YEAR 3

Unit 3D Rocks and soils

ABOUT THE UNIT

Through this unit children should come to recognise that underneath all surfaces is rock which they may not be able to see, that rocks get broken down into pebbles and soils which we can often see, and that there are different sorts of rock with different characteristics. Pebbles and soils from different rocks consequently have different characteristics.

Experimental and investigative work focuses on:

- considering whether a test is fair
- measuring volumes of liquids using appropriate apparatus
- making comparisons
- drawing and suggesting explanations for conclusions.

Work in this unit also offers opportunities for children to use their understanding of science to explain observations about rocks and soils, for children to collect evidence to test ideas, and to recognise hazards and risks.

This unit takes approximately 10 hours.

WHERE THE UNIT FITS IN

Builds on Unit 1C 'Sorting and using materials' and Unit 2D 'Grouping and changing materials'

Children need:

- to understand rocks are naturally occurring
- to know vocabulary used to describe characteristics of materials
- to know how to construct a bar chart.

Links with Units 3B, 3C, 4C and geography.

VOCABULARY

In this unit children will have opportunities to use:

- names of different rocks and soils *eg slate, marble, chalk, granite, sand, clay*
- words relating to rocks and soils *eg rock, stone, pebble, texture, absorbent*
- expressions of reason using 'because'.

RESOURCES

- collection of secondary sources *eg CD-ROMs*
- rocks including at least one permeable rock *eg chalk*, *sandstone* and one non-permeable rock *eg granite, marble*
- hand lenses
- sieves, timers and measuring jugs or cylinders
- containers for soil tests, *eg transparent plastic tubes with gauze covering the bottom*
- pictures/video showing landscapes with and without visible rocks and different soils
- samples of different soils

EXPECTATIONS

at the end of this unit

most children will:	name and give characteristics of several rocks; explain that rocks are used for different purposes; recognise that there is rock under all surfaces and that soils come from rocks; recognise when a test or comparison is unfair, measure time and volume of water carefully and say what their experiments and investigations show
some children will not have made so much progress and will:	name one or two rocks; say that there are rocks under surfaces and make measurements of time and volume
some children will have progressed further and will also:	explain how to make a test fair and explain what their experiments and investigations show in terms of the characteristics and uses of the soils and rocks tested

QCA

LEARNING OBJECTIVES	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES	POINTS TO NOTE
CHILDREN SHOULD LEARN		CHILDREN	
• that rocks are used for a variety of purposes	◆ Review children's understanding of materials which are naturally occurring, and those which are not, through a visit to look at different types of rock used in a local environment *eg school or shopping centre* or use of a video to illustrate uses of different rocks. Explain that rocks are naturally occurring and that many other building materials *eg bricks* are not.	• identify some rocks *eg marble, granite, slate* and explain why they are used for a particular purpose *eg slate for a roof*	It may be helpful to clarify with children that 'stones' and 'pebbles' are small pieces of rock and that the word 'stone' is sometimes used instead of 'rock'. ⚠ **SAFETY** – All off-site visits must be carried out in accordance with LEA/school guidelines.
• that rocks can be grouped according to observable characteristics • to observe and compare rocks	◆ Present children with a collection of rocks to observe and group in terms of texture *eg size, shape and arrangement of particles* and appearance *eg range of colours*. Ask children to choose a criterion for grouping and ask other children to guess what this is.	• group rocks according to differences in texture and record and justify the groupings • allocate an additional rock to a group and explain the decision	It is helpful to children to make clear that they should look at the particles in the rock as well as colour. If possible, have different sized samples of the same rock. This helps children to understand that the same material can be 'pebbles', 'stones' and 'rock'. At this stage children are not expected to recall the names of all the rocks they see.
• that differences between rocks can be identified by testing	◆ Compare rocks in terms of how easily they are worn away. Help children to carry out a 'rubbing' test to compare how well different rocks withstand being ground down, and record results. Help children test for differences in permeability by dropping small quantities of water on to rocks and observing whether it remains on the surface or not.	• use results of their tests to rank rocks in order of ease of wearing away and/or permeability	Two rocks can be rubbed gently together. It is helpful for the children to collect and examine the particles formed. Children can use the test to rank rocks in terms of how easily the rocks are worn away. At this stage children should test for permeability by observing whether a rock absorbs small amounts of water and how quickly it does so. ⚠ **SAFETY** – Rocks should be rubbed gently and care taken to make sure particles do not get into children's eyes.
• that rocks are chosen for particular purposes because of their characteristics	◆ Children review, using secondary sources *eg books, CD-ROMs,* the uses of different rocks and link these to their characteristics.	• relate the use of particular rocks to their characteristics and explain why they are used *eg that granite is often used for steps to buildings because it doesn't wear away easily, that marble is used because it is attractive to look at*	
• that beneath all surfaces there is rock	◆ Show a series of pictures *eg cliffs, quarries, mountains with rock faces, fields/moors with rocky outcrops, muddy fields, town streets* and ask children to point out where the rocks are. Ask them to suggest why they can see rocks in some pictures but not in others.	• explain why they can't see the rock in some pictures e*g by saying because it is covered with soil or buildings*	⚠ **SAFETY** – This activity provides an opportunity for pointing out the dangers of quarries, cliff tops, etc.
• that there are different kinds of soil depending on the rock from which they come	◆ Show a video or a series of pictures showing different soils. Ask children to compare these with a sample of soil from the local environment.	• describe how the soils differ from those in the local environment	It may be helpful to show children that a soil can be made up of several layers of different colours.
• to observe differences and make comparisons • that particles of different sizes can be separated by sieving	◆ Present children with samples of different soils and ask them to observe and record differences in colour, texture and what makes up the soil. Suggest children use a sieve with large mesh to separate out large particles. Use graded sieves to separate the dry soil sample. Ask children to describe and explain what they found out about the soils.	• separate particles using the equipment provided • rank soils in terms of changing colour and particle size, justifying the ranking in terms of their observations • describe how the soil particles are separated *eg by saying the stones were too big to go through the holes*	Graded sieves can be made by pushing holes in margarine tubs from the inside. At this stage 'particle' is used to refer to 'very small pieces' of rock or soil. ⚠ **SAFETY** – Collect soil samples from areas free of broken glass etc and unlikely to be contaminated with dog faeces. Wash hands after handling soil.

Continued overleaf

LEARNING OBJECTIVES	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES	POINTS TO NOTE
CHILDREN SHOULD LEARN • to use simple apparatus to measure volumes of liquids and to measure time • to recognise when a test is unfair	◆ Ask children about, or show pictures of, puddles or floods on different surfaces *eg fields, dry sandy beaches, school fields* and ask why puddles stay longer in some places than in others. Demonstrate that water flows more quickly through sand than through clay *eg by pouring a specific volume of water which children have measured on to both soil types, placed in containers with small perforations at the bottom.* During demonstrations, do the test unfairly and challenge children to decide whether the test was fair or not.	CHILDREN • explain why the test was unfair and describe what should have been done • use apparatus provided to measure volume of water carefully	If children have already done Unit 3C they may have made some measurements of volumes of liquids. At this stage, accept children's use of 'amount' for 'volume'. It will be important to establish correct use of terms *eg volume, weight* later in Key Stage 2.
• to plan a fair test • to make and record measurements of time and volume of water • to use their results to make comparisons, and draw and explain conclusions	◆ Ask children to investigate the relationship between type of soil and ease of water flow through it. Remind them of earlier work on the characteristics of different soils. Help them to plan what to measure and what apparatus to use *eg how much water flows through in a given time or how long it takes the same volume of water to flow through different soils* and to plan a fair test and remind them about how to measure volumes of water. If necessary, provide children with a prepared table. Discuss children's results with them and ask them to explain the differences and what this shows about the different soils.	• explain how their test is fair *eg by saying they will use the same volume (amount) of soil, the same volume of water and measure how long the water takes to flow through* • make careful measurements of time and volume • explain their results *eg by saying that the water went through the sandy soil most quickly because there were bigger spaces which let the water through*	This activity offers children the opportunity to carry out a whole investigation. It may be helpful to concentrate on the aspects of investigation highlighted in the learning objectives. It is helpful to use the same soils that children observed and sieved in the earlier activity.

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