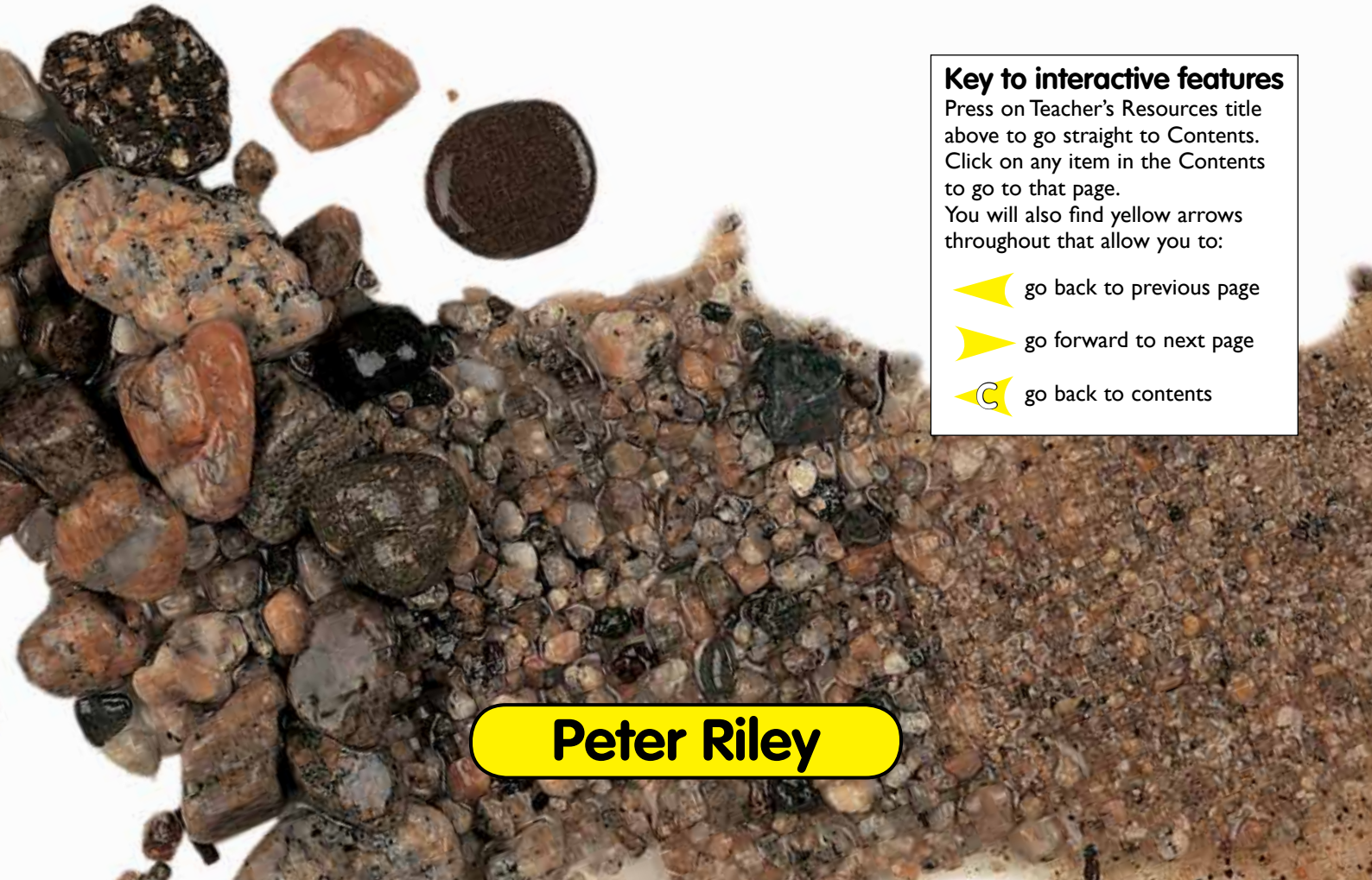
CurriculumVisions 3D Science@School

Rocks and soils

Teacher's Resources Interactive PDF

Multimedia resources can be found at the 'Learning Centre':

www.CurriculumVisions.com



Key to interactive features

Press on Teacher's Resources title above to go straight to Contents.
Click on any item in the Contents to go to that page.
You will also find yellow arrows throughout that allow you to:

- go back to previous page
- go forward to next page
- C go back to contents

Peter Riley

Curriculum Visions

A CVP Teacher's Resources
Interactive PDF

Copyright © Atlantic Europe Publishing 2012
First published in 2002

The right of Peter Riley to be identified as the author of this work has been asserted by him in accordance with the Copyright, Designs and Patents Act 1988.

Curriculum Visions' publications are protected by international copyright. The copyright of all materials in this publication remains the property of the publisher. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior permission of the copyright holder.

Curriculum Visions does permit the purchasing school to make as many photocopies as they require of the worksheets throughout this publication for educational use, providing that these copies are made and used within the confines of that purchasing school only.

ISBN 978 1 86214 756 0

Author
Peter Riley, BSc, C Biol, MI Biol, PGCE

Science Consultant
Brian Knapp, BSc, PhD

Senior Designer
Adele Humphries, BA, PGCE

Editors
Lisa Magloff, BA, and Barbara Bass, BA

Illustrations
David Woodroffe

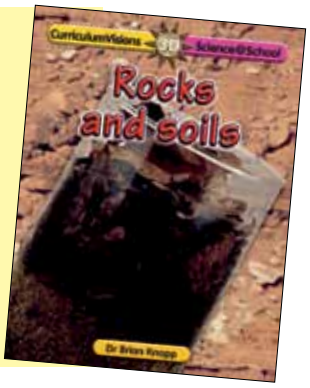
Designed and produced by
Atlantic Europe Publishing Limited

Contents

Section 1: Resources

Welcome to the Teacher's Resources for *Rocks and soils*. The resources we provide are in a number of media:

1 The Rocks and soils pupil book is the full-colour paperback book that covers the scientific principles for understanding how rocks form, differ in properties, shape the land and can be changed into soils – all in simple, easy-to-follow units which make it accessible to a very wide range of abilities.



3 You can buy various Science @School sets, for example Year 3 set, KS2 class book set, KS2 TG set or the complete Book Box set.

2 Our Learning Centre at

www.curriculumvisions.com

has almost everything you need to teach your primary curriculum in one convenient Virtual Learning Environment.

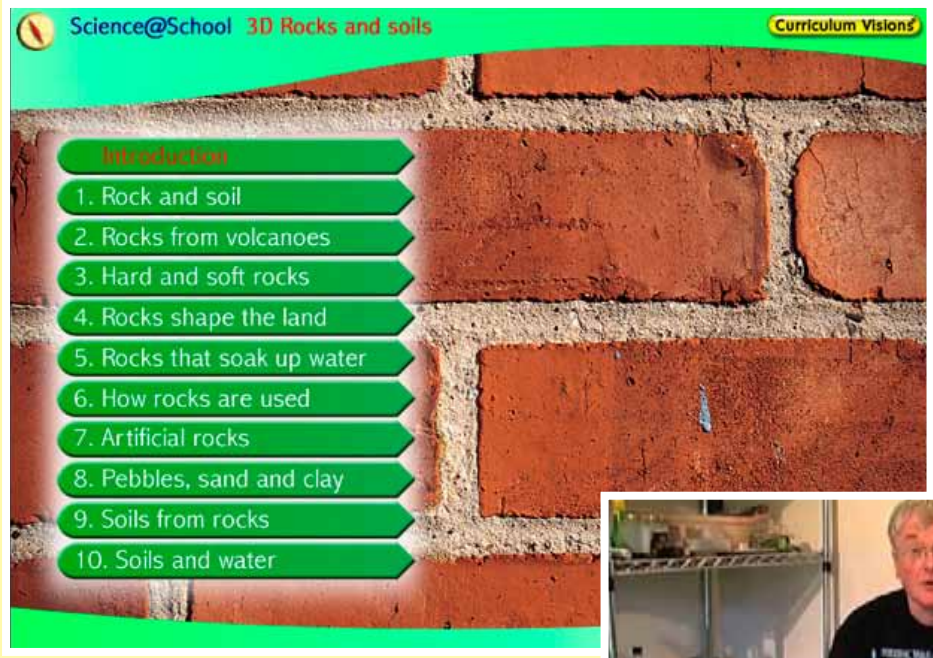
You can use support videos, e-books, picture and video galleries, plus additional Creative Topic books, graphic books called Storyboards, and workbooks. Together they cover all major curriculum areas.

All topics are easily accessible, and there is a built-in context search across all media.

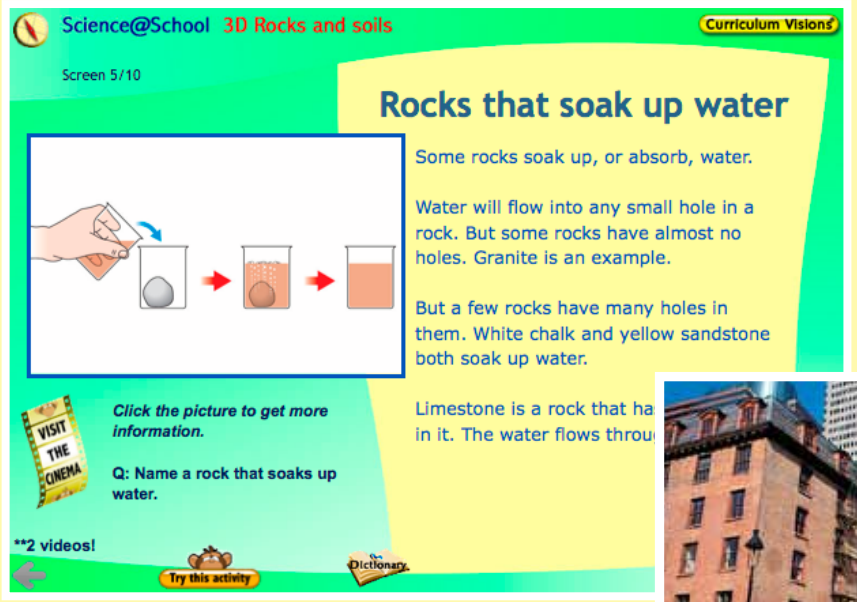
You can also use our printed student books online as part of your subscription to the Learning Centre. There page-turning versions of every printed Curriculum Visions book for use on your whiteboard.

© 2012 Atlantic Europe Publishing

▼ The Rocks and soils home screen



▲ 'Classroom cinema' video



▲ Web site page

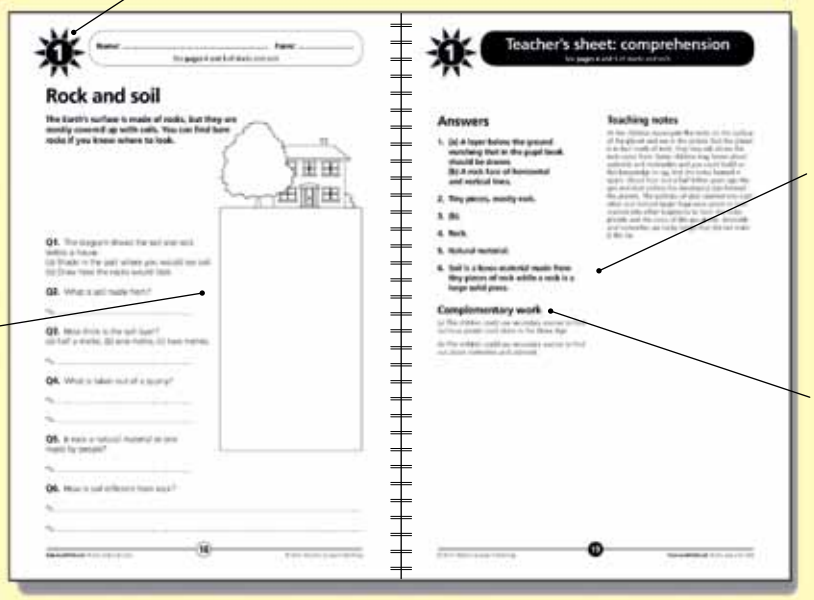
▶ Web site caption

© 2012 Atlantic Europe Publishing

▼ ***Each unit has one comprehension worksheet and one activity worksheet, each with a teacher's sheet.***

▶ ***The photocopiable comprehension worksheet and supporting teacher's sheet.***

Unit number.

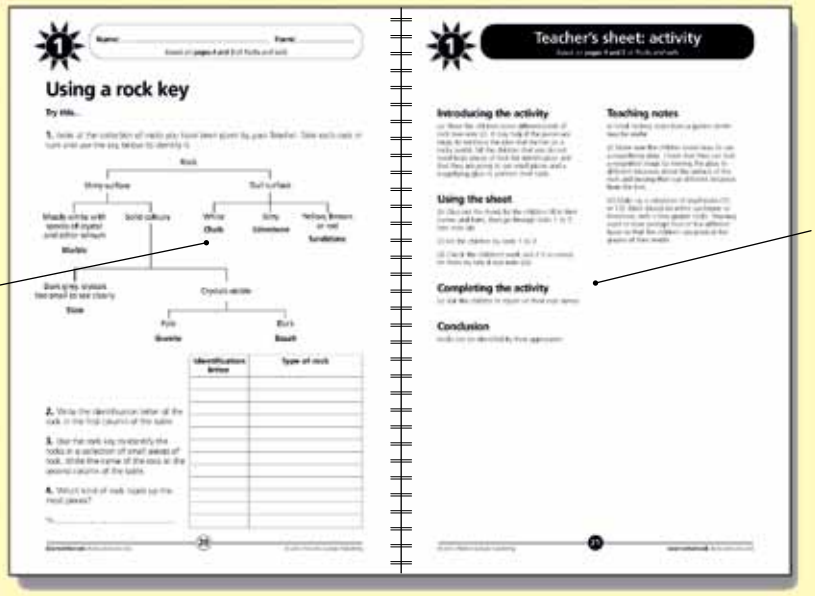


Left hand page is to photocopy and hand out to pupils.

Right hand page is the teacher's sheet and provides answers, suggestions for complementary work and teaching notes.

Resources needed to support the complementary work are shown in List 2 on page 15 of this Teacher's Guide.

▶ ***The photocopiable activity worksheet and supporting teacher's sheet.***



Left hand page is to photocopy and hand out to pupils. For some activities, pupils will also require additional sheets of paper.

Right hand page is the teacher's sheet and provides a detailed activity plan, conclusion and teaching notes. *Resources needed to support the activity worksheet are shown in List 3 on page 15 of this Teacher's Guide.*

Matching the curriculum

This book covers the rocks and soils component of the curriculum in a way that is highly relevant to work in the lower junior classes of a primary school.

It expands the children's work in materials science into an earth science context.

While covering the subject matter of the curriculum, *Rocks and soils* also facilitates the development of investigative skills by providing examples of fair tests. In the supporting activities there are several opportunities for the children to plan and carry out simple investigations to find out how the different investigative skills combine to lead to new discoveries.

The pack is fundamentally built around the idea of looking at rocks and soils as materials which shape our world and have a range of useful properties. It takes the basic fascination that children have with attractive pebbles and builds this up into scientific study so that the children can see the relationships between any rocky materials they find.

© 2012 Atlantic Europe Publishing

Section 2: The pupil book explained unit by unit

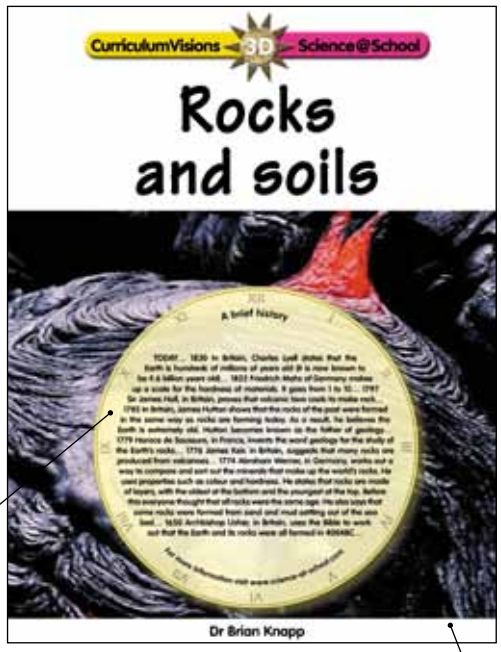
Although the pupil book – *Rocks and soils* – is clear and simple, a great deal of care and thought has been given to the structure and the content of each double page spread or unit. The worksheets and activities in this *Teacher's Guide* also link directly to the pages in *Rocks and soils*.

It is possible to use *Rocks and soils,* and the worksheets and activities, without reading this section, but we would strongly recommend that you take a short time to familiarise yourself with the construction of the pupil book.

The units are arranged in sequence, to help you with your lesson planning. In this section, a brief description of the content of each unit is given, together with hints on how to start or support it. List 1 (Starting a unit with a demonstration) on page 15 sets out the resources that you could use to do the demonstrations where suggested. The activity associated with each unit is also briefly described to help you see how the unit and activity work together.

Title page

The book begins on the title page (page 1). Here you will find information about rocks and soils in the form of a clock. You may want to use this to set the scene for the study of the book's contents. You may choose to focus on an event which ties in with your work in history, before moving onto the rest of the book. Alternatively, you may wish to skip over this page and return to it later. It is not a core part of the book, but helps the children see how the work they are doing now fits in with the work of scientists and geologists in the past. It may also be used to stimulate more able pupils to research the people and events that are described here.



A time clock giving additional historical information about the topic.

The picture shows lava turning from red to black as it cools.

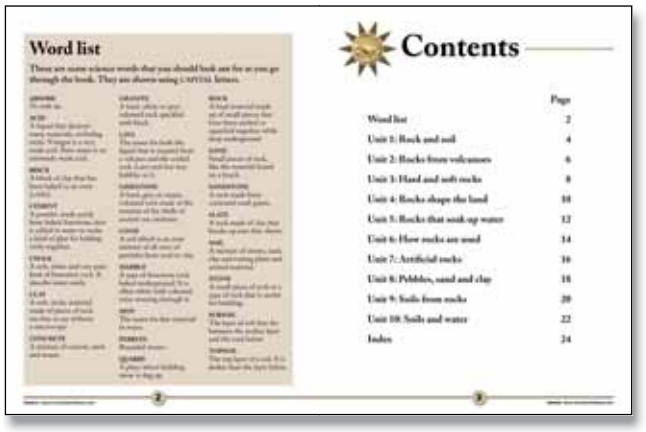
© 2012 Atlantic Europe Publishing

Word list and contents

The core content of the book begins with a word list on page 2. This is a glossary, brought to the front for the pupils' attention. Pupils could be encouraged to look at the list and see how many of the words they already recognise.

One of the important things about science is the precision with which words are used. However, many scientific words are also common words, often used in a slightly different way from how they would be used in science. The word list presents the opportunity for pupils to consider the words they already know, and the meanings they are familiar with.

When your teaching unit has been completed, you may want to invite pupils to revisit this list and see if their understanding of the words has been enhanced or changed in any way. A visual dictionary is also given on the CD.



The entire contents are shown on page 3. It shows that the book is organised into double page spreads. Each double page spread covers one unit.

The units

Heading and introduction

Each unit has a heading, below which is an introductory sentence that sets the scene and draws out the most important theme of the unit.

Body

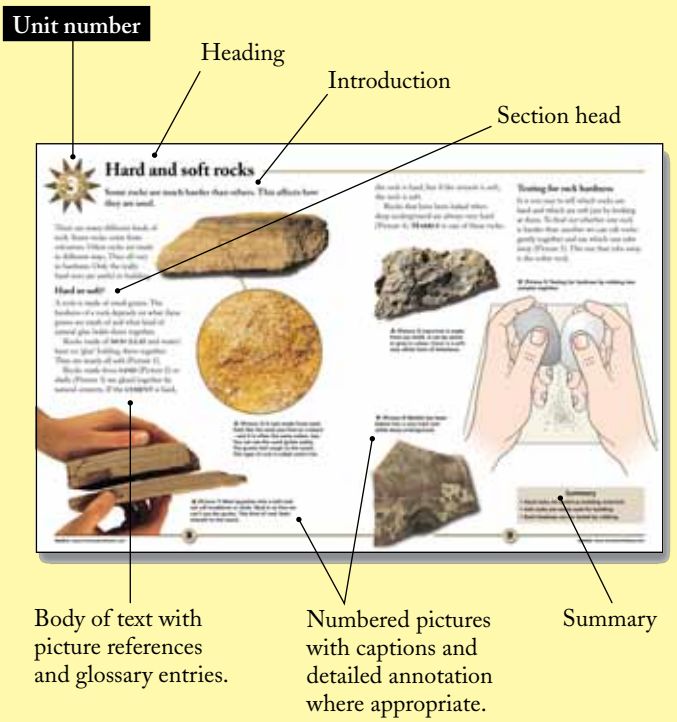
The main text of the page then follows in a straightforward, easy-to-follow, double column format.

Words highlighted in bold capitals in the pupil book are defined in the word list on page 2. A visual dictionary is also given on the CD.

The glossary words are highlighted on the first page on which they occur. They may be highlighted again on subsequent pages if they are regarded as particularly important to that unit.

Summary

Each unit concludes with a summary, highlighting and reinforcing the main teaching objectives of the unit.



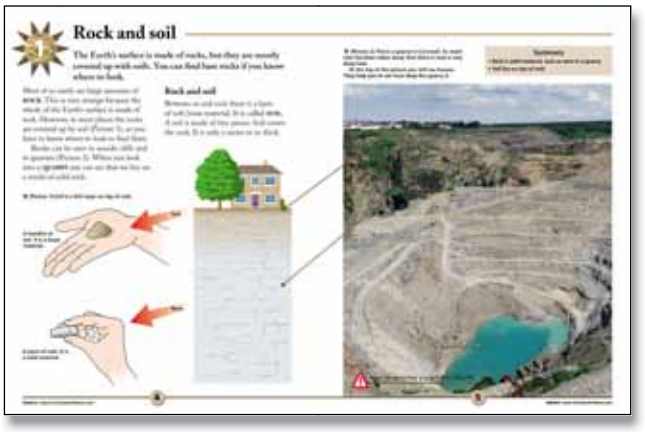
© 2012 Atlantic Europe Publishing

1 Rock and soil

When children visit the beach they often collect a few pebbles that they find attractive. You may wish to remind the children of any visits to the seashore and see if any still have some pebbles that they could bring in for a display. Alternatively, the children could search for pebbles in an area around the school to which dogs do not have access. The children could simply compare the pebbles visually at this stage and note that there appears to be different kinds of rock.

The unit begins by stating that the Earth's surface is made of rocks, but they are mostly covered with soil. It shows a large picture of a quarry so that the children can appreciate how the thin layer of soil covers a huge quantity of rock. You may use this picture to remind the children that rock is a natural material and revise work done in the infant department.

In the supporting activity the children use a key to identify different kinds of rock.



In the complementary activities the children can use secondary sources to find out about the Stone Age and rocks from space.

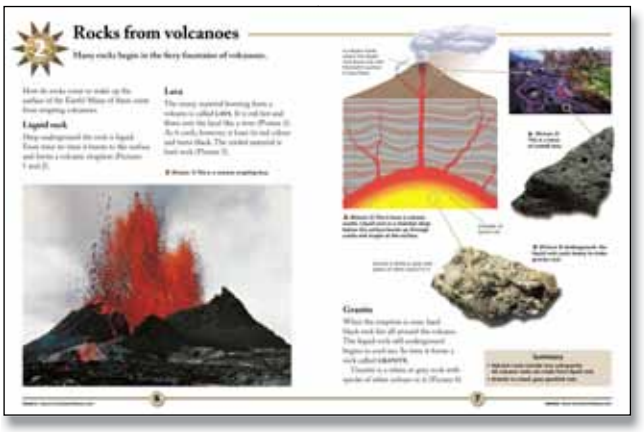
(You may wish to highlight the risks of children visiting a quarry alone.)

2 Rocks from volcanoes

A volcano is an exciting and fascinating structure that the children may have studied a little before. Begin by asking about their knowledge of volcanoes, then use the unit to review what they know and lay the foundations for later work.

The unit features a striking photograph that has been taken close to an eruption. You may want to ask the children how they would feel being so close to a fountain of lava and generate in them a sense of the power of volcanic action.

The photograph is supported by a diagram showing the passage of molten rock to the surface and the distinction is made between rock which cools underground (granite) and rock which cools on the surface (lava). The unit concludes that volcanic rocks are made from crystals and there is complementary work to extend this concept. In the supporting activity, the children compare pumice with other rocks, and use treacle 'lava' to see how temperature affects flow.



© 2012 Atlantic Europe Publishing

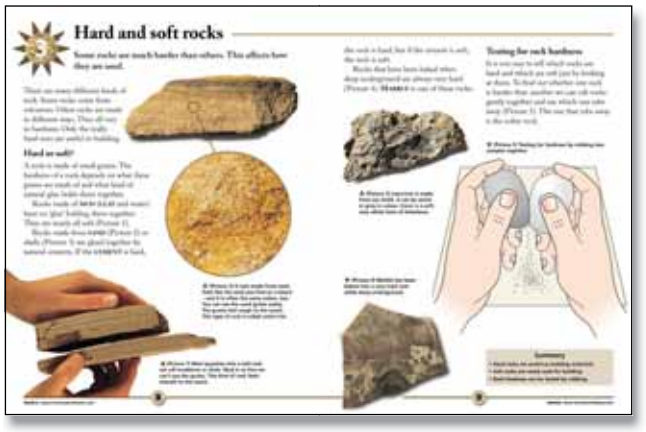
3 Hard and soft rocks

People tend to think of all rocks as hard, but when different types are compared they are found to vary in hardness.

After the unit has introduced this concept it then looks at the origins of various kinds of rock. The children may be surprised to find that some rock is made from mud and it may be useful to have some mud and pieces of mudstone or shale available so that they can be compared.

Similarly, the children could examine some sand and sandstone. Some limestone is rich in fossils and the children will enjoy looking at limestone rocks containing fossils and finding out that the rock is indeed often made from large numbers of fossils.

The heating of rock was mentioned in the previous unit and here it is mentioned again in the context of changing limestone into marble. A piece of marble to compare with the limestone will help the children realise how limestone is changed when it is baked in the Earth.



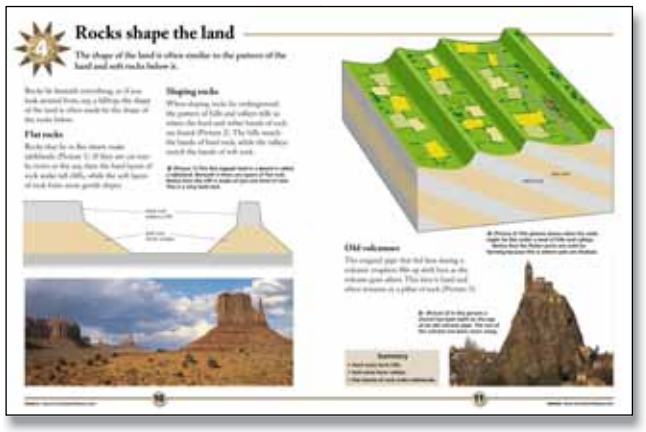
In the complementary work you can demonstrate how a fossil forms. In the supporting activity the children compare the hardness of a variety of rocks and arrange them in order of hardness.

4 Rocks shape the land

You may like to begin by reminding the children that rocks may be hard or soft. Ask them what they think would happen if a hard rock and soft rock were put side by side and each one rubbed with a hard rock. They should answer that the soft rock would become worn down more quickly than the hard rock.

You can then transfer this idea to land made from hard rock and soft rock and the way both are worn down by the weather. They should be made to realise that the soft rock would be worn down, leaving the hard rock to form hills.

The link between rocks and the landscape is made by the study of a striking photograph and interpreted with a diagram. In the landscape photograph, they see how flat rocks can be eroded to leave upstanding areas (known as mesas and buttes) in which the layers of rock show clearly. The uppermost layer is very massive and has vertical joints, so make sure that the children can identify it as a thick layer, and not as columns of rock, by close correlation with the diagram.



This is followed by the study of sloping rocks which produce a series of hills and valleys.

The unit links to Unit 2 by showing hard rock at the centre of a volcano.

In the supporting activity the children make a model landscape then cause it to erode by showering it with water. Through this they can observe how hard rock remains and softer materials are eroded away.

© 2012 Atlantic Europe Publishing

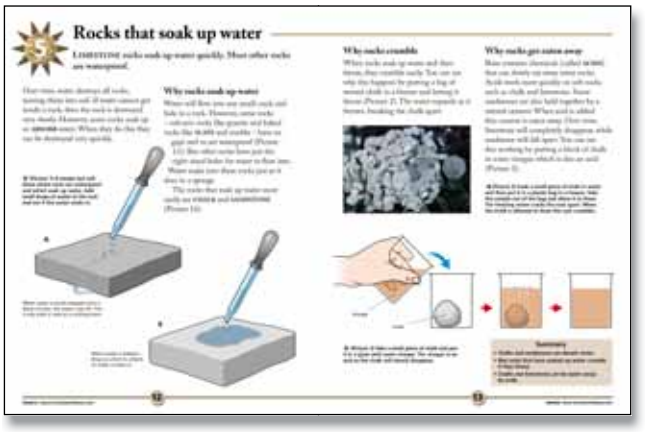
5 Rocks that soak up water

The title of the unit is so intriguing that you may wish to start the children studying the unit straight away.

Most people think of rocks as permanent structures, but in the first paragraph the reader learns that all rocks eventually turn into soil and those that soak up water may break up more quickly.

Three experiments are featured in the unit. The first shows you how to tell if a rock soaks up water and this is developed in the supporting activity.

You may like to try the other two experiments as demonstrations as you work through the unit. For the second experiment you need two pieces of chalk rock. One piece should have been soaked and frozen. This is now allowed to thaw and then compared with the untreated rock. In the third experiment you can show how acid attacks some rocks by dropping a piece of chalk in some vinegar.



The children will be impressed by the fizzing and frothing as the chalk disappears.

In the complementary activities, instructions are given to show the children how a stalactite and stalagmite form.

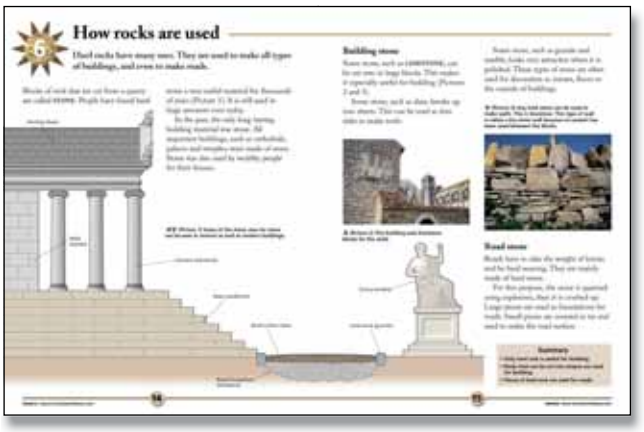
6 How rocks are used

Challenge the children to think of a stone that has a use. They may think of stone forming a garden wall or house or rock chippings covering the surface of a road.

Some children may think of more decorative stones and mention gemstones in jewellery (although these are often minerals rather than rocks). You may build on this by showing them a few stones used in dry stone walling and some gemstones in a ring or a necklace.

The unit not only shows how rocks are used but also which types of rocks are used. It links the properties of limestone, granite and marble to their uses. The supporting activity develops this by inviting the children to look for examples of stones in use in their surroundings.

The complementary activities allow the children to study the use of decorative stones in jewellery and



to find out how rocks are extracted from the ground and prepared for use in buildings.

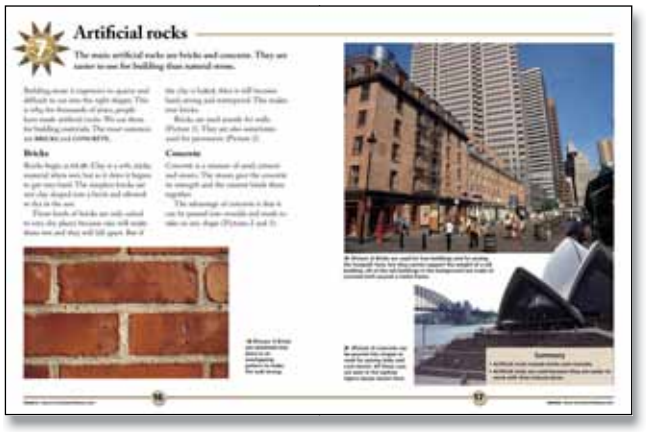
© 2012 Atlantic Europe Publishing

7 Artificial rocks

Before you start the unit, ask the children what they think is meant by the term artificial rock. Look for an answer that implies artificial rock does the same task as a real rock, but is made by people. Develop the discussion further by asking for examples of artificial rocks, then let the children check their answers by turning to the unit.

The unit begins by giving reasons for the use of artificial rocks, then describes how bricks and concrete are made. The applications of bricks and concrete are described and illustrated with two examples from around the world. A common pattern of bonding bricks together is also illustrated and you may like to use this to compare with bonding patterns in the brick walls in the school and other buildings.

The supporting activity allows the children to plan experiments, using their experiences from work on earlier units, and to carry out a comparison



of hardness and ability to soak up water between artificial rocks and real rocks.

The complementary activities allow the children to research brick making in history and the present day. They also allow children to examine the different arrangements of bricks that may be used in a wall.

8 Pebbles, sand and clay

Begin by asking the children about their experiences of a visit to a river. This may elicit anecdotes about paddling, slipping on pebbles and building dams.

Now ask the children to describe how the river might appear when it is in flood. Look for descriptions of a fast current or churning water. Ask the children to think about what might happen to the pebbles they used to build a dam. Put some soft rocks, such as pieces of very soft sandstone or pieces of chalk, in a tin and shake them up to simulate the rocks being churned up by the water. Before you open the tin ask the children what they may find. When the children see the rocky fragments ask them what might happen to rocks that are churned up many times. The children may answer that the rocks break up completely and you can direct them to investigate their answer by studying the unit.

The text begins by distinguishing pebbles, sand and clay then moves on to describe how pebbles attain a smooth surface. The swirling of pebbles in

rocky holes of a river bed is clearly illustrated and a pebble worn into a cannon ball shape is shown. The unit ends by showing how pebbles, sand and mud are arranged on a river bank.

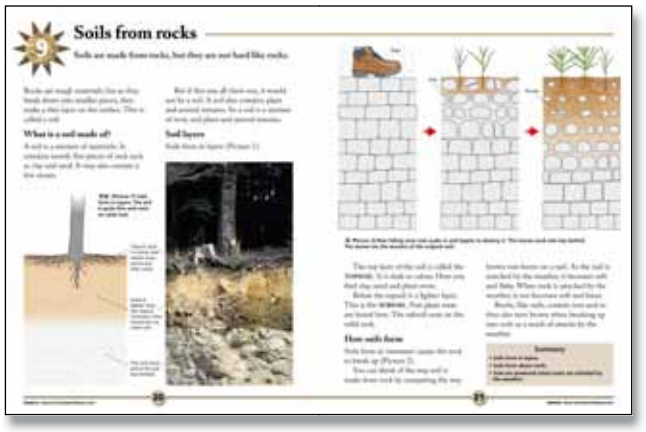
The supporting activity builds on the erosion activity in Unit 4 and lets the children discover how a river carries along particles of different sizes.

© 2012 Atlantic Europe Publishing

9 Soils from rocks

In this unit the transition is made from rocks to soil. The children may have already studied soil in *3C Helping plants to grow* in this series. If this is the case, you may like to ask them about what they remember about the soil. Pick up on the mention of rocky fragments, and ask them to use their previous work in this book to explain how the soil comes to have rocky fragments in it. Look for an answer featuring the breakdown of rocks, then leave the topic there while you ask them about digging in soil. This may lead to the idea of darker soil being on the top and lighter soil below. If possible, test this idea with the children by going out into the school grounds and digging a hole. The scene is now set to move onto the unit.

As the children work through the unit they can review their ideas on the components of the soil, how the soil is arranged over the rocks and how soil forms. The supporting activity takes the study of the components of soil further by featuring the use of sieves as equipment for separating solid



particles of different sizes. The activity asks the children to make comparisons from their sieving exercises and to arrange a collection of soils in order, based on observations of the components of the various soils.

The complementary activities invite the children to find out about soils around the world and animals that burrow in them.

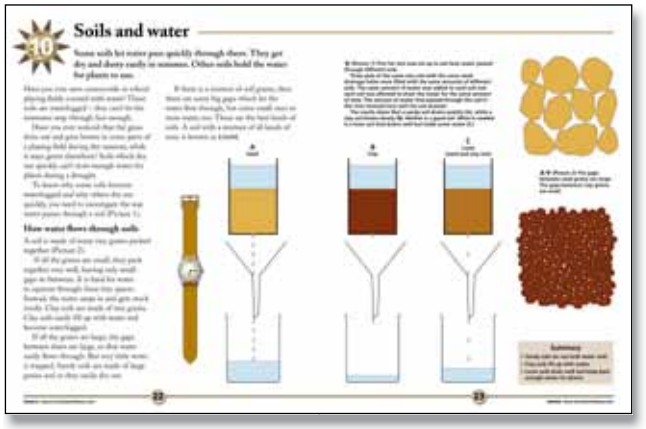
10 Soils and water

You may like to precede work on this unit by placing a small seed tray of sand over a bucket and watering it with a watering can, then repeating the operation with a seed tray of clay soil. Ask the children about any difference they see and challenge them to find an explanation.

You might like to make notes on the board about their ideas and then ask them how they could make their observations on the soil more scientific. Again, add notes to the board, then introduce the unit and let the children match their ideas with its content.

The unit features a way to make a fair test on sand, clay and loam. It also explains why the different soils drain water differently.

In the supporting activity the children plan and carry out their own test to see which of two soils – a sandy loam and a clay loam – is better at holding water. On completion of the unit and the exercise the children should have a firm grasp of the requirements for a fair test and how such a test can be carried out.



In the complementary work, the children can make two models of soil to show how the particle size affects the size of the gaps between them, and they can use secondary sources to find out about waterlogged soils in paddy fields and swamps, and why water meadows were flooded in the past.

Index

There is an index on page 24.

© 2012 Atlantic Europe Publishing

Section 3: Using the pupil book and photocopiable worksheets

Introduction

There is a wealth of material to support the topic of rocks and soils in the pupil book and in the *Teacher's Guide*. On this and the following three pages, suggestions are made on how to use the worksheets and their associated teacher's sheets on pages 18 to 57, and how to integrate them for lesson planning. On the page opposite you will find the resource lists for introductory demonstrations, the complementary work and the activity worksheets. The learning objectives are shown on pages 16 and 17.

Starting a unit

Each unit in the pupil book forms the basis for a lesson. You may like to start by reading it with the class, or begin with a demonstration (see pages 7 to 13 and List 1 on page 15). Always begin the unit by reading the introductory sentences in bold type. This helps focus the class on the content of the unit and to prepare them for the work.

The first part of the main text introduces the content, which is then developed in the headed sections. The illustrations are closely keyed to the main text, and the captions of the illustrations develop the main text content (*see* 'The units' at the bottom of page 8).

With less skilled readers, you may prefer to keep to the main text and discuss the illustrations when they are mentioned. With more skilled readers, you may want to let them read the captions for themselves. Each unit ends with a summary. The children can use this for revision work. They can also use it to test their understanding by trying to explain the points made in the summary.

You can find the learning objectives for each unit on pages 16 and 17 of this *Teacher's Guide*.

The style and content of the unit also make it suitable for use in literacy work, where the needs of both English and science are met. You may wish to use the unit as a topic study in literacy work, or you may want to perform an activity in science time and follow it up with a study of the unit during literacy work.

Using the comprehension worksheets

Each unit in the pupil book has one photocopiable comprehension worksheet in this *Teacher's Guide* to provide a test. The learning objectives on page 16 are for these comprehension worksheets and relate directly to the knowledge and understanding component of the science curriculum.

The comprehension worksheets begin with simple questions and have harder questions towards the end.

The worksheets may be used singly, after each unit has been studied, or they may be used along with other worksheets to extend the study.

The teacher's sheet, which is opposite the comprehension worksheet, shows the answers and background information to the unit. This teacher's sheet also carries a section on work complementary to the study topic. This work may feature research using other sources. It may also have value in literacy work.

Using the activity worksheets

The activities are designed to develop skills in scientific enquiry. The learning objectives for practical skills associated with each unit are given on page 17. The activities may be small experiments, may focus on data handling or comprise a whole investigation.

Each activity section is a double page spread in this *Teacher's Guide*. On the left hand page is a photocopiable activity worksheet to help the children in practical work, or it may contain data for the children to use or interpret. The page opposite the worksheet is a teacher's sheet providing a step-by-step activity plan to help you organise your work. Each plan has a set of notes which provide hints on teaching or on the use of resources. The activity plan ends with a conclusion, which you may like to read first, to help you focus on the activity in your lesson planning.

Planning to use a unit

The materials in this pack are very flexible and can be used in a variety of ways. First, look at the unit and activity objectives on pages 16 and 17. Next, read the unit in the pupil book, and the associated worksheet and activity units in this *Teacher's Guide*. Finally, plan how you will integrate the material to make one or more lessons. You may wish to add more objectives, or replace some of the activity objectives with some of your own.

© 2012 Atlantic Europe Publishing

Safety

The practical activities feature equipment made from everyday materials or available from educational suppliers. However, make sure you carry out a risk assessment, following the guidelines of your employer, before you do any of the practical activities in either the pupil's book or the *Teacher's Guide*.

Resources

The three lists below show the resources needed to support the photocopiable worksheets.

- List 1 shows resources for demonstrations suggested for starting a unit.
- List 2 gives resources needed for the complementary work featured on the teacher's sheet associated with each comprehension worksheet.
- List 3 details those resources needed for the 10 activity worksheets.

List 1 (Starting a unit with a demonstration)

You will need the following items:

▼ UNIT

1. Collection of pebbles.
2. –
3. A sample of mud and a piece of mudstone, a sample of sand and piece of sandstone, a piece of limestone and of marble. Magnifying glass.
4. –
5. Chalk rock that has been soaked, frozen and thawed. Untreated chalk rock. Chalk rock, beaker, vinegar.
6. Stones for dry stone walling, gemstones in jewellery.
7. Brick wall that shows different bonding patterns.
8. Pieces of rock, tin.
9. Access to school grounds where a hole can be dug, spade.
10. Two seed trays, clay, sand, two buckets, watering can.

List 2 (Complementary work)

Each group will need the following items:

▼ UNIT

1. Secondary sources for life in the Stone Age and formation of the solar system, asteroids and meteorites.
2. Salt and sugar crystals and magnifying glass. Crystal growing kit available from educational suppliers.
3. Plasticine, shell, plaster of Paris, water mixing bowl, spoon, eye protection.
4. Photographs of local landscape. Secondary sources about minerals and mining.
5. Secondary sources about caves, washing soda, wool yarn, dish, two jars, safe place to leave experiment for over a week.
6. Jewellery pages from a mail order catalogue, secondary sources about extracting rocks from a quarry and making building stone.
7. Secondary sources featuring brick building in Ancient Egypt and adobe bricks, walls with different brick bonding patterns.
8. Buildings coated in pebble dashing. Visit of polished-stone hobbyist.
9. Secondary sources about soil in the desert, rainforest and mountain side. Secondary sources about animals that make burrows.
10. Twelve large counters or coins and twelve small counters or coins. Graph paper one millimetre square, if possible. Secondary sources about paddy fields, swamps and water meadows.

List 3 (Activity worksheets)

Each group will need the following items:

▼ UNIT

1. Rockery rock from a garden centre. A selection of rocks to include marble, slate, granite, basalt, chalk, limestone and sandstone. Magnifying glass.
2. Pumice stone, granite pebble. Metal tray, stop clock, block of wood, cold treacle, warm treacle.
3. Pieces of granite, sandstone, mudstone, chalk, limestone or marble, coin, nail. Paper to collect fragments.
4. Bowl, rock, soil, sand, watering can.
5. Samples of limestone, granite, slate, chalk, marble, sandstone, pipette or spoon, beaker of water.
6. Arrange for a supervised walk of the neighbourhood to look at the uses of rock.
7. Brick, concrete block and clay roof tile. For children's work – brick, concrete, granite, pipette or spoon, beaker of water.
8. Plastic gutter, bowl, sand, clay, gravel and water.
9. Coarse sieve, fine sieve, tin lids or paper plates, sand, clay, aquarium gravel, loams, scales or balance.
10. Container with drain holes, funnel, beaker, supports, measuring cylinder, stop clock, sandy loam, clay loam.

© 2012 Atlantic Europe Publishing

Learning objectives

Comprehension worksheets

The table below shows the learning objectives for knowledge and understanding associated with each unit in the pupil book, using the comprehension worksheets in this *Teacher's Guide*:

Unit 1

- Beneath the soil there is rock.
- The world is made of solid rock.

Unit 2

- Liquid rock from below the Earth's surface makes some of the solid rock on the surface.

Unit 3

- Some rocks are hard and others are soft.
- Rocks are formed in different ways.
- The hardness of rocks can be compared.
- Rocks can be grouped according to their hardness or softness.

Unit 4

- Hard and soft rocks in the Earth's surface shape the land.

Unit 5

- Some rocks have tiny holes in them which let the rock soak up water.
- Some rocks do not have tiny holes and cannot soak up water.
- Rocks can be shattered by the frozen water they contain.
- Rocks can be grouped according to whether or not they take up water.
- Acids can destroy rocks.

Unit 6

- Rocks are put to use according to their properties.

Unit 7

- Some materials can be made which do the same task as rocks more cheaply and more easily.

Unit 8

- Rocks are ground down in a river to make pebbles, sand and clay.

Unit 9

- Soils are made from rocks.

Unit 10

- Some soils let water drain through them quickly and other soils only drain water slowly.

© 2012 Atlantic Europe Publishing

Learning objectives

Activity worksheets

The table below shows the learning objectives for practical skills associated with each unit in the pupil book, using the activity worksheets in this *Teacher's Guide*:

Unit 1

- Group rocks according to their observable characteristics.
- Observe and compare rocks.

Unit 2

- Make observations and record them.
- Plan an investigation.
- Make a table for the results.
- Use observations to draw conclusions.

Unit 3

- Make a fair test.
- Make comparisons.
- Present results in a logical sequence based on observations.

Unit 4

- Use simple equipment appropriately.
- Make observations.
- Make a prediction.

Unit 5

- Make a prediction.
- Use simple equipment appropriately.
- Fill in a table.

Unit 6

- Use observations to draw conclusions.

Unit 7

- Plan an investigation.
- Carry out a planned investigation.

Unit 8

- Make comparisons and identify a simple pattern.
- Use scientific knowledge to explain results.
- Draw conclusions.

Unit 9

- Make comparisons.
- Arrange the data in a logical order.

Unit 10

- Plan an investigation.
- Carry out a planned investigation.
- Present results.
- Draw conclusions.

© 2012 Atlantic Europe Publishing

C 1

Name: ..... Form: .....

See **pages 4 and 5** of *Rocks and soils*

Rock and soil

The Earth's surface is made of rocks, but they are mostly covered up with soils. You can find bare rocks if you know where to look.

Q1. The diagram shows the soil and rock below a house.
(a) Shade in the part where you would see soil.
(b) Draw how the rocks would look.

Q2. What is soil made from?

✎.....

Q3. How thick is the soil layer?
(a) half a metre, (b) one metre, (c) two metres.

✎.....

Q4. What is taken out of a quarry?

✎.....

✎.....

Q5. Is rock a natural material or one made by people?

✎.....

Q6. How is soil different from rock?

✎.....

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: comprehension

See **pages 4 and 5** of *Rocks and soils*

Answers

1. **(a) A layer below the ground matching that in the pupil book should be drawn.**
   (b) A rock face of horizontal and vertical lines.
2. **Tiny pieces, mostly rock.**
3. **(b).**
4. **Rock.**
5. **Natural material.**
6. **Soil is a loose material made from tiny pieces of rock while a rock is a large solid piece.**

Complementary work

(a) The children could use secondary sources to find out how people used stone in the Stone Age.

(b) The children could use secondary sources to find out about meteorites and asteroids.

Teaching notes

As the children investigate the rocks on the surface of the planet and see in the picture that the planet is in fact made of rock, they may ask where the rock came from. Some children may know about asteroids and meteorites and you could build on this knowledge to say that the rocks formed in space. About four and a half billion years ago the gas and dust circling the developing Sun formed the planets. The particles of dust crashed into each other and formed larger fragments which in turn crashed into other fragments to form the rocky planets and the cores of the gas giants. Asteroids and meteorites are rocky lumps that did not make it this far.

© 2002 Atlantic Europe Publishing

C 1

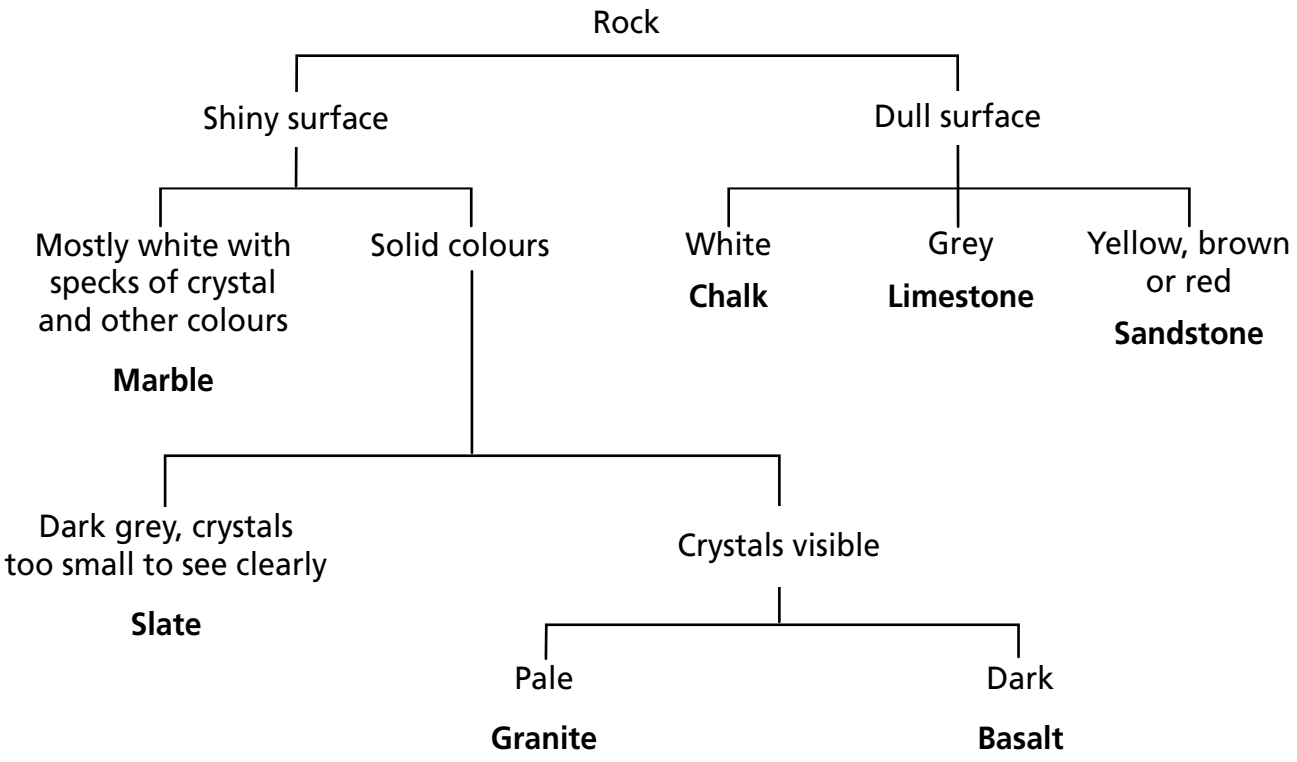
Name: ..... **Form:** .....

Based on **pages 4 and 5** of *Rocks and soils*

Using a rock key

Try this...

1. Look at the collection of rocks you have been given by your Teacher. Take each rock in turn and use the key below to identify it.



Identification letter	Type of rock

2. Write the identification letter of the rock in the first column of the table.

3. Use the rock key to identify the rocks in a collection of small pieces of rock. Write the name of the rock in the second column of the table.

4. Which kind of rock made up the most pieces?

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: activity

Based on **pages 4 and 5** of *Rocks and soils*

Introducing the activity

(a) Show the children some different kinds of rock (see note (i)). It may help if the pieces are large, to reinforce the idea that we live on a rocky world. Tell the children that you do not need large pieces of rock for identification and that they are going to use small pieces and a magnifying glass to perform their tasks.

Using the sheet

(b) Give out the sheet, let the children fill in their names and form, then go through tasks 1 to 3 (see note (ii)).

(c) Let the children try tasks 1 to 3.

(d) Check the children's work and if it is correct let them try task 4 (see note (iii)).

Completing the activity

(e) Ask the children to report on their rock survey.

Conclusion

Rocks can be identified by their appearance.

Teaching notes

(i) Small rockery rocks from a garden centre may be useful.

(ii) Make sure the children know how to use a magnifying glass. Check that they can find a magnified image by moving the glass to different distances above the surface of the rock and moving their eye different distances from the lens.

(iii) Make up a collection of small rocks (10 or 12). Most should be either sandstone or limestone, with a few granite rocks. You may want to have perhaps four or five different types so that the children can produce bar graphs of their results.

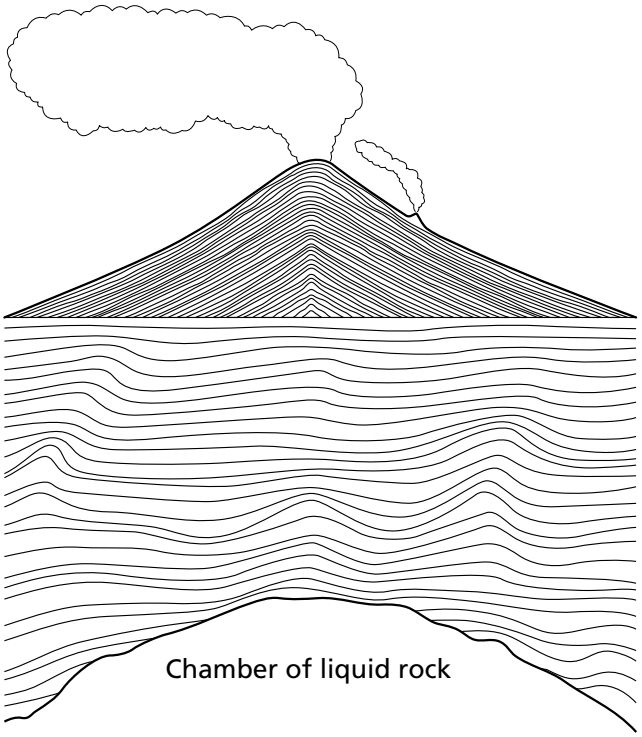
© 2002 Atlantic Europe Publishing

Name: ..... Form: .....

See **pages 6 and 7** of *Rocks and soils*

Rocks from volcanoes

Many rocks begin in the fiery fountains of volcanoes.



Q1. How does liquid rock get out of the volcano? On the diagram, draw in the path or paths that it would take.

Q2. Draw a lava flow on the diagram.

Q3. What colour is lava (a) when it leaves the volcano? (b) when it cools down?

(a) ✎..... (b) ✎.....

Q4. What happens when a volcano erupts?

✎.....

✎.....

Q5. When liquid rock cools down underground what kind of rock is formed?

✎.....

Q6. How is this rock different from lava?

✎.....

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: comprehension

See **pages 6 and 7** of *Rocks and soils*

Answers

1. **The central pipe should be drawn in connecting the chamber to the top of the volcano. A side pipe may also be drawn in.**
2. **This should be running down the side of the volcano.**
3. **(a) Red; (b) Black.**
4. **Lava flows out of it, gas and ash is produced.**
5. **Granite.**
6. **It is white or grey with specks.**

Complementary work

(a) The children could be introduced to crystals by looking at salt and sugar crystals with a magnifying glass or microscope to see their flat sides meeting at sharp angles.

(b) You may demonstrate how to grow a crystal of alum from a kit available from educational suppliers.

Teaching notes

The children may be surprised that when you go deep into the Earth the rocks should be molten. This is due to the high temperatures and pressures inside the Earth. The pressure is due to the weight of the rocks and the heat is due to radioactive materials which release energy. Some of this energy is in the form of heat, which heats up the rocks. The centre of the Earth is at a temperature of 4,500°C, which is 45 times hotter than a boiling kettle.

Most of the rock in the Earth moves slowly, rather like the toothpaste you squeeze from a tube. But nearer the surface, where there is less pressure, the rock is thinner and may run like a liquid if it gets a chance to escape onto the surface. All volcanic rock is made from crystals. If the rock cools quickly (e.g. lava) the crystals are small and difficult to see, but if the rock cools slowly (e.g. granite) the crystals are larger and easier to see. Lava cools quickly above ground because it loses heat quickly to the air. Granite cools slowly underground because it loses heat slowly to the surrounding rock. The pink crystals in granite are feldspar and the black crystals are mica. They are embedded in a glass-like crystalline material called quartz.

© 2002 Atlantic Europe Publishing

2

Name: ..... **Form:** .....

Based on **pages 6 and 7** of *Rocks and soils*

Pumice and lava

Try this...

1. How is a piece of pumice stone different from a pebble? Report your findings in this space.

✎.....

✎.....

✎.....

2. You have a tray, a block of wood, a stop clock and some cold and warm treacle. How can you compare the speed at which the cold treacle and warm treacle flow?

✎.....

✎.....

✎.....

3. Make a table for your results.

Looking at the results.

4. What do the results show?

✎.....

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: activity

Based on **pages 6 and 7** of *Rocks and soils*

Introducing the activity

(a) Ask the children to imagine that they are standing near a volcano as it erupts and see the ash thrown into the air and the lava flowing. Show them a piece of pumice as an example of a frothy lava and show them black treacle, which you can make behave like lava.

(b) Tell the children that they are going to investigate each one in turn.

Using the sheet

(c) Give out the sheet, pieces of pumice and pebbles, let the children fill in their names and form, then go through task 1 (see note (i)).

(d) Let the children try task 1 (see note (ii)).

(e) When the children have completed their written account go through tasks 2 and 3.

(f) Let the children make their plan (see note (iii)).

(g) Let the children try their plan when you have checked it.

(h) Let the children try task 4.

Completing the activity

(i) The children can compare their results.

Conclusion

Cold treacle (lava) flows more slowly than warm treacle (lava).

Teaching notes

(i) Tell the children that they have to find out how the pumice stone is different from a pebble. Say that they can use a magnifying glass, scales and a dish of water.

(ii) They should readily observe the two rocks with the magnifying glass and may feel the difference in weight which they can then check with the balance. The difference in weight is due to the fact that pumice contains trapped air bubbles. If the children do not think about testing in water, suggest this to them, and they will discover that the pumice stone floats while the pebble sinks.

(iii) They can draw a diagram of how they would set out their equipment. The plan should include putting each drop of treacle at the same distance from the edge of the tray, having the tray on the same slant for both tests, timing from the moment the treacle reaches the tray from the spoon until it has flowed to the bottom edge of the tray.
The table should have two columns – the left one headed 'Treacle (or lava)' and the right one headed 'Time to flow (secs)' (see example below). In the boxes in the left column should be written 'Cold treacle' and 'Warm treacle'. You may warm up some treacle by putting a cup of it in a bowl of warm water. Depending on the ability of your class it may be better if you put the treacle on the tray when the children are ready for it.

Treacle (lava)	Time to flow (secs)
Cold treacle	
Warm treacle	

© 2002 Atlantic Europe Publishing

C

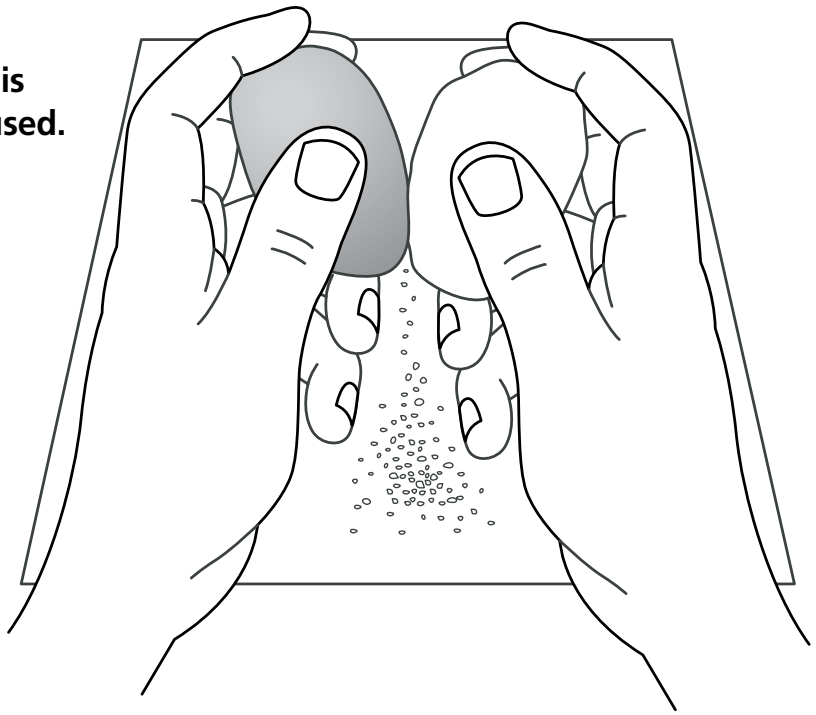
3

Name: ..... Form: .....

See **pages 8 and 9** of *Rocks and soils*

Hard and soft rocks

Some rocks are much harder than others. This affects how they are used.



Q1. Write an A on the hard rock and a B on the soft rock.

Q2. How can you tell that one rock is softer than the other?

✎.....

✎.....

Q3. What is the name of rock made from mud?

✎.....

Q4. What holds grains of sand together to make a rock?

✎.....

Q5. What is limestone made from?

✎.....

Q6. What is marble?

✎.....

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: comprehension

See **pages 8 and 9** of *Rocks and soils*

Answers

1. **A on left hand rock, B on right hand rock.**
2. **Small pieces are being rubbed off the softer rock.**
3. **Mudstone or shale.**
4. **Natural cement.**
5. **Sea shells.**
6. **A kind of limestone that is baked underground.**

Complementary work

(a) The children can use secondary sources to find out about the different ways that rocks are made.

Teaching notes

Although the children do not have to know about the rock cycle at this level, they do investigate certain aspects of it in the course of studying the pupil book. It may be helpful here just to give an outline of the cycle to show how the different rocks are related to each other. All the original rock on the Earth's surface was volcanic but over the course of time most of it has been weathered (broken down). The fragments of weathered rock have been transported by rivers and deposited in oceans where they have been compacted and cemented together to form sedimentary rocks such as mudstone and sandstone.

Many sea creatures can extract calcium from sea water and use it to make shells. When the creatures die, their shells collect on the sea bed and also form a sedimentary rock.

The movement of the molten rock inside the Earth moves huge plates of rock across its surface. At places where the plates meet, layers of sedimentary rock may be folded up, squashed and brought nearer to the hot rocks below for a while. The increase in heat bakes these rocks and they change form. These rocks are known as metamorphic rocks.

Limestone and marble are featured in the unit, and slate is a metamorphic rock formed from baked mudstone. Over time, the surface of the Earth has become covered with sedimentary, metamorphic and with volcanic rock that is still moving up from below the Earth's crust today.

© 2002 Atlantic Europe Publishing

3

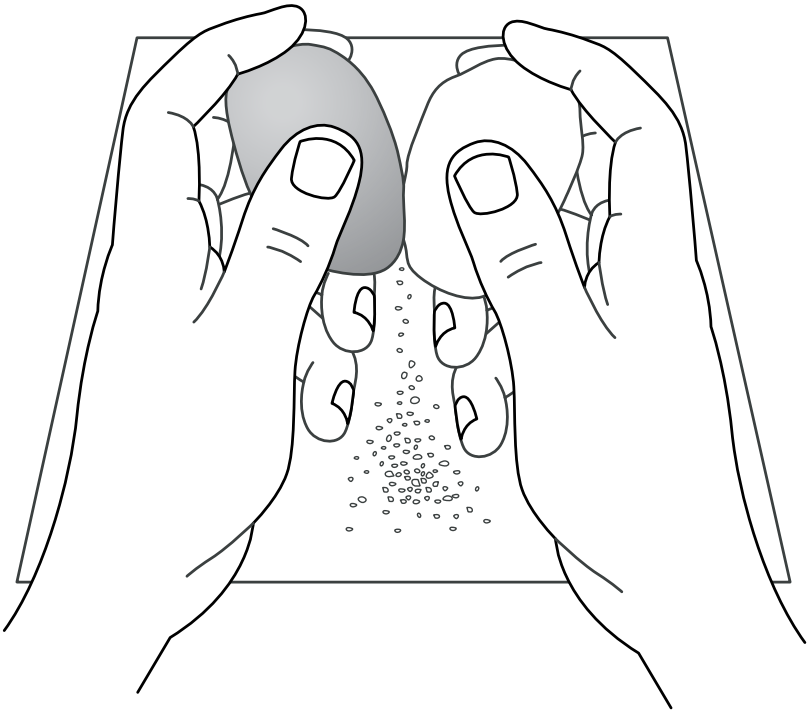
Name: ..... Form: .....

Based on **pages 8 and 9** of *Rocks and soils*

Testing the hardness of rocks

Try this...

1. Rub two different rocks together as the diagram shows.



2. Note which rock was the harder one of the pair.

✎.....

3. Try task 1 and 2 with all the rocks.

4. Put the rocks in order starting with the hardest.

✎.....

✎.....

✎.....

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: activity

Based on **pages 8 and 9** of *Rocks and soils*

Introducing the activity

(a) You may begin by saying how people associate rock with hardness and even use the phrase 'rock hard'. The children are going to test the rocks to see if they are all very hard.

Using the sheet

(b) Give out the sheet, let the children fill in their names and form, then go through tasks 1 and 2.

(c) Let the children try tasks 1 and 2 (see note (i)).

(d) Review the test with the children then let them try task 3 (see note (ii)).

(e) Let the children try task 4. The order should be granite, sandstone, mudstone and chalk.

Completing the activity

(f) Introduce another stone such as marble (very hard) or limestone (soft). Ask the children to feel it and predict where it may come on their scale, then let them try and place it (see note (iii)).

Conclusion

Rocks do not all have the same degree of hardness and some may be quite soft.

Teaching notes

(i) Let the children use granite and natural chalk or a pebble and chalkboard chalk if these other materials are not to hand. Natural chalk is a rock made from broken up shells of microscopic sea creatures.

(ii) The other stones for the test should be sandstone and mudstone/shale.

(iii) The children could be reminded of the scratch test used for testing materials, if they have previously studied ***3C Properties of materials*** in this series. You can demonstrate this by saying that if a fingernail makes a mark the rock is very soft, if a coin makes a mark the rock is soft, but if a nail makes a mark the rock is hard.

© 2002 Atlantic Europe Publishing

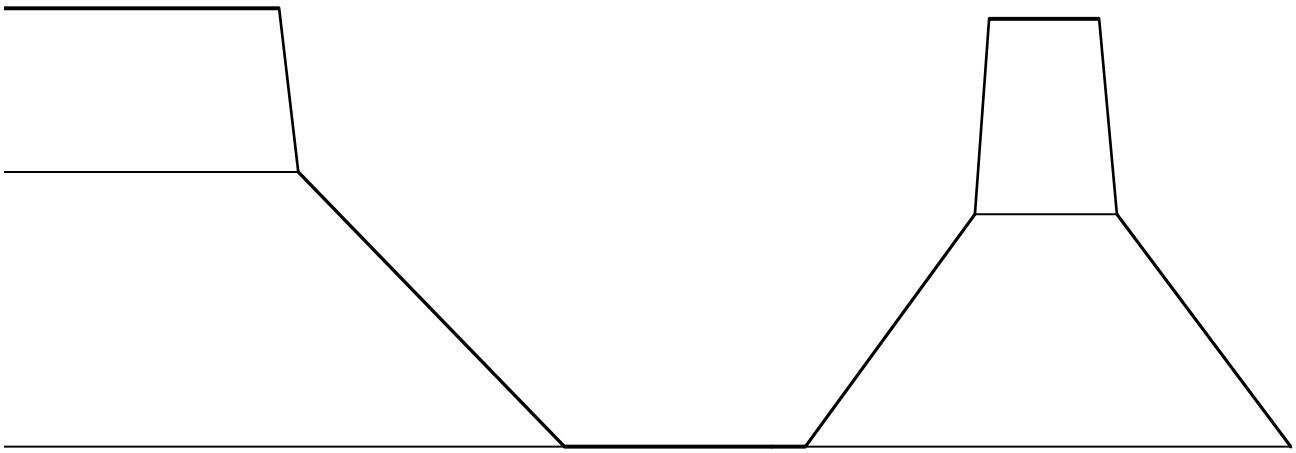
C 4

Name: ..... Form: .....

See **pages 10 and 11** of *Rocks and soils*

Rocks shape the land

The shape of the land is often similar to the pattern of the hard and soft rocks below it.



Q1. Shade in the areas of hard rock in the diagram.

Q2. Draw horizontal lines to show where the soft rock is found.

Q3. What could have cut into the rocks to give them their shape?

✎.....

Q4. What kind of feature do the top-most rocks in the diagram make?

✎.....

Q5. When sloping rocks lie underground, do the hard rocks make the hills or the valleys?

✎.....

Q6. What is the last part of a volcano to be worn away?

✎.....

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: comprehension

See **pages 10 and 11** of *Rocks and soils*

Answers

1. **The rocks with the vertical cliff faces should be shaded in.**
2. **The rock below the hard rock.**
3. **A river or a sea, or even rain.**
4. **A mesa or tableland.**
5. **Hills.**
6. **The pillar of rock made by the lava in the pipe at its centre.**

Complementary work

(a) The children could look at photographs of the local landscape and identify areas where there are hard and soft rocks.

(b) The children could study photographs of landscapes from around the world and identify regions where hard and soft rock may be found below ground.

(c) The children can use secondary sources to find out about minerals and mining.

Teaching notes

This unit builds on the fact that rocks vary in hardness, and links this to the landscape and its role in people's lives. It will help to sustain the idea that we live on a rocky planet. Factors affecting the development of a landscape are complex and here just two are considered – the different hardnesses of the rock and the erosion of the rocks by water. Glacial erosion is also important in many landscapes but it need not be developed here.

In previous units, the children have been introduced to a layered pattern in the diagram of the volcano and have seen that rock fragments become cemented together. Here, the hard and soft rocks are shown in layers, and you may like to explain that when rocks are broken down into fragments, the fragments settle out to form layers. If the children try the accompanying activity they will see how sand moves from one part of the landscape and settles in another.

It is mentioned in the unit that the flatter surface of the softer rock allows the build up of soil, which in turn provides a suitable environment for growing crops. By contrast, the steep slopes of the hills produced by the hard rocks have only a thin soil. This is covered in grass which provides a suitable food for sheep. A more direct link to livelihood and rocks can be made by looking at mining. To appreciate this the children need to know that rocks are made from a mixture of minerals, and that sometimes molten rock that squeezes into cracks between other rocks cools to form structures called veins which are especially rich in certain minerals. Miners extract the minerals. Rocks which have a high mineral content are known as ores.

© 2002 Atlantic Europe Publishing

4

Name: ..... **Form:** .....

Based on **pages 10 and 11** of *Rocks and soils*

Making model landscapes

Try this...

1. Put a rock in the centre of a large bowl.

2. Put a layer of soil over the rock.

3. Put a layer of sand over the soil. You have now made a model landscape

4. Draw how your landscape looks from above in the left-hand box below.

5. Pour water over the model landscape from a watering can.

6. Draw how the landscape looks after its shower of rain in the right-hand box below.

7. Make another landscape. Add a pebble to the soil layer, then cover it with sand.

8. Draw how you think the landscape might look after the rain in the left-hand box below.

9. Pour water over the model landscape from a watering can.

10. Draw how the landscape looks after its shower of rain in the right-hand box below.

11. How good was your prediction? ✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: activity

Based on **pages 10 and 11** of *Rocks and soils*

Introducing the activity

(a) Remind the children that the landscape is made from the materials that lie beneath it, and say that they are going to test this idea by making a model landscape and then wearing it down with water.

Using the sheet

(b) Give out the sheet, let the children fill in their names and form, then go through tasks 1 to 4 (see note (i)).

(c) Let the children try tasks 1 to 4.

(d) Go through tasks 5 and 6 then let the children try them (see note (ii)).

(e) Let the children try out tasks 7 to 11 (see note (iii)).

Completing the activity

(f) Let the children compare their results and assess the predictions made by each other.

Conclusion

Hard materials stick up in the landscape when the softer materials have been worn away.

Teaching notes

(i) You may like to demonstrate these tasks by making a small mound of soil over a rock and covering it with sand.

(ii) The water should cut valleys in the sand and carry it away to the edges of the landscape. Some of the soil may go, too.

(iii) The sand may be washed off the pebble and some of the sand and soil may be washed away from around the pebble. A different pattern of valleys may form.

(Note that 'valleys' only form if a sufficiently long slope is available.)

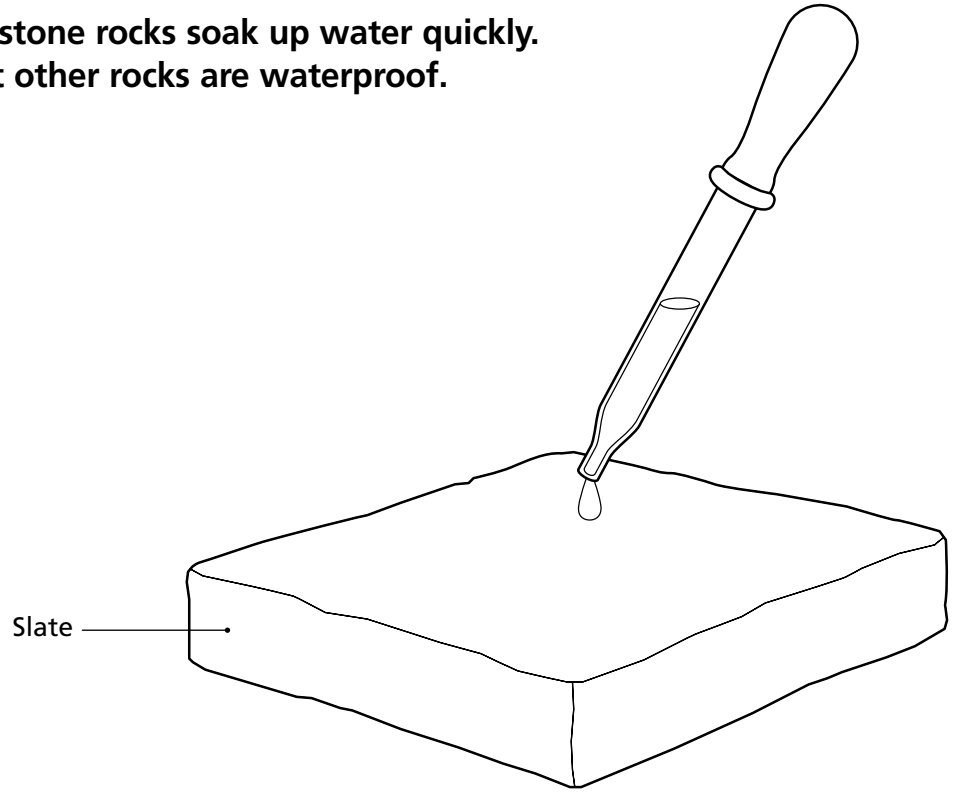
© 2002 Atlantic Europe Publishing

Name: ..... Form: .....

See **pages 12 and 13** of *Rocks and soils*

Rocks that soak up water

Limestone rocks soak up water quickly.
Most other rocks are waterproof.



Q1. Draw what will happen to the water when it is dripped on the slate.

Q2. Which of these rocks soak up water – chalk, granite, sandstone, marble?

✎.....

Q3. Why do some rocks soak up water?

✎.....

Q4. What happens to rocks that soak up water, freeze, then thaw out?

✎.....

Q5. What does rainwater contain that can destroy rocks?

✎.....

Q6. Name two rocks that can be destroyed by rainwater.

1 ✎..... 2 ✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: comprehension

See **pages 12 and 13** of *Rocks and soils*

Answers

1. **It will flow across the surface and over the edge.**
2. **Chalk and sandstone.**
3. **They have holes in them.**
4. **They crumble.**
5. **Acid.**
6. **Limestone, sandstone, chalk.**

Complementary work

(a) The children can use secondary sources to find out about caves and how they form. They can find out about stalactites and stalagmites.

(b) You could set up a demonstration of how stalactites and stalagmites form by dissolving a large amount of washing soda in some water and pouring it into two jars. Place the jars about 12 centimetres apart. Dip both ends of a piece of woollen yarn into each jar and let the middle of the yarn hang down a little between them. Put a dish under the lowest point of the yarn. The washing soda solution will soak into the yarn and begin to drip into the dish. In a few days, it may form a stalactite and a stalagmite.

Teaching notes

When water enters the gaps in a piece of rock and the rock is frozen, the water expands as it turns into a solid. This expansion of the water causes parts of the rock to snap. When the rock is thawed out, and the ice contracts and turns back to liquid, the broken parts inside the rock cause it to crumble. This is a form of weathering that is sometimes called frost shattering, and the rocks are called frost shattered rocks.

Today the term acid rain refers to the rain produced when the fumes from power stations are dissolved in raindrops. These fumes contain sulphur dioxide, which forms sulphurous acid in rainwater. Rain was slightly acid before the development of power stations. The acid is formed when carbon dioxide dissolves in water. This acid is called carbonic acid.

When rain falls on limestone it reacts with (dissolves) the limestone and widens cracks in the rock. As the water soaks through the limestone it removes more of the rock and may create caves. Eventually, the water will reach a rock which is not permeable and it will run along its surface, dissolving limestone as it goes, until it reaches the surface again lower down the hill or mountain. The place where the water returns to the surface is called a spring.

Inside a limestone cave, water covers the roof and some evaporation occurs. This leads to some of the limestone reforming as spikes (stalactites). Water drips from the stalactites and as each drop leaves the stalactites more limestone is left behind to increase the size of the stalactites. On the cave floor where the drops fall, a stalagmite builds upwards.

© 2002 Atlantic Europe Publishing

Name: ..... Form: .....

Based on **pages 12 and 13** of *Rocks and soils*

Which rocks are waterproof?

Try this...

1. Collect the pieces of rock and label each rock with its identification letter.

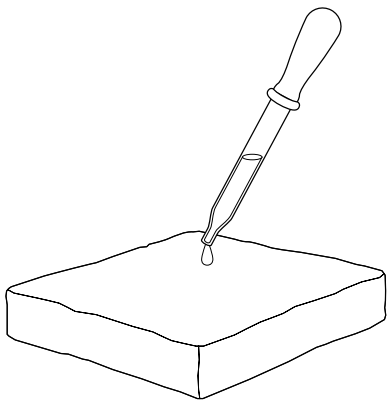
2. Write down the identification letters of the rocks in the left hand column of the table.

Rock	Prediction	Result

3. Look at the surface of each rock with a magnifying glass and predict if it will soak up water or if water will run off it.

4. Write down your predictions in the table using the words ' soak up' and 'run off'.

5. Put some drops of water on each rock and see if they are soaked up or if they run off the rock.



6. Write down the result for each test in the table.

Looking at the results.

7. How well could you predict whether a rock would soak up water or let it run off?

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: activity

Based on **pages 12 and 13** of *Rocks and soils*

Introducing the activity

(a) Tell the children that they are going to test some rock samples to see if they soak up water. They are not being told the identity of the rocks and must label them using the code (see note (i)).

Using the sheet

(b) Give out the sheet, let the children fill in their names and form, then go through task 1 (see note (ii)).

(c) Let the children perform task 1.

(d) Go through tasks 2 to 4, then let the children try them.

(e) Check that the children have filled in their table correctly then let them try tasks 5 and 6 (see note (iii)).

(f) Check that the children have filled in their table correctly then let them try task 7.

Completing the activity

(g) Let the children compare their work and ask them if they can identify any of the rocks.

Conclusion

Granite, marble and slate do not soak up water. Sandstone, chalk and some soft limestones (but not hard mountain limestone) soak up water.

Teaching notes

(i) You may like to put the rocks in separate boxes. For example A = limestone, B = granite, C = slate, D = chalk, E = marble, F = sandstone. Try to use samples of rocks that the children have not seen previously. If possible, they should be a different shape from previously seen specimens.

(ii) The children must put each piece of rock on a separate piece of paper and label the paper.

(iii) Depending on the ability and attitude of the children, you may prefer to use teaspoons instead of droppers. The children need to make a fair test, which includes adding the same number of drops to each rock and, if the rocks are flat, leaving the water on the different rocks for the same amount of time.

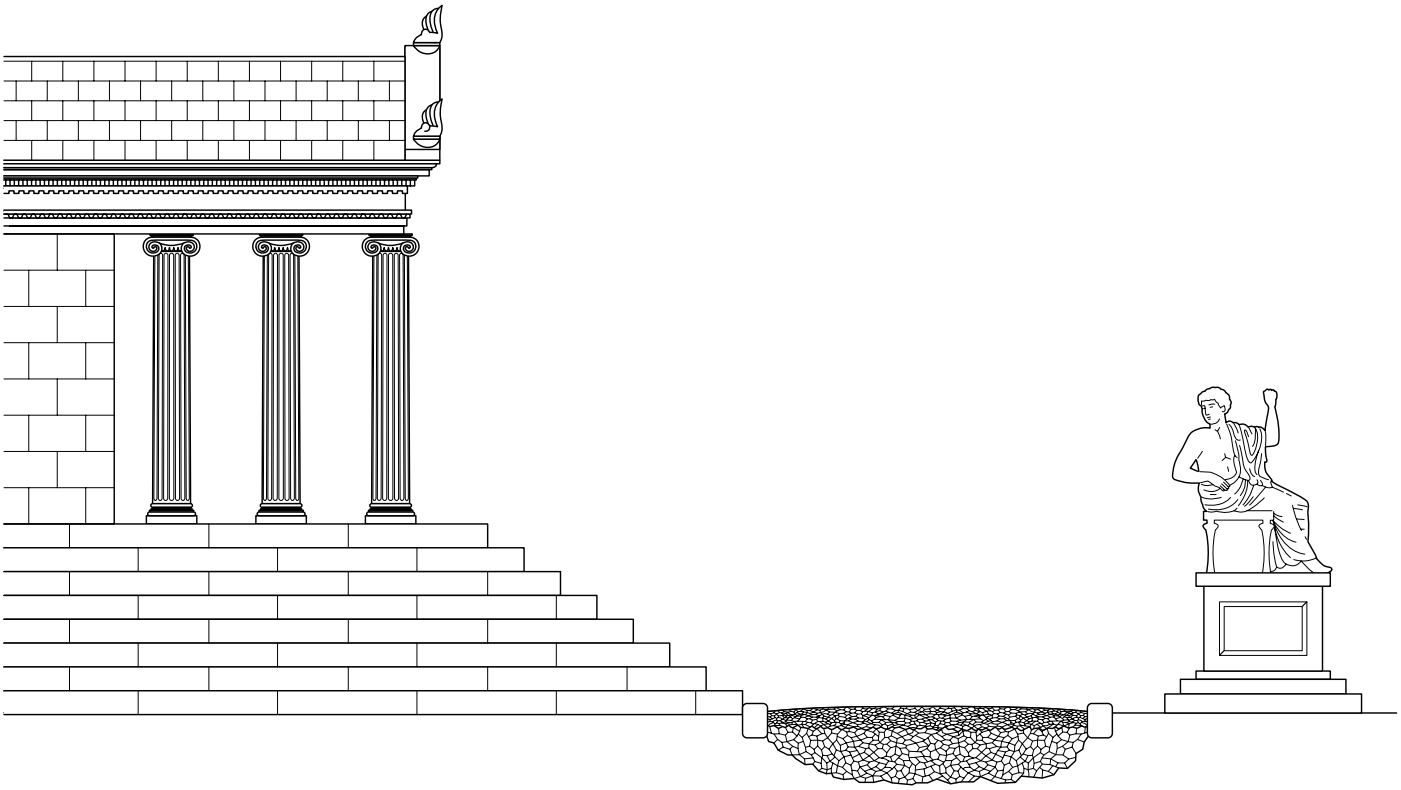
© 2002 Atlantic Europe Publishing

Name: ..... Form: .....

See **pages 14 and 15** of *Rocks and soils*

How rocks are used

Hard rocks have many uses. They are used to make all types of buildings, and even to make roads.



Q1. On the diagram, put an X where slate is used.

Q2. Give two reasons why slate is used there.

1 ✎.....

2 ✎.....

Q3. On the diagram, put a Y where marble is used.

Q4. Why is marble polished?

✎.....

Q5. On the diagram, put a Z where lava is used.

Q6. Give one reason why lava is used there.

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: comprehension

See **pages 14 and 15** of *Rocks and soils*

Answers

1. **The roof.**
2. **It is waterproof. It breaks into thin sheets.**
3. **The statue (and/or the walls).**
4. **To make it look attractive.**
5. **The road surface.**
6. **It is hard.**

Complementary work

(a) If you have introduced the children to minerals and gemstones, they could find how they are used in jewellery by looking at the pages of a mail order catalogue.

(b) The children could use secondary sources to find out how rocks are extracted from a quarry and prepared to make building stone.

Teaching notes

Rock was one of the first materials to be used by humans. Flint and the volcanic rock obsidian became widely used for making cutting instruments, from axes to arrowheads and even sickles. These are brittle rocks which can be chipped to make sharp cutting edges. Other rocks, such as sandstone, have been used to make grinding stones for grinding corn and are still used for this purpose in some countries today.

Polished granite is often used to decorate the front of prestigious buildings because its crystals make its surface look attractive. Polished stones may also be used as ornaments and are found both inside and outside buildings. Turquoise and opal are two rocks commonly used in jewellery.

If the children have been made aware of minerals in Unit 4, you may wish to extend this by considering the use of minerals as gemstones in jewellery. The most widely used gemstones are diamond, sapphire, amethyst, ruby, emerald topaz, garnet, jade and onyx (which is a form of agate).

© 2002 Atlantic Europe Publishing

C

6

Name: ..... Form: .....

Based on **pages 14 and 15** of *Rocks and soils*

Where are rocks used?

Try this…

1. Look for rocks being used for the purposes given in the table.

2. Write down the name of the rock you find being used.

3. Write down where you saw the rock being used.

Purpose	Rock	Place used
1 Building wall		
2 Garden wall		
3 Roof		
4 Doorstep		
5 Pavement		
6 Kerbstone		
7 Grave stone		
8 Statue		
9 Garden ornament		
10 Rockery stone		
11		
12		
13		
14		

Looking at the results.

4. Which kind of rock is used most widely?

✎.....

5. Which kind of rock is used least widely?

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: activity

Based on **pages 14 and 15** of *Rocks and soils*

Introducing the activity

(a) Begin by asking the children if they can find anything that is made of stone in the school or its surroundings (see note (i)).

(b) Explain that the children are going to look for the use of stone in their surroundings (see note (ii)).

Using the sheet

(c) Give out the sheet, let the children fill in their names and form, then go through tasks 1 to 3 (see note (iii)).

(d) Let the children try tasks 1 to 3.

(e) Check the tables have been filled in correctly then let the children try task 4.

Completing the activity

(f) If the children have done this as a homework exercise they could compare their results in class. If they have made a school neighbourhood survey you may like to produce a simple map on which they could write the locations of the various stone objects (see note (iv)).

Conclusion

The type of rock used will depend to some extent on the local rock. In a limestone area many of the features will be made of limestone. The fronts of prestigious buildings such as libraries and town halls may be made of granite or marble in any area. Although slate is the best roofing material, sometimes slabs of other kinds of rock may be used.

Teaching notes

(i) The school itself may be made of stone or it may have stone steps or a stone wall in the playground.

(ii) You may wish to take the children on a walk around the school neighbourhood, or you may like to set the work for homework and have them look in the immediate neighbourhood to their homes. They may give an approximate location for the rocks they see, such as Market Street or Green Park.

(iii) If you are setting this as a homework exercise, you may wish to blank out some of the items in the table (e.g. grave stones). Either way you decide to have the children perform the activity, there are some extra spaces in the table for the children to fill in if they find any other uses of rock.

(iv) You may wish to take photographs of the siteps of the various stone objects and let the children place them on a map.

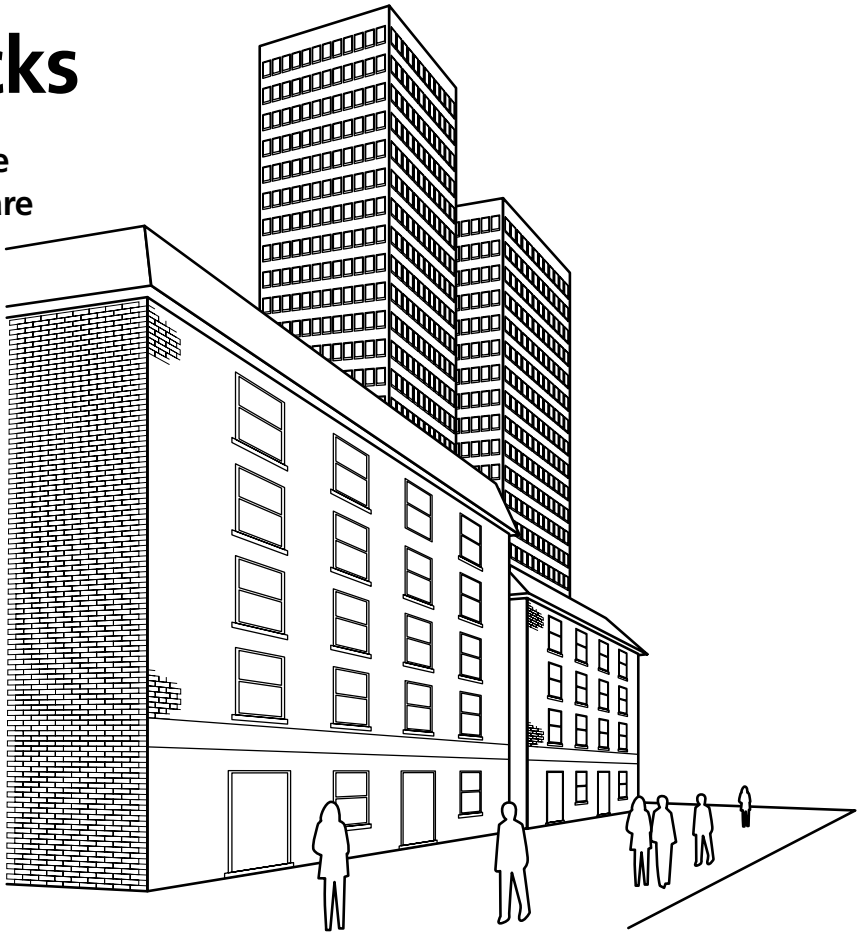
© 2002 Atlantic Europe Publishing

Name: ..... Form: .....

See **pages 16 and 17** of *Rocks and soils*

Artificial rocks

The main artificial rocks are bricks and concrete. They are easier to use for building than natural stone.



Q1. (a) Put an A on the buildings made from bricks. (b) Put a B on the buildings made from concrete.

Q2. Label with a C a place where either bricks or concrete may be used.

Q3. What is used to hold bricks in place?

✎.....

Q4. What is concrete made from?

✎.....

Q5. Which part of the concrete mixture is strong?

✎.....

Q6. How is a waterproof brick made?

✎.....

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: comprehension

See **pages 16 and 17** of *Rocks and soils*

Answers

1. **(a) The two small buildings should be marked with an A. (b) The two large buildings should be marked with a B.**
2. **The pedestrian area.**
3. **Cement.**
4. **Stone, sand, cement (and water).**
5. **The stones.**
6. **By wetting clay and shaping it into a brick shape, then letting it dry and baking it.**

Complementary work

(a) The children can use secondary sources to find out how bricks were made in Ancient Egypt, how they are made today and how adobe bricks are made and where they are used.

(b) If walls with different brick patterns can be found they can be shown to the children.

Teaching notes

The clay for brick-making is extracted from a clay pit. The clay is screened to remove small stones, then may be ground up to make all the particles the same size so they can pack together more closely. Water may also be added to the clay so that it can be extruded easily into a slab, then cut into blocks with wire. Clay that is too thick to be extruded is pressed into a mould. Moulded bricks have a depression in the top called a frog. The bricks are dried before firing to let the water evaporate, then heated in a kiln at 800 to 1,100°C for four to ten days. Chemical changes take place in the kiln which bind the clay particles together.

Mortar is used to bind the bricks together. The simplest mortar is made from sand and cement. Lime is used in many mortars because it makes a more weather-resistant bond. Bricks can be made with special properties. For example, facing bricks may have a surface coated in sand or small stones. These make the brick more weather-resistant as facing bricks are used for building outside walls.

The arrangement of bricks in a wall confers strength on the wall. The arrangements are known as bonds. The alternate arrangement shown in the photograph is called stretcher bond, and the bricks that are laid along the wall with their side showing are called stretchers. In walls that are two bricks thick, some bricks may be laid so that their ends face out of the wall instead of their sides. These bricks are called headers. In English bond there are alternate rows of stretchers and headers. In Flemish bond the stretchers and headers are arranged alternately in each row. Note that in modern houses brick walls are cavity walls and are only one brick thick. The inner wall is made from concrete blocks.

Cement is made by heating a mixture of limestone and concrete, then grinding it to a powder.

© 2002 Atlantic Europe Publishing

C

7

Name: ..... Form: .....

Based on **pages 16 and 17** of *Rocks and soils*

Artificial rocks and real rocks?

Try this…

1. Is a brick harder than a rock?

Work out a test to find out. Write down your test here.

✎.....

✎.....

✎.....

✎.....

✎.....

2. Try your test and write your result here.

✎.....

3. Use your test to find out if concrete is harder than a stone and write your result here.

✎.....

4. Do artificial rocks soak up water?

Work out a test to find out. Write down your test here.

✎.....

✎.....

✎.....

✎.....

✎.....

5. Try your test and write your results here.

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: activity

Based on **pages 16 and 17** of *Rocks and soils*

Introducing the activity

(a) You may begin by saying that we live in a habitat made by artificial rocks. Walls are made of brick and concrete blocks, floors are made of concrete, and some roofs are covered with baked clay tiles (see note (i)).

(b) Tell the children that they are going to find out how the properties of artificial rock compare with real rocks.

Using the sheet

(c) Give out the sheet, let the children fill in their names and form, then let them try task 1 (see note (ii)).

(d) When you have checked their test let them try it and also let them perform tasks 2 and 3 (see note (iii)).

(e) Let the children try task 4 (see note (iv)).

(f) When you have checked their test let them try it and also let them complete task 5 (see note (v)).

Completing the activity

(g) The children can compare their results.

(h) Challenge the children to think of a way to stop water rising through a brick wall. If they have already studied ***3C Properties of materials*** in this series they may suggest putting a waterproof material between the bricks. You could then set up a brick in a bowl of water with a piece of waterproof material (e.g. plastic sheet) on top, then another brick above this. The children would see the water rise through the first brick but not the second. You could take them outside and show them a damp-proof course in a wall.

Conclusion

Artificial rocks have similar properties to real rocks but they are lighter and cheaper.

Teaching notes

(i) Show children examples of brick, concrete block and roof tile, if possible.

(ii) The children should use the test on page 9 of the pupil book. They may use drawings in their plan.

(iii) Depending on the rock used, they may find that the brick is softer than some of the rock and that the sand and cement part of the concrete is easily worn away.

(iv) The children should use the test on page 12 of the pupil book. They may use drawings in their plan.

(v) The brick and concrete will take up water.

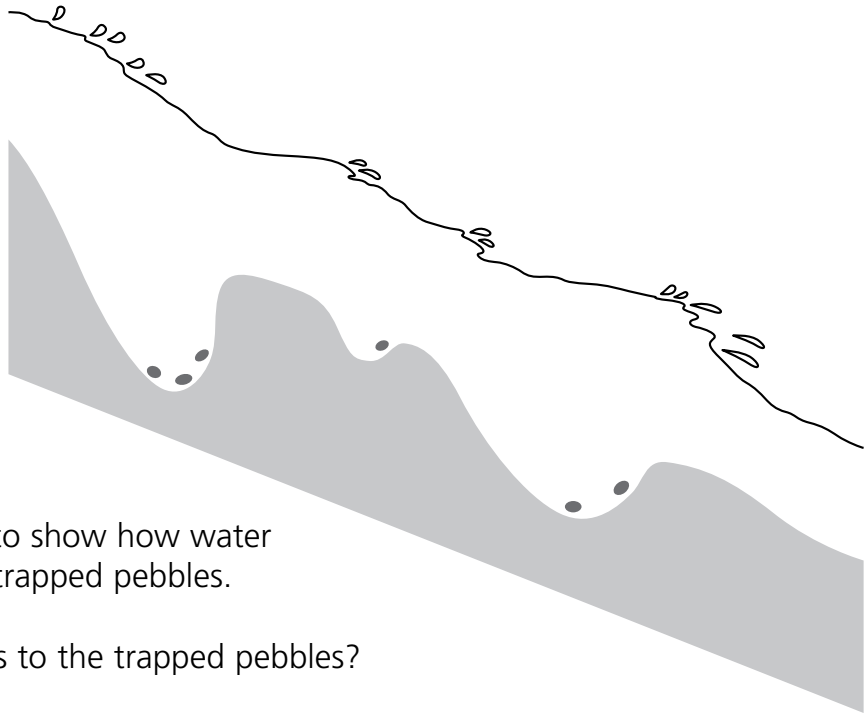
© 2002 Atlantic Europe Publishing

Name: ..... Form: .....

See **pages 18 and 19** of *Rocks and soils*

Pebbles, sand and clay

As rocks roll down river beds, they get broken down into smaller pieces. We call these pieces pebbles, sand and clay.



Q1. Draw arrows to show how water moves around the trapped pebbles.

Q2. What happens to the trapped pebbles?

✎.....

✎.....

Q3. What is sand made from?

✎.....

Q4. How is clay different from sand?

✎.....

✎.....

Q5. In which part of a river will you find most sand and clay? (a) The upper part, (b) the middle part, or (c) the lower part?

✎.....

Q6. What rocky materials can you find on a river bank?

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: comprehension

See **pages 18 and 19** of *Rocks and soils*

Answers

1. **Spiral arrows drawn in each pot hole.**
2. **They crash into each other and pieces get broken off.**
3. **Pebble chips.**
4. **It is made from smaller pieces.**
5. **(c) The lower part.**
6. **Pebbles, sand, silt and mud.**

Complementary work

(a) If there are examples of pebble dashing used as a protective coating on buildings in your area, you may be able to show them to the children.

(b) You may be able to arrange a visit by a person who makes jewellery from polished stones, to demonstrate how pebbles are made smooth. (Note that you should check if electrical equipment brought into school needs professional checking before use.)

Teaching notes

When water is moving fast it can trap air bubbles inside it. These scatter light in all directions and make the water seem white. White water in a river in flood has enough energy to raise and move the loose, rocky components of a river bed.

The pebbles shown in picture 2A of the pupil book are trapped in potholes. These are hollows which have been worn into the solid rock of the river bed and should not be confused with pot holes, which are caverns in limestone country. A pothole in a river is formed when circular currents or eddies swirl pebbles over an area of softer rock. This rock is worn away to make a shallow depression which in turn affects the way the water flows over it. The depression produces more circular currents, and pebbles trapped in the pothole move round and deepen it.

Along the length of a river, the bed changes. Generally, rivers flow over solid rock beds near their headwaters, while lower down the beds are dominated by pebbles, and towards the river's mouth the bed is dominated by the smallest particles of silt and clay. Material is also moved in suspension.

The particles are not moving down the river all the time. When the river is low, the water is clear and particles are not transported, but when the river is in flood transportation occurs. The activity helps the children to think about how rocky fragments of different sizes are transported by a river in flood. See also ***The River Book*** in the Curriculum Visions series.

© 2002 Atlantic Europe Publishing

C 8

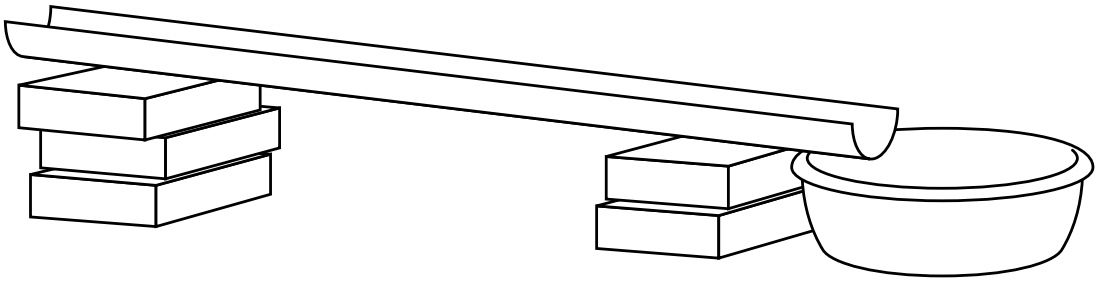
Name: ..... Form: .....

Based on **pages 18 and 19** of *Rocks and soils*

How does water move rock?

Try this…

1. Set up a piece of plastic gutter as the diagram shows



2. Mix up some sand, clay, gravel and water in a bowl. Stir it well and then quickly pour it into the plastic gutter.

3. Watch the different parts of the mixture settle out.

4. The lines below show the top view of three plastic gutters. In one box, draw how the different parts of the mixture settled in the gutter. Label the parts.

5. Clean out the gutter and repeat tasks 1 to 4 twice more.

Looking at the results.

6. Describe any similarities in your results.

✎.....

7. Describe any differences in your results.

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: activity

Based on **pages 18 and 19** of *Rocks and soils*

Introducing the activity

(a) Tell the children they are going to make a model of how water and rocky material behave when a river floods.

Using the sheet

(b) Give out the sheet, let the children fill in their names and form, then go through task 1 and let the children set up the equipment.

(c) Go through tasks 2 to 4 and make sure the children know how to perform each task (see note (i)).

(d) Let the children perform tasks 2 to 4 then check their work.

(e) Let the children try task 5 and check their work.

(f) Let the children try tasks 6 and 7 (see note (ii)).

Completing the activity

(g) Let the children compare their results (see note (iii)).

(h) Some children may wonder if you would get the same pattern if they made the slope of the gutter a little steeper. You may like them to demonstrate this to the whole class and discover that although the gravel and sand may travel further down the gutter, the arrangement of the parts of the mixture stays the same.

(i) You may like to ask the children the reason for the distribution of rocky particles. Look for an answer that the heavier particles travel the least and the lightest particles travel the furthest (see note (iv)).

Conclusion

When a mixture of rocky particles is carried along by a current of water, the heaviest ones settle out first and the lightest ones settle out last.

Teaching notes

(i) Make sure the children stir up the mixture well, to simulate the water rushing over a river bed and churning it up. This will help the different components settle out at different lengths along the gutter.

(ii) The children should find that the gravel settles at the top of the gutter, the sand settles in the middle and some of the silt and clay may settle in the lower part of the gutter, while the rest may go into the bowl with the water. They should not find that there is any difference in this arrangement over three tests.

(iii) You may like to ask the children if they can see a pattern in the results and talk about how scientists look for patterns in results. You may like to refer them to some other work they have done where a pattern is shown through measuring (e.g. plant growth).

(iv) The clay particles form a suspension in the water and only slowly settle. The other particles settle much faster and form a sediment. The children may come across these terms when they study the separation of solids and liquids.

© 2002 Atlantic Europe Publishing

C

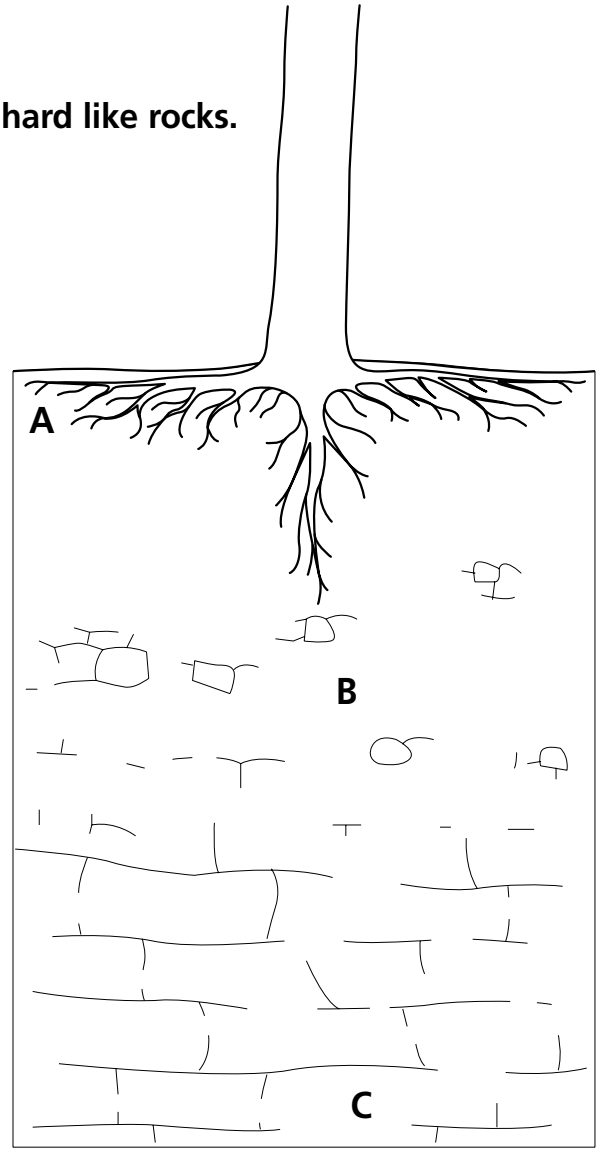
9

Name: ..... Form: .....

See **pages 20 and 21** of *Rocks and soils*

Soils from rocks

Soils are made from rocks, but they are not hard like rocks.



Q1. What are the names of layers A and B in the diagram?

A ✎.....

A ✎.....

Q2. What is layer C made from?

A ✎.....

Q3. Which layer is darkest in colour? Shade it in.

Q4. What causes rock to break up?

✎.....

Q5. Name four things in soil that are made from rock.

1 ✎..... 2 ✎.....

3 ✎..... 4 ✎.....

Q6. What does soil contain that is not made from rock?

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: comprehension

See **pages 20 and 21** of *Rocks and soils*

Answers

1. **A is the topsoil, B is the subsoil.**
2. **Rock.**
3. **A.**
4. **Rainwater.**
5. **Clay, mud, silt, sand, stones.**
6. **Plant and animal remains.**

Complementary work

(a) The children can use secondary sources to find out about the type of soil found in a desert, a mountainside and a rainforest.

(b) The children could use secondary sources to find out about animals that make burrows in the soil.

Teaching notes

The particles in soils are categorised according to their diameter as coarse sand (2.0 to 0.2mm), fine sand (0.2 to 0.02mm), silt (0.02 to 0.002mm) and clay (below 0.002mm). A sandy soil has over 70% sand and less than 20% clay. A loam has between 40% to 70% sand and 20% to 40% clay. A clay soil has under 40% sand and over 40% clay. In the unit, a simple formation of the soil is described.

The brown colour of soil is due to a chemical containing iron, in the same way that the brown colour of rust is caused by a chemical containing iron.

The part of the soil made from plant and animal remains is called humus. It is dealt with in more detail in *3B Helping plants to grow* in this series.

© 2002 Atlantic Europe Publishing

9

Name: ..... Form: .....

Based on **pages 20 and 21** of *Rocks and soils*

Rocky fragments in soil

Try this…

1. Collect a piece of paper, a soil and three containers.

2. Write the code letter of the soil on the paper. Put the soil on the paper.

3. Look at a sample of soil and write down its colour.

4. Touch the soil and write down how it feels.

5. Weigh out an amount of soil.

6. Shake the soil through the coarse sieve. Tip out the material which did not pass through the sieve and put it aside.

7. Now shake the soil through the fine sieve. Tip out the material which did not pass through the sieve and put it aside.

8. Keep the material which passed through the fine sieve.

9. Repeat tasks 1 to 8 with the other soils. Use the same amount of each soil.

10. Compare the soil samples.

11. Arrange the soils in order and say why you have arranged them that way.

The order is:

✎.....

✎.....

I have arranged them this way because:

✎.....

✎.....

✎.....

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: activity

Based on **pages 20 and 21** of *Rocks and soils*

Introducing the activity

(a) Begin by asking the children if they think that all soils are the same. From their response, ask the children how they could compare soils and steer them towards the tasks in the activity.

Using the sheet

(b) Give out the sheet, let the children fill in their names and form, then go through tasks 1 to 4 (see note (i)).

(c) Let the children perform tasks 1 to 4 (see note (ii)).

(d) Go through task 5 then let the children perform it (see note (iii)).

(e) Go through tasks 6 to 8 with the children, then let the children perform them.

(f) Let the children perform task 9.

(g) Go through tasks 10 and 11 with the children (see note (iv)).

(h) Let the children try tasks 10 and 11 (see note (v))

Completing the activity

(i) Let the children display their work and compare the way they have arranged the soils in order (see note (vi)).

Conclusion

There are different types of soil. They differ in the composition of the fragments, colour and texture.

Teaching notes

(i) The containers could be everyday items such as tin lids and paper plates.

(ii) You may like to make up your own compositions of soil from sand, clay, aquarium gravel and loam, or use soils from the school surroundings. Any soil used must not come from areas where there is broken glass or dog faeces.

If you make your own soils, make up three different soils, with different amounts of sand, clay, gravel and loam in each. If you use soils from the area, make sure you use three different types of soil. A garden centre can often supply a variety of soils.

(iii) The children may use scales, a school balance or their own balance, if they have made one from an elastic band or a spring. The children should compare soils of the same weight.

(iv) Children may be unsure how they compare things so it may be useful to remind them to look at a particular feature of a soil, for example, the amount of large fragments in it, and look at this feature in all the soils.

(v) The children may arrange them in order of colour, or lightness and darkness, if these are obvious features. They may arrange them in order of texture, such as 'grittiness'. The soils may be arranged in order of amount of a particular size of fragment, starting with the one, for example, with the greatest amount of large fragments. They may also compare the weight of the samples before and after sieving.

(vi) Look for the way they have expressed themselves in giving a reason for their arrangement of soil and perhaps pick out good examples to discuss with the class.

© 2002 Atlantic Europe Publishing

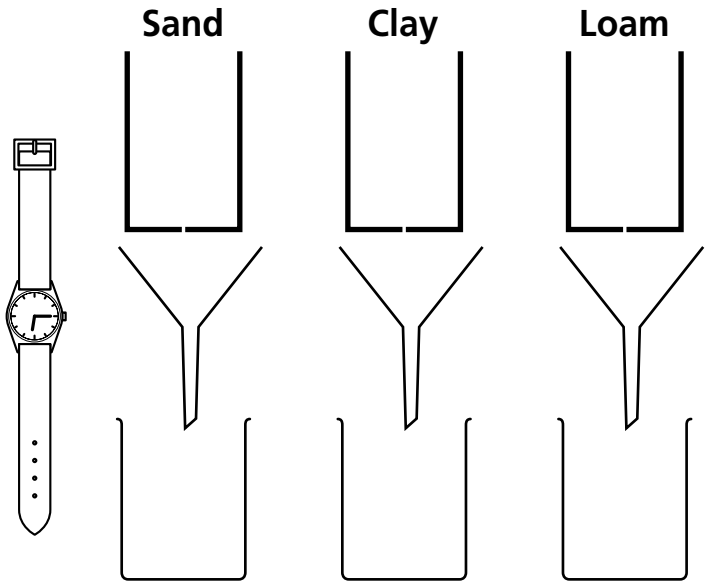
C 10

Name: ..... Form: .....

See **pages 22 and 23** of *Rocks and soils*

Soils and water

Some soils let water pass quickly through them. They get dry and dusty easily in summer. Other soils hold the water for plants to use.



Q1. The equipment in the diagram is set up to compare how water passes through sand, clay and loam. The pots each have the same sized draining holes. Name three other things that must be done to make the test fair.

(i) ✎.....

(ii) ✎.....

(iii) ✎.....

Q2. Draw in the amount of water you would expect in each beaker after the fair test.

Q3. Which soil has the largest gaps between its grains?

✎.....

Q4. Which soil has the smallest gaps between its grains?

✎.....

Q5. What is a waterlogged soil?

✎.....

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: comprehension

See **pages 22 and 23** of *Rocks and soils*

Answers

1. **(i) Use same amount of sand, clay and loam. (ii) Pour same amount of water onto each soil. (iii) Let water pass through each soil for the same amount of time.**
2. **Sand would have the most water in the beaker and clay would have the least.**
3. **Sand.**
4. **Clay.**
5. **A soil which cannot let water seep through it fast enough to drain.**

Complementary work

(a) The children could put 12 large counters or coins on a piece of graph paper (millimetre squares are best) and push them into a group so that their edges touch and they can see the squares of paper in the gaps. The children should then do the same with small counters or coins and note that they see fewer squares because the gaps are smaller.

(b) The children can use secondary sources to find out more about waterlogged soils such as those in paddy fields and swamps. They could also find out about the use of water meadows in the past.

In this they should note that waterlogging can arise from position in the landscape as well as from low permeability. Thus, meadows are wet primarily because they are close to a river and paddy fields are waterlogged only because of the constant application of water.

Teaching notes

The ability of a soil to drain water is simply a matter of grain size, which in turn affects the pore size. When the soil is not full of water the empty gaps hold air. A sandy soil has lots of air spaces. A clay soil, by comparison, has smaller gaps and holds less air.

The relationship between soil and plant growth is studied in appropriate detail for this level in *3B Helping plants to grow*.

(The correct term for the movement of water through a soil is permeability. This is not the same as porosity. Soils with many small pores, such as clays, are poorly permeable.)

© 2002 Atlantic Europe Publishing

C

10

Name: ..... Form: .....

Based on **pages 22 and 23** of *Rocks and soils*

Which soils hold onto water?

Try this…

1. You have two samples of dry soil. You have to see which one holds onto the most water. Think about how you will do the test.

2. Write down the things you will need.

✎.....

✎.....

✎.....

3. Write down what you will do (you may make a drawing too).

✎.....

✎.....

✎.....

✎.....

4. Try your test and write down your result.

✎.....

Looking at your results.

5. What do your results show?

✎.....

© 2002 Atlantic Europe Publishing

Teacher's sheet: activity

Based on **pages 22 and 23** of *Rocks and soils*

Introducing the activity

(a) Show the children two samples of soil (see note (i)) and say that they have to find out which one holds more water than the other. Ask the children for ideas on how they could do it (see note (ii)).

Using the sheet

(b) Give out the sheet, let the children fill in their names and form, then let them try tasks 1 and 2 (see note (iii)).

(c) If necessary, go through a plan with them again as a class, then let them try task 3 (see note (iv)).

(d) Ask the children to think about how they will record their result. If they wish to use a table they should make one now (see note (v)).

(e) Let the children try tasks 4 and 5.

Completing the lesson

(f) Let the children compare their results. Those who have not used a table should see that a table allows the results to be presented more clearly.

Conclusion

The sandy loam drains better than the clay loam. The clay loam holds onto more water.

Teaching notes

(i) These should be a sandy loam and a clay loam.

(ii) Depending on the ability of the class you may like to write some of their ideas on the board so that they can use them in their plan. The spelling and list of equipment is particularly useful here.

(iii) The equipment could include a balance, a soil container with drainage holes, a funnel, a clamp and stand or other support, a beaker, a measuring cylinder, a watch or stop clock.

(iv) The plan should include: using the same weight or amount of dry soil, pouring the same volume of water onto each soil, letting each soil drain for the same amount of time.

(v) The children should make a table. It could have two columns – 'Soil' and 'Amount of water drained' (cm^3), as shown below.

Soil	Amount of water drained (cm^3)

© 2002 Atlantic Europe Publishing

SAT STYLE QUESTIONS

Name: ..... **Form:** .....

Q1. What is the place where we get rock from the ground?

Tick a box:

Pit ☐ Mine ☐ Quarry ☐

Q2. We cannot see most of the rock in the countryside. Why is this?

✎.....

✎.....

Q3. When a volcano erupts, which of these things could you see?

Tick one or more boxes:

Ash ☐ Granite ☐ Lava ☐

Q4. Paul rubs a granite rock on a mudstone rock. Small pieces break off the mudstone. What does this tell Paul about the rocks?

Tick a box:

☐ A. Granite and mudstone are the same hardness.

☐ B. Granite is harder than mudstone.

☐ C. Mudstone is harder than granite.

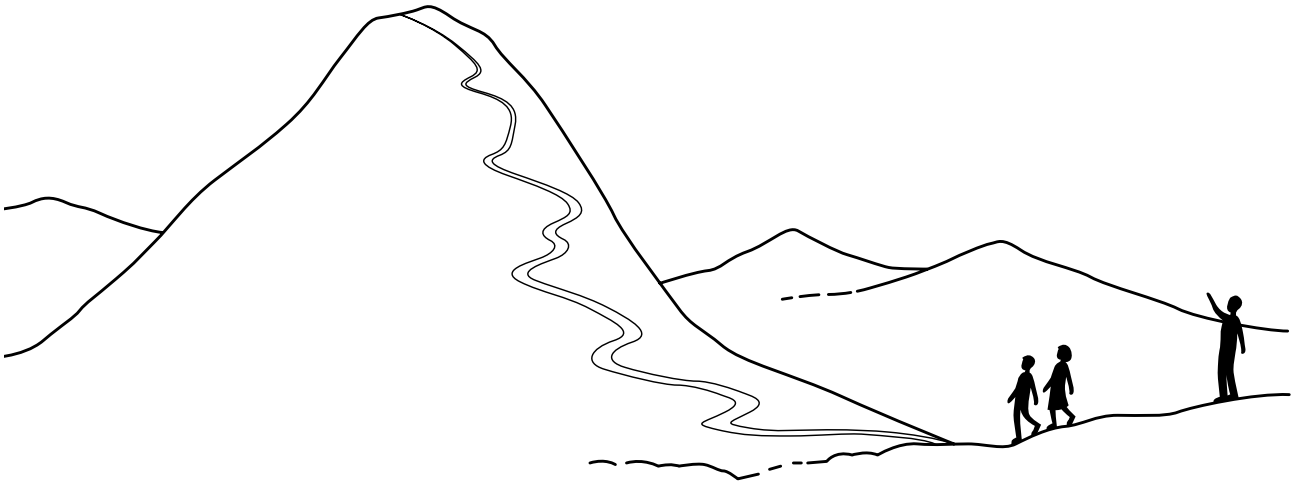
Q5. Sandstone is made from grains of sand that are stuck together. What sticks the grains together?

✎.....

© 2002 Atlantic Europe Publishing

Name: ..... **Form:** .....

Q6. Sarah and Ben are taking a walk in the countryside. They start off in a valley and climb up a hill.



Which kinds of rock are they likely to walk on?

Tick a box:

- ☐ A. Soft rocks then hard rocks.
- ☐ B. Hard rocks then soft rocks.
- ☐ C. All hard rocks.
- ☐ D. All soft rocks.

Q7. Two tests have been made on rocks but the results table has not been completed.

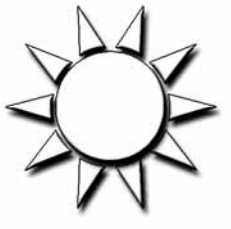
Rock	Lets water in	Scratched with nail
Limestone	yes	yes
Sandstone		
Granite	no	no
Slate		yes

(i) Fill in the gaps in the table.

(ii) What does scratching with a nail test?

✎.....

© 2002 Atlantic Europe Publishing



SAT STYLE QUESTIONS

Name: ..... **Form:** .....

Q8. A rock is hit with a hammer and it breaks into thin sheets.

(i) What kind of rock is it?

✎.....

(ii) Which part of a house could be made from this rock?

✎.....

Q9. A sculptor wants to make a statue.

(i) Which kind of rock should the sculptor use?

Tick a box:

Sandstone ☐ Slate ☐ Marble ☐ Lava ☐

(ii) Give a reason for your answer.

✎.....

Q10. (i) What are bricks made from?

✎.....

(ii) Why are bricks baked?

✎.....

Q11. Some buildings are made from a mixture of sand, cement and stones.

(i) What is the name of this mixture?

✎.....

(ii) A fourth material is needed to make the mixture hard. What is it?

✎.....

© 2002 Atlantic Europe Publishing

Name: ..... Form: .....

Q12. Nasreen picks up a smooth, round rock from a river bank.

(i) What is this kind of rock called?

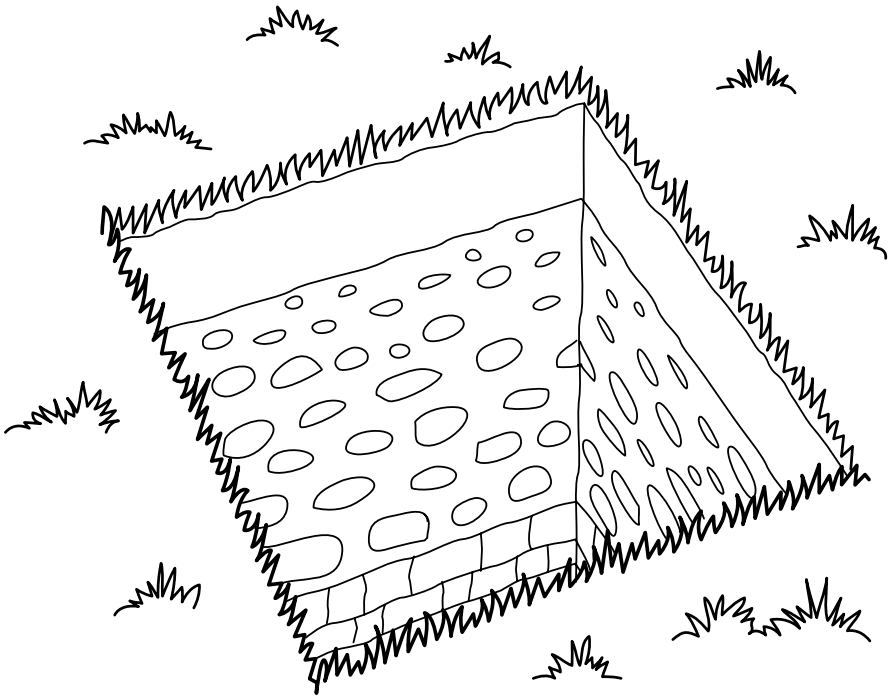
✎.....

(ii) Why is the rock smooth?

✎.....

✎.....

Q13. Paul has dug a hole in the ground.



(i) Label the different materials that can be seen.

(ii) In which material are plant remains found?

✎.....

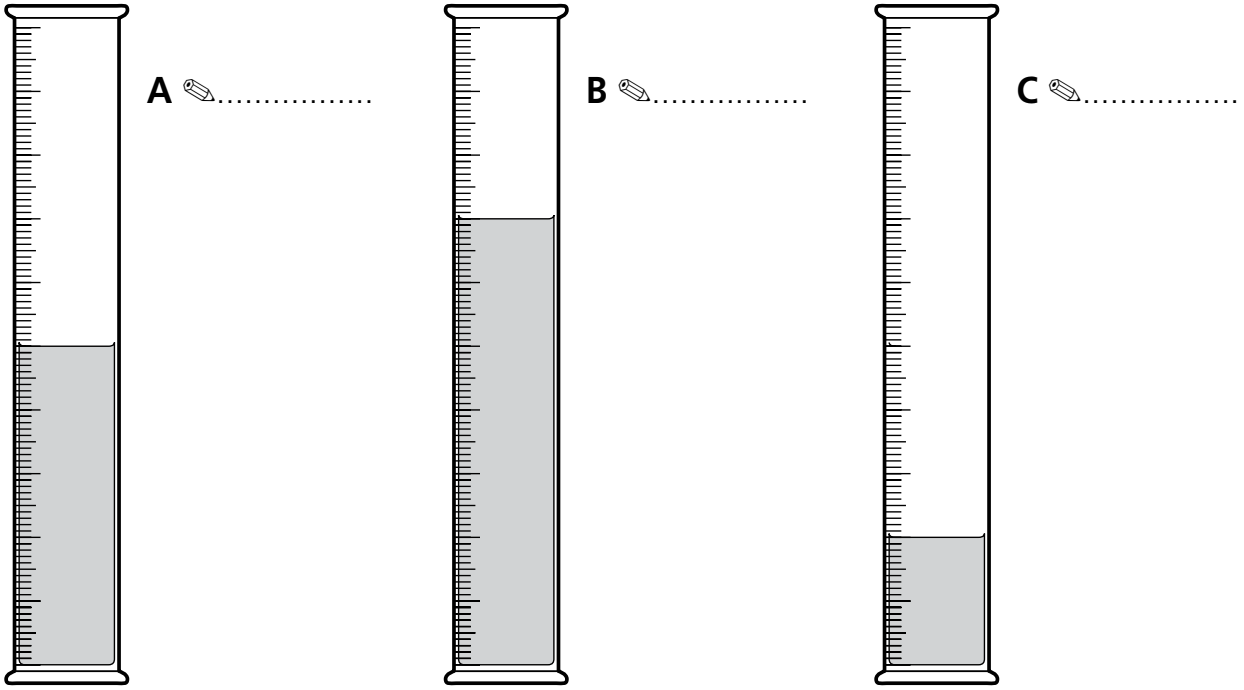
Q14. When rock breaks down in the ground what is it changed into?

✎.....

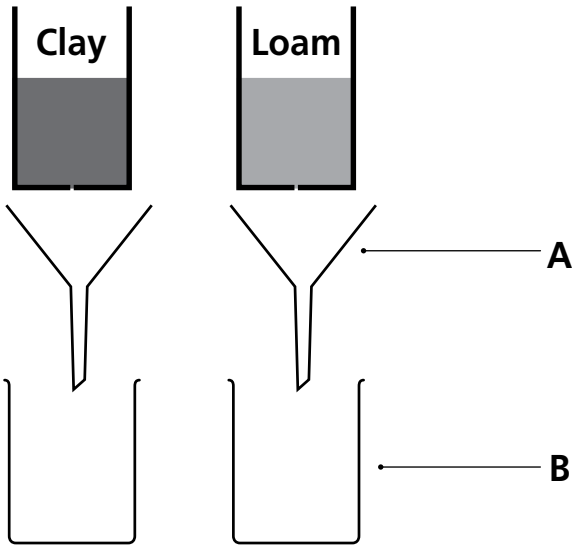
© 2002 Atlantic Europe Publishing

Name: ..... **Form:** .....

Q15. (i) How much water is in each of these measuring cylinders?



Arif set up this equipment.



(ii) Label A and B.

A ✎.....

B ✎.....

Arif poured 100cm^3 of water onto each soil sample and left them for 10 minutes.

(iii) Draw, in the beakers above, the amount of water you predict to pass through the soil.

(iv) Explain your prediction.

✎.....

✎.....

© 2002 Atlantic Europe Publishing

Name: ..... Form: .....

Q16. Two blocks of stone, A and B, were weighed and then put in a bowl of water. They were left for a few hours then they were weighed again. Stone A was the same weight but stone B was heavier.

(i) Why had stone B increased in weight?

✎.....

(ii) Why had stone A not increased in weight?

✎.....

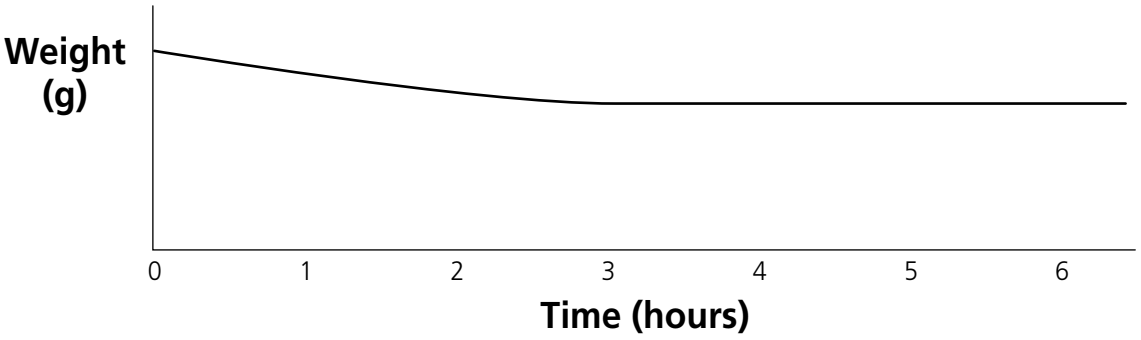
(iii) Suggest a kind of rock that stone A may be made from.

✎.....

(iv) Suggest a kind of rock that stone B may be made from.

✎.....

Stone B was taken out of the water and placed on some scales and its weight was recorded over six hours. This graph shows the weight of the stone over this time.



(v) How did the weight change in the first three hours?

✎.....

(vi) How did the weight change in the next three hours?

✎.....

(vii) Explain why the weight of the rock changed.

✎.....

© 2002 Atlantic Europe Publishing

ANSWERS
SAT STYLE QUESTIONS

1. Quarry. *1 mark*

2. Because it is covered in soil. *1 mark*

3. Ash, lava. *2 marks*

4. B. *1 mark*

5. Natural cement. *1 mark*

6. A. *1 mark*

7. (i) In sandstone line: yes, yes. In slate line: no. *3 marks*
(ii) Hardness. *1 mark*

8. (i) Slate. *1 mark*
(ii) Roof. *1 mark*

9. (i) Marble. *1 mark*
(ii) It makes an attractive rock when polished. *1 mark*

10. (i) Clay. *1 mark*
(ii) To make them hard, strong and stop them breaking up in the rain. *3 marks*

11. (i) Cement. *1 mark*
(ii) Water. *1 mark*

12. (i) Pebble. *1 mark*
(ii) Worn down by rubbing against other rocks in the river. *1 mark*

13. (i) Top to bottom: Topsoil, subsoil, rock. *3 marks*
(ii) Topsoil. *1 mark*

14. Sand, pebbles, silt and clay. *2 marks for any 2 or more*

15. (i) A 50cm^3, B 70cm^3, C 20cm^3. *3 marks*
(ii) A=Funnel. B=Beaker. *2 marks*
(iii) Larger amount below loam, only small amount below clay. *2 marks*
(iv) Clay has only very small gaps between grains so it only lets a little water through. Loam has larger gaps between grains so it lets more water through. *2 marks*

16. (i) It took in water. *1 mark*
(ii) Did not take in water. *1 mark*
(iii) Granite, marble or slate. *1 mark*
(iv) Limestone, sandstone or chalk. *1 mark*
(v) Decreased. *1 mark*
(vi) Stayed the same. *1 mark*
(vii) The rock dried out in first three hours. *1 mark*

Total marks: 45

© 2002 Atlantic Europe Publishing