

© UKRIGS Education Project: Earth Science On-Site

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Recommended preparation prior to field work:

At an early stage, it is advisable to contact the Somerset Earth Science Centre at Moon's Hill Quarry to check on permission to visit Tedbury Camp Quarry. [www.earthsciencecentre.org.uk]. You might want to visit Moon's Hill Quarry itself and use the expertise of the teaching staff at Somerset Earth Science Centre for a variety of activities in addition to this Earth Science Teaching Trail. A preparatory visit to Tedbury Camp Quarry is essential, not only to familiarise yourself with the Earth science aspects but also the ecological potential of the site and to make risk assessments.

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. Ask the children to predict what will happen when material is tipped in. 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? (Answer: the one at the top).

A similar model could be the daily disposal of rubbish over a week. If collection is made early on Monday morning the rest of Monday's rubbish will go into the bin & reach the bottom. Tuesday's rubbish will be next, on top of Monday's, followed by Wednesday's etc, with Sunday's rubbish on top - the last in the bin and youngest! 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. Fossils

As fossils may 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" [Teaching Primary Earth Science, **Issue No 1 – Fossils**].

Your local museum may have specimens to loan to schools. Children may have collected some of their own from various localities and should be encouraged to do some research and to "show and tell" to their classmates. 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 children enjoy.

3. 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 below younger!

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

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

For Teacher Reference

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

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,	24 - Out and About 4,
25 - Out and About 5,	37 - Organising Field Trips,	38 - Spotlight on Limestones and their uses.

Tedbury KS2 Suggested Follow-up Work.

Suggested Follow-up work

Much material could go into a folder on Tedbury Camp, being the first part of a wider study, adding later sections on soils, vegetation, wildlife, conservation, recreation and quarrying.

If visiting East Mendip Study Centre, teachers might wish to use a separate folder for quarrying.

1. Completion of all worksheets:

*Quarry Map and Site A **pupil activity sheet 1** – A first look at the quarry.

*Site B **pupil activity sheet 2** – View from 20m.

*Site B **pupil activity sheets 3, 4 & 5** – A close look at the rocks.

*From Site B to C **pupil activity sheet 6 & 7** – A close look at the Quarry floor.

*Site C **pupil activity sheet 8, 9 & 10** – On the edge.

*Site D **pupil activity sheet 11** – Plants taking over.

An optional worksheet combination is activity sheets 1 with 12, the Summary pupil activity sheet which summarises activity sheets 2 to 11.

2. Classroom display of all aspects of the field visit, including maps, diagrams and photographs. Samples of both limestones could be displayed, showing a broken, fresh face, suitably labelled. Sample may be cut [by an adult with a DIY tile cutter] and varnished to bring out the detail, possibly showing layering and fossils within the sedimentary rocks. Recognisable fossils may be identified using reference books and making plaster casts of fossils is an enjoyable activity [see preparation notes].

3. Demonstrate layering in sedimentary rocks – as described in preparation, including fine and coarse sand, broken shells etc. Put results into the display, with samples both limestones [as in 2] and other sedimentary rocks you may have to hand. Include photographs from Tedbury Camp and elsewhere [including postcards].

4. The display could include the UK Geology Wall Map. Tedbury Camp is on the boundary of the bluish [Carboniferous] and brownish [Jurassic] shading west of Frome. Rock samples children collect from further afield could be added to the display, with labels and markers linking the sample to the location on the map.

5. Make a model of the quarries - use plaster to cement corrugated card and sand into hard beds of sedimentary rocks, the lower ones tilting to N, upper ones horizontal. Papier mache could also be used. Half of model could show a working quarry with small machinery, lorries etc, with the other half as landscaped today [with "vegetation" purchased from toy/model shops]. If visited, Whatley Quarry could be used as an example of a working quarry, with the added feature of rail transport.

6. Research into quarrying - Quarrying continues at Whatley, a study in itself! Aspects to focus on include: size, depth, benching, blasting, dumper trucks, crushers, road and significant use of rail transport, environmental impact, reclamation, jobs etc.

Collect some data on tonnages and use [see below].

Relate to other quarrying local to the visiting school.

Visit the Quarry Products Association website to view the "Virtual Quarry"

www.qpa.org or www.virtualquarry.co.uk

7. Research into uses of both types of limestone - in the local area and further afield. Incorporate into classroom display. Where does all the limestone go to? [See **PEST 38 – Limestone – The world's most useful rock**]. Early use as a building stone in churches and houses, as well as for walls and bridges; used to neutralise acid soils and as a flux in iron furnaces, partly powered by water.

More recently they have been burnt with shale or clay to make cement; and the harder Carboniferous limestone has been used as aggregate for roadstone, including coating with bitumen, and railway ballast; 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!

Take photographs of any examples of these rocks being used and include in the classroom display.

Children bring in items for a shopping basket display of items used every day which contain limestone or in which limestone has been used in its manufacture.

8. Sequencing exercise on the story of Tedbury Camp Quarry.

The story could be illustrated in cartoon form, or the seven slides scanned into a power point presentation with captions. The main parts of the sequence are given below:

1. Deposition of lime mud and shell fragments in tropical sea 340 million years ago, compressed and cemented by calcite.
2. Rocks are uplifted, folded and fractured by Earth movements.
3. 180 million years of weathering and erosion wore away the landscape to sea level.
4. Deposition of shell fragments and oolites of lime mud sediment in the sea 190 million years ago, compressed and cemented by calcite.
5. Rocks are uplifted and fractured by Earth movements.
6. Weathering and erosion wear away much of the landscape over millions of years.
7. The present landscape is used by Mankind for farming, quarrying, building and tourism.

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 soil samples will be collected during the visit from a selection of localities.