath our feet. “Working with Rocks” provides useful background on the rock cycle and explains the terms igneous, sedimentary and metamorphic rocks. In both packs porosity and permeability are clearly defined.

The UK Geology Wall Map, published by the Ordnance Survey would be useful additional reference material. Teachers may wish to introduce soils as part of the field visit, collecting samples for later investigation.

‘*Working with Rocks*’ includes the following activities:

1. Sequencing – Story of a marble gravestone [literacy].
2. Sorting rocks – using different criteria, including texture, colour.
3. Rock identification – using key terms as clues, introducing names of common rocks.
4. Testing rocks – testing for porosity, permeability and “hardness”. Making wells.
5. Weathering – how to weather your own rock by freeze/thaw.
6. Use of rocks – devising a town trail & showing the use of building materials.

‘*Working with Soil*’ includes the following activities:

Science/Geography:

1. Looking at soil - see, feel, smell, content & properties.
2. Separating soils - by sieving dry.
3. Separating soils - by settling in water.
4. Porosity - water held in pore spaces.
5. Permeability - rate of water draining through.
6. Soil erosion - with or without vegetation cover?

There are also four Literacy and five Numeracy activities based on a storybook about a family of worms! Work on maps includes scale and compass points.

Additional activities:

1. To model layering in sedimentary rocks by settling in water – a demonstration.

Collect samples of different coloured sand, silt, and a few broken shells. Mix each sample with water in a beaker. Half fill a transparent tank or plastic jar with water. Carefully pour one beaker at a time into the larger container. Observe the settling of the sediment. Do not disturb. Pour in another beaker and observe. Repeat, using shells and the remaining samples. Note that clay in any of the samples will remain in suspension, make the water cloudy and take ages to settle. The sediment will be layered. Ask the children which is the oldest layer (the one on the bottom). Which is the youngest layer? (the one at the top).

Geologists call this 'the law of superposition' and it helps them to work out the order of a sequence of events as shown by the rocks.

2. To model geological time

There are several ways of demonstrating the immensity of geological time.

The Earth was formed about 4,600 million years ago. Use a paper roll or string to make a time line. At a scale of 1cm to 1 million years it will be 46 metres long. To fit your classroom, you may need to reduce the scale in the oldest part. The names and dates of the geological periods of the last 570 million years, with significant events, are illustrated in column form on the UK Geology Wall Map, published by the Ordnance Survey. The advantage of a column is that older are beneath the younger!

Other comparisons involve using a 24 hour clock or a calendar year.

See also: Teaching Primary Earth Science, issue 43 – Geological Time.

3. Fossils

As fossils will be seen on the visit, it will be useful if the children have some idea what they are.

"A fossil is the remains or trace of an animal or plant which lived in the distant past and is now found preserved in rocks. A body fossil is the altered remains of an animal or plant itself, eg shell, bone, leaf. A trace fossil is the trace left behind by an animal, eg footprint, burrow".

Your local museum may have specimens to loan to schools. There are also many reference books available for children.

See also: Teaching Primary Earth Science Issues 1 – Fossils; and 22 – Putting Fossils into the National Curriculum.

Making plaster casts of fossils is one activity offered by the NSC

For Teacher Reference

The following issues of Teaching Primary Earth Science provide useful background information for a visit to the NSC:

- 1- Fossils; 2 – Introducing Rocks; 3 – Soil; 5 – Using Rocks; 9 – Minerals;
- 10 – Out and About 1; 12 – Out and About 2; 20 – Out and About 3;
- 22 – Putting Fossils into the National Curriculum; 24 – Out and About 4;
- 25 – Out and About 5; 30 - The National Stone Centre;
- 37 – Organising Field Trips; 38 – Spotlight on Limestones and their uses.

Recommended follow-up activities to field work:

Much material could go into a folder on the National Stone Centre, being part of a wider study, with follow-up work on quarrying and use of stone here and in the local area of the visiting school.

- 1. Completion of all worksheets**, diagrams and drawings for inclusion in record folder.
- 2. National Stone Centre Folder**, for each child, as a record of the visit. Include all work done during the visit, reference materials and any leaflets collected by the children. The visit provides plenty of opportunity for developing aspects of the literacy curriculum including reports, use of notes and descriptive writing.
- 3. Classroom display** of all aspects of the field visit, including reports, photographs, drawings, maps and samples.
- 4. The display could include links to the UK Geology Wall Map** to show places of origin of different rock types used in the Millennium Wall and steps.
- 5. Geological Time Line or Column** to show the ages of the different rocks found on the site.
- 6. Homework/Research on fossils - Write the story of the last day of the crinoids.** Illustration as a cartoon strip to record the series of events. Lived, died, buried, fossilised, uplifted, blasted out, found by quarry man.
- 7. Homework/Research on Quarrying.** Linked to the adjacent Dene Quarry with viewing platform gives the “wow” factor and display panel shows the processes involved. Note size, depth, benching, blasting, dumper trucks, crushers, road and rail transport, environmental impact, reclamation, jobs etc. Relate to other quarrying local to the visiting school.
- 8. Homework/Research into uses of limestone** in the National Stone Centre area [or other rock local to visiting school]. Incorporate into classroom display. Where does all the limestone go to? [See PEST 38 – Limestone – The world’s most useful rock]. Building stone; aggregates for roadstone, including coating with tar; railway ballast; burnt with shale or clay to make cement; used in making iron and steel, and glass; as a filler in paint, plastics and rubber; neutralises acid soils and power station gasses; even used in animal feeds and in flour and toothpaste! Relate to other quarrying local to the visiting school.
- 9. Homework/Research into Lead Mining.** Linked to “gem” panning activity and possible visit to the Peak District Mining Museum at Matlock Bath.
- 10. Sequencing exercise** on the story of NSC from Tropical Reef to Tourist Attraction. This would require research by children or could be a teacher-led lesson summarising the main observations seen in the rocks and interpreting the story they tell us.[see summary notes]

Working with Soil

If not done prior to the visit, it would be appropriate for the Soil topic to follow the visit even if the school isn't following the QCA guidance, Unit 3D –Rocks and Soils. The notes on preparation for the visit give details of ESTA's Working with Soil pack.

It is anticipated that several soil samples will have been collected during the visit and the sites marked on the map.