

## Third and Fourth Class

### Strand Unit: Rocks and Soils

#### ***Safety first***

***Before allowing children to engage in experiments teachers should read the safety advice contained in the Teacher Guidelines for Science and in the section Organising fieldwork above (pp. 74–81).***

The suggestions in this exemplar involve experimenting with rocks and soils, and when handling these materials the following should also be noted:

- the collection of rocks, soils, plants or any other materials in the environment should be done only under the direct supervision of an adult
- great care should be taken when handling soil because of the risk of infection. Gloves should be worn and any cuts, sores or abrasions should be covered
- hands should always be washed thoroughly after any activity in which soil is used
- rocks should be covered with cloth and goggles worn if specimens are to be broken (by an adult or by a pupil). Care should be exercised when handling fragments, as these can be very sharp
- the experiments do not involve the use of toxic materials but, as in all experiments, children should be warned never to taste materials or place their hands in their mouths during experiments.

#### **Content Objective:**

- observe, collect and examine different soil samples in the immediate and other environments
- sort and group constituent materials in samples
- compare and contrast materials, focusing on certain criteria
- begin to explore influence of soils and rocks on animal and plant life

**Some suggested Activities:**

- ***Collect samples of rocks & soil from immediate environment***

Sorting and classifying natural materials: plants, soil, rocks, stones, mud and sand can be collected, labelled and displayed in the classroom.

- **Collecting rock samples**

Build up a reasonably comprehensive collection of rock samples in the school. This should include rocks from each of the major rock groupings (igneous, sedimentary and metamorphic). The location of those found in the environment should be noted and the samples labelled. Samples can be displayed alongside a map of the locality marking the locations of the finds.

- **Sorting and testing rocks**

Samples of the rocks mentioned above can be examined and sorted according to a number of criteria:

***Texture and appearance***

Examining the rock carefully using a magnifier, children could look for:

- a grainy rough texture (possibly sandstone)
- pebbles or larger fragments (a conglomerate)
- wavy stripes or banding (often a sedimentary or a metamorphic rock)
- crystals (often visible in an igneous rock such as granite)
- fossils (an indication of chalk or limestone)
- spots or holes (pumice stone contains bubbles caused by trapped gases).

***Colour***

When examining for colour, only freshly broken surfaces should be used, hence the need to break samples. The effect that the colour of the local stone has on the appearance of buildings can be examined in conjunction with this activity.

***Hardness***

Using samples of rocks as listed above test the extent to which the surface of each can be marked with a range of tools. These can include the child's fingernail, a paper clip, a coin, files (such as a nail file and a file from a hardware shop) and a nail. The results can then be tabulated and consideration can be given to the implications this has for the use of the materials in construction.

### ***Looking at a soil profile***

If a hole is dug down into the soil its layers (or horizons) will become visible: the lowest layer will contain much of the parent material (such as rock or, in glaciated areas, boulder clay) from which the soil has been formed while the intermediate layer (subsoil) will mark a transition between this and the top layer (topsoil) in which animals and the roots of plants live.

Pupils will be able to distinguish the layers in the profile quite readily and sometimes it is possible to see these layers when excavation has taken place for building or road extension.

### ***Examining constituent materials***

Before accurately describing soil samples, they should be allowed to handle and come to recognise pure samples of some of the possible constituent elements which they contain, such as peat, clay, silt, sand and gravel. Each of these substances has its own particular characteristics: it can be useful to place the samples in 'feely bags' so that the pupils have to handle and recognise the sample solely by touch.

Within the local area a range of soil samples will probably produce quite contrasting results. In urban areas many if not all the soils will be almost entirely artificial, created when builders landscaped housing estates during construction. In some cases it may be necessary to bring samples from further afield to allow comparisons to be made.

When soil samples are to be examined they can be spread out on newspaper. Living things can be removed and returned to the environment. Humus (dead organic matter) may also be separated out. Following the familiarisation described above children will be able to describe soil samples much more readily using terms such as 'peaty', 'sandy', 'clayey' and can look for some of the characteristics of these constituent materials in the samples. A set of tests can be assembled and the results tabulated. Can the soil be rolled into a sausage? If some soil is rubbed between the fingers, how does it feel? What colour is the sample? What does it smell like?

Filters such as a large garden sieve and a colander could be used to separate the constituent materials further and the results recorded.

### ***Settlement jars***

Page 110 Teacher Guidelines: A quantity of soil (about enough to fill half a flower pot) may be placed in a transparent plastic jar with some water, shaken vigorously and allowed to settle. Sand, silt, clay and organic matter will separate in different layers and at different speeds.

***Effect of soil constituents on growth***

Samples of sand, clay, peat and other materials may be placed in pots in which cress or other seeds are sown.

***Water in the soil***

Weighed samples of soils may be placed in foil trays and dried in an oven at a low temperature or over time. The samples can be re-weighed and the difference in weights calculated. Beakers might be filled with equivalent weights of water to emphasise the amount of liquid involved.

***Water retention***

Prepare soil holders by cutting large plastic bottles in half, cover the stopper hole with a coffee filter paper and invert the funnel into the lower portion of the bottle. The soil samples are placed in each of the funnels and an equal quantity of water poured into each, and the passage of the water through the sample (if it occurs) may be timed. In this activity children should be encouraged to discuss and predict the likely outcome of the experiment in advance and to propose the means by which results could be recorded. A check-list which could be ticked as appropriate could be drawn up, to include categories such as 'water stays on top', 'water soaks in', 'water runs through slowly', 'water runs through quickly', etc. The results and the earlier predictions should be evaluated and, if possible, reasons sought for the phenomena observed.

**Skills and Concepts Developed:**

- Geographical Investigation Skills – Investigating and Experimenting; Analysing; Recording;

**Geography approaches and methodologies:**

- Fieldwork

**Resources:**

Gloves, goggles, jars, trowels, sieves, filters, funnels, plastic bottles,

**SEE SAFETY NOTE AT TOP OF PAGE**

**Teacher Guidelines Reference:**

- page 113 -114

**Relevant websites and reference books:**

Excellent Map of Geology of Ireland – [www.gsi.ie](http://www.gsi.ie)

[http://www.gsi.ie/everyone/simplegeol/ireland/GSI\\_GeolIreland\\_A4.pdf](http://www.gsi.ie/everyone/simplegeol/ireland/GSI_GeolIreland_A4.pdf)