

EARTH SCIENCE INVESTIGATION - KS2 - TRIASSIC PARK HALL

Recommended sources for preparation prior to field work:

Many local children are likely to know some information about Park Hall already, from family or earlier school visits, thus providing a useful starting point. It is assumed that, prior to this **Earth-Science On-Site** 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, incl 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.

For older children, preparation could include measuring slope angles with a simple clinometer.

Additional activities relating to features found at Park Hall:

1. To model the rounding of pebbles during transport (e.g. by rivers).

Demonstration or small group activity.

Weigh, then place several cubes of sugar in a closed container and shake for 30 seconds. Observe that the cubes have become rounded and reduced in size with residue (dust) of fine powder fragments. Repeat at 30 second intervals. Measure the 'lumps' by weight at each stage and record/graph results (time/size).

This activity shows that large fragments become more rounded and reduced in size when they are subjected to movement, (involving collisions with other rocks in rivers, beaches etc). The finer materials broken off become reduced to sand, silt and clay.

2. To model layering in sedimentary rocks by settling in water.

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 the sediment in the tank. 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 enables them to work out the order of a sequence of events as shown by the rocks.

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.

4. To model river erosion, transport and deposition.

This is best used as an extension activity or for older children studying Rivers as part of the Geography curriculum.

Demonstration

A child's slide extension or guttering can be used as the channel for this activity. The channel will need to be gently sloped, supported by bricks/blocks of wood, draining into a large plastic container (wide bowl). The upper three quarters of the channel should be covered with a sand and gravel (pea-sized) mixture. Water will need to be supplied via a flexible tube clamped at the top of the channel. Turn water supply on and observe the river develop on the sand/gravel mixture. Many Earth science processes can be observed at work:

- Erosion - as the river cuts into its bed and banks.
- Transport - sand and finer sediments are moved along the river bed and in suspension.
- Deposition - sediments settle on the wide channel bed as sand bars and on the inside banks of meanders. Watch the sediment as it moves along the top of the sand bar. As it reaches the edge of the sand bar it avalanches down the front and sides at an angle. This sediment deposited at an angle produces 'cross-bedding'. It can be seen when cut through, as in the rocks at Park Hall. (See **Figure 1**, below showing "cross bedding" sloping from right down to left, indicating a flowing current to the left, or north)

Figure 1. Cross Bedding at Play Canyon, Park Hall.



Variables can be introduced by altering the gradient and volume of water. These variables model changes in real rivers.

Large volumes of water, as a result of occasional flash floods in desert areas, can move vast amounts of sediment, including large boulders. As the flow of water loses energy the largest boulders and pebbles are deposited first, followed by smaller pebbles and gravel, then sand, silt and clay. Over hundreds of years such sediment can be transported hundreds of kilometres, becoming more rounded, smoother and smaller along the way.

5. See also the animation of cross bedding in PH4_KS3_clip.exe - a short animation with narration for Key Stage 3.

Videos and still pictures of such river environments can also be useful.

See also the <http://www.jesei.org> website, and for available printed materials go to www.esta-uk.org