Site Observations

Geography: 1a, 3a, c
Aims: To accurately record observations
To observe and contrast different areas within a site.

Visit one of the recommended sites in the South Yorkshire Forest. Within the site choose three contrasting areas from which to take soil samples.

e.g. 1. an area under broadleaved trees
2. an area under coniferous trees
3. a meadow
4. a woodland
5. an area of park grassland
6. a sample from your school grounds

It would be a good activity to mark these areas on a map or to ask the children to draw their own maps including the chosen sampling sites. Before taking samples (you will need to take quite a lot of soil to complete all the following experiments) get the children to fill in a Site Observations sheet for each area. After taking samples tidy up any mess and replace turf if necessary.

Equipment

Compass, labelled bags/jars for soil trowel, augur (this is a piece of equipment which looks like a corkscrew and is used for taking soil samples without digging up very much and disturbing the ground.)

Describe location of the site

By a pond/stream
North, south, east or west
Sheltered by trees or a dry stone wall
Exposed to the elements

What is the weather like?

This may have an effect on how much water is in your soil sample

Site description

Soil at the top of a steep slope may not contain as much water as that at the bottom

How wet is the ground?

Is the ground squelchy, damp or dry? Some plants like very wet soil while others prefer it dry.

Describe any plants and animals you can see.

Include any moss, lichen, fungus, grasses, flowers, trees etc.

Look for evidence of animals such as fur, feathers, tracks and droppings.

Although larger animals may have hidden, take a closer look for minibeasts such as spiders, slugs, worms, snails, beetles.

Describe any rocks you can see - size, colour and texture

These rocks will eventually weather down to become soil and may already make up a part of the soil sample the children are to collect. The type of rock influences the type of soil which influences the types of plants and animals that will live there.

Table of describing words for site feelings

cool	damp	warm
mysterious	magical	happy
sad	gloomy	bleak
spooky	relaxing	wild

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Site Observations

Use this sheet to record your observations of each site before you take a soil sample.

1 Describe location of the site.

2 What is the weather like?

3 Site description

Steeply sloping ◯

Gently sloping ◯

Flat ◯

4 How wet is the ground?

Squelchy ◯

Damp ◯

Dry ◯

5 Describe any plants and animals you can see.

6 Describe any rocks you can see - size, colour and texture.

7 Describe the 'mood' of the site.
How the site feels to you.

Soil Sampling

Science: Materials and their properties 1d
Aim: To use simple methods to distinguish different soils.

Take a soil sample from each of the three different sites you have observed. You could also use a sample from your school grounds or compost as a contrast.

Soil is important because it supports plants and helps them to grow upright. It provides many of the nutrients and minerals needed for plants to grow as well as air and water. It provides a home for many animals such as moles, earthworms and centipedes.

Describe how your soil smells

Encourage the use of describing words such as musty, damp, dirty, clean, chalky, mouldy, fresh, stale etc.

Roll the soil between your fingers. How does it feel?

Texture - soil is generally a mixture of particles of different sizes which gives a characteristic texture or 'feel'.

Gritty/rough - indicates sandy soil

Smooth/silky - this is silty soil

Sticky - this soil contains clay

A mixture of all three - soils containing a mixture of sand, silt and clay are called loams

Other observations

Are there any stones, grit, vegetation, debris, animal remains, mould, minibeasts?

Are the particles very fine and even sized or are they lumpy and clogged together?

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Soil Sampling

Take a soil sample from each of the three sites you have observed.

1 What colour is your soil?

dark brown / black, red /brown
grey / brown, other colours(which?)

Sample 1

Sample 2

Sample 3

2 Describe how your soil smells.

Sample 1

Sample 2

Sample 3

3 Roll the soil between your fingers.How does it feel?

Gritty/rough, sticky, smooth/silky
A mixture of all three

Sample 1

Sample 2

Sample 3

4 Other observations.

Sample 1

Sample 2

Sample 3

What is Soil Made of?

Science: Scientific Enquiry 2i, j
Materials and their properties 2a
Aims: To understand that soil is made up of different components.
To accurately record observations.

The main components of soil are soil particles, humus, water and air.

The particles settle in the jar at a speed according to their size. Stones, gravel and sand will settle first. Clay will take much longer. Leaves, grass, twigs and animal remains, such as fur and feathers, will float on top. These organic remains will eventually rot down further to form humus which is full of the nutrients and minerals needed for plant growth. Humus is an important word when discussing soil and will probably need defining.

This experiment could be run three times to compare the contents of the three different soil samples collected from your site visit. Results could be compared via a group discussion or display.

Further experiments with water

To see if soil contains any water put some of each sample on a piece of blotting paper. After 5 minutes remove the soil and see what has happened to both the soil and the paper.

Further experiments with air

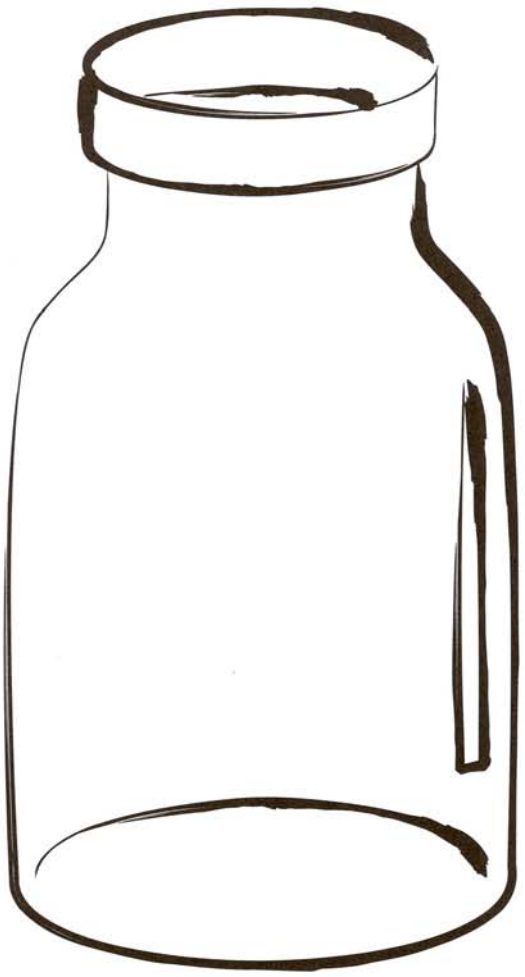
To see if air is present in the soil push a bottle top or egg cup into soil firmly so that it fills with soil. Lift it out with a trowel or spoon and place it soil side up in a bowl of water. Bubbles rising up from the soil indicates the presence of air.

Plants need water and air to grow and animals need it to be able to survive in the soil - are the collected samples suitable places for plants and animals to live in?

What is Soil Made of?

Put your soil sample in a jar so it is half full and add enough water to nearly fill the jar. Shake or stir thoroughly to mix up the contents and leave to settle for at least an hour.

When the contents have settled, complete the picture below.



1. Is anything floating on the surface?
Describe what you can see.

2. Is the water clean and clear or does it contain tiny particles of soil?

3. Describe what has sunk to the bottom.

4. Other observations/comments.

How is Soil Made?

Science: Scientific Enquiry 2e
Aims: To understand how soil is made.
To understand that this process takes several years.

Soil is made from the breakdown of rock, plants and animal remains into tiny particles.
This process is called weathering.

List all the ingredients which make up soil. The ingredients of which soil is made are:-

soil particles of clay, silt or sand which originally came from rocks;

humus which is rotted down plants and animal remains;

water;

air.

For the purpose of this experiment sand, clay and/or rocks can be used to demonstrate soil particles. Dead leaves or plants for humus, water and air will be in the jar.

Now put a little of each ingredient in a cup and stir or shake well for at least a minute.

Discuss the proportion of each ingredient needed to make good soil. Maybe use different proportions and compare results.

Does it look like soil? Yes No

If Yes then compare your soil to one of your samples - can you describe any similarities and differences?

If you chose to mix rocks, plants, animal remains such as feathers with water and air then it is very unlikely that the mixture will look like soil. However if you mixed sand/clay/silt, leaf mould, water and air this may look like soil but on a closer inspection it will not be as well mixed and the particles would be larger and less weathered.

If No, how is it different?

What do you think would mix up all the ingredients naturally?

There are lots of plants and animals in the soil. Earthworms burrow through the soil and mix it up. Roots help break up the soil as they grow through it. Fungi and bacteria eat dead organic matter and produce nutrients. Wind, sun and rain are all involved in the weathering process.

Worms are highly active in soil. Keep a few worms in a large jar with some loose soil and the surface will show some interesting changes in the course of a few days.

How long do you think it would take for all your ingredients to turn into soil naturally?

It takes a long time for soil to be produced. It takes two years for a leaf to rot down to humus and very many years for a large tree to rot down or a rock be weathered into particles by the wind and rain.

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How is Soil Made?

1 **List all the ingredients which make up soil.**

2 **Now put a little of each ingredient in a jar and stir thoroughly or shake well for at least a minute.**
Does it look like soil?

Yes ◯ **No** ◯

3 **If yes then compare your soil to one of your samples**
- can you describe any similarities and differences?

4 **If no, how is it different?**

5 **What do you think would mix up all the ingredients naturally?**

6 **How long do you think it would take for all your ingredients to turn into soil naturally?**

Soil in Action

Science: Scientific Enquiry 2f, i
Life Processes and Living Things 3a
Aims: To understand that different plants grow in different soils.
To accurately observe and record growth rates of plants.

Choose a fast growing type of seed, such as bean, sunflower or nasturtium to plant in each of the three soil samples the class have collected and also plant in a sample of compost as a control. If possible plant a variety of seeds in the soil samples as different seeds may grow better/worse in different soils. Growth should be monitored regularly i.e. weekly on the worksheet provided and it should be noted again that seeds need water and then light in order to grow. If they are inside the seeds will start growing at once but if they are outside they will not grow until spring.

Background

Germination begins when water enters the seed and it swells. The embryo then begins to grow. It produces a tiny root called a radicle which grows into the soil and anchors the new plant. Then a small shoot called a plumule is produced which reaches up to the light. Sometimes the seed case is pushed above ground by the shoot and sometimes it stays underground. The shoot quickly turns green and begins to produce food for the plant by photosynthesis.

Now your soil investigations are completed, spend some time looking at all results and comparing your different soil samples. Can you come to any conclusions from all the results? Ask the children to write up all their results and create a soils display or book full of experiments, results, art work, poetry etc.

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Soil in Action

Use this recording table to record the growth in centimetres of seeds in your soil samples.

Type of seed _____

Date	Sample 1	Sample 2	Sample 3	Compost