'Does that really come from a quarry?

QCA Science - Unit 1C: Sorting and using materials

Does that really come from a quarry?

This unit encourages children to think about what is beneath their feet, exploring the fact that most of planet Earth is made up of rock. This unit then encourages children to explore the world of quarries and how this rock is removed from the ground and used to make everyday goods.

Using a feely bag, they explore a range of items made from quarried materials, encouraging an appreciation of the vast number of goods we use in our everyday lives that have been made from materials that have been quarried.

Unit 1C – Sorting and Using Materials
Science Year 1
Does that really come from a quarry?

Overview Teacher Introduction:

The themes explored in 'Does that really come from a quarry? are designed to be used in conjunction with the teaching of Unit 1C 'Sorting and Using Materials'. Through the use of the 'Virtual Quarry' resource, children will learn about what a working quarry is and how many of the materials that we use every day come from quarried materials.

The three lessons provided are designed to be slotted into the existing teaching within this unit. You may find that they can replace some of the lessons that you currently teach. These three lessons are not designed to teach all the objectives within this unit, only the sections highlighted in the QCA Unit document. They are designed to enhance and develop existing teaching.

Does that really come from a quarry?
Unit 1C Sorting and using materials

ABOUT THE UNIT

Through this unit children learn about the characteristics and uses of a range of common materials and vocabulary for describing and comparing materials.

Experimental and investigative work focuses on:

- thinking about what is expected to happen
- turning ideas into a form that can be tested
- making observations and comparisons.

Work in this unit also offers opportunities for using IT (see IT Unit 1D) to store information and for relating understanding of science to materials found in the home.

This unit takes approximately 9 hours.

WHERE THE UNIT FITS IN

Builds on Unit 1A 'Ourselves'

Children need:

- to know about the five senses
- to know vocabulary associated with the senses.

Links with Units 2D, 2E, art, design and technology.

VOCABULARY

In this unit children will have opportunities to use:

- names of materials, including quarried materials *eg metal, plastic, wood, paper, glass, clay, rock, fabric, sand, stone*
- words used to describe materials *eg hard, soft, rough, smooth, shiny, dull, magnetic, transparent, bendy, waterproof, strong*
- words and phrases for making comparisons *eg the same as, different from, harder, smoother*
- words which may have different meanings in a non-science context *eg group, material*
- expressions giving reasons using 'because'.

RESOURCES

- collection of common quarried materials (gravels, rocks, stones)
- collection of china / glass objects
- feely bags/blindfold
- collection of objects/materials to illustrate particular properties
- magnets of different types
- selection of papers and fabrics including some that are waterproof containers *eg yoghurt pots, margarine tubs, beakers/jugs for pouring water*

EXPECTATIONS

at the end of this unit

most children will:	name some common quarried materials; make observations of these and of common objects, communicate these using terms *eg rough, hard;* suggest how to test an idea and say what the result of the test shows
some children will not have made so much progress and will:	make observations of common objects and communicate these
some children will have progressed further and will also:	suggest several reasons why a material may or may not be suitable for a particular purpose and predict the results of tests they are going to do

LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
See Quarry Lesson 1 **'Are all rocks and stones the same?'** • that every material has many properties which can be recognised using our senses and described using appropriate vocabulary • to record observations of materials	♦ Ask children to handle a variety of quarried materials *eg a variety of different gravels, stones and rocks* and ask them to describe them *eg hard, shiny, dull, rough, sparkly.* Introduce words children are not familiar with. Record *eg by writing descriptions round a picture of the object.*	• use words *eg hard, shiny, rough* to describe materials and objects	**SAFETY** – Glass objects should be avoided with young children but they could touch windows etc. **SAFETY** – Do not use sharp objects.
See Quarry Lesson 1 **'Are all rocks and stones the same?'** • that materials can be used in a variety of ways • to group materials together and make a record of groupings	♦ Give children a collection rocks and stones, and challenge them to find different ways of grouping them *eg rough, smooth, shiny, dull.* Ask children to record *eg by putting the rocks in sets and labelling* and to explain their groups.	• identify a common characteristic and make a simple record *eg grouping and labelling*	
See Quarry Lesson 2 **'Is that really made from rock?** • to ask questions and to explore materials and objects made from quarried materials	♦ Ask children to suggest other senses they could use to find out what objects are like. Use feely bags or a blindfold game to encourage children to use senses of touch, hearing and smell to describe or identify objects that are made from quarried materials. Get the children to explain out loud, what they feel in the bag.	• ask suitable questions about objects • describe materials in terms of senses *eg this feels smooth, has a lid, It feels soft, it has a hole in it etc.*	

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See Quarry Lesson 2
'Is that really made from rock?'

- that there are many things made from quarried materials and these can be named and described

- Explain to the children that all these objects are made from quarried materials. Talk about glass (don't forget mirrors are glass!), things made of china, bricks and clay things. How many of items made of these things can they see around school and in their homes?
- List all the things they can think of that are made of glass.
- List all the things they can think of that are made of bricks.

- name several common materials and describe them using terms *eg rough, hard, shiny*
- identify different objects made of the same material and name the material

Children sometimes confuse the word 'material' with the word 'fabric'.

Children often have difficulty in distinguishing the material from the object made from the material. It is helpful to have some pieces of material not made into particular objects.

LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
See Quarry Lesson 3 • that objects are made from materials, and different, everyday objects can be made from the same materials	♦ Make a display of objects made of a quarried material – (Clay is a good one, as glass can pose a more of a hazard with young children – Items made of clay could include: China objects, terracotta, ceramics, tiles) Choose attractive or unusual objects, if possible. Invite children to add to the display. Discuss where the material to make the objects came from. Ask children to choose an object they particularly like and to use as many words as they can to describe it *eg how it feels, looks.* Build up collections *eg of stone objects , glass objects.* Label each set. Use simple reference books to find out more about each material.	• describe the object they chose *eg I chose this china cup, it's smooth, hard but could break if I dropped it.* • group together objects made of the same material and name the material	
• that materials can be sorted in a variety of ways according to their properties • to use appropriate vocabulary to describe materials	♦ Tell children you want to find a material to use *eg to make a window for a doll's house, to make a flower pot.* Ask children to suggest what the material would need to be like and sort out, from a variety of materials, which would be suitable and which would not. Ask them to explain the criteria they used *eg bendy/not bendy, transparent/not transparent, rough/smooth.* Record by drawing or sticking materials in sets and labelling or writing simple sentences.	• identify and name properties of materials *eg transparent, bendy, flexible* and sort into groups on the basis of these	

LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
• that some materials are magnetic but most are not • to think about which objects they expect to be attracted to a magnet • to make observations, communicate what happened, and with help, use results to draw conclusions saying whether their predictions were right	♦ Give children some magnets to explore *eg fishing game, fridge magnets, 'wand' magnets to catch their attention,* and ask them to explore what objects are attracted to, or 'stick to', a magnet. Group objects by magnetic or non-magnetic behaviour. Present children with a range of objects, ask them to predict whether they will be attracted to a magnet, to test their predictions and make a record of what happened.	• identify some objects that are attracted to a magnet • predict which objects will be attracted to a magnet and say whether they were right • recognise that objects that are attracted to magnets are made of metal but that not all metal objects are attracted	Children need plenty of time to explore the magnets before they start grouping. At this stage children should learn that iron is attracted to a magnet but other metals and other materials are not attracted.
• that materials are chosen for specific purposes on the basis of their properties	♦ Ask children to draw a picture of their house or school or of themselves on a cold, wet day and label materials that parts of the house or their clothes are made from OR show children a large picture and ask them to attach labels to show what materials parts of the house/school/clothes are made from. Discuss with children why the materials are suitable and ask questions about unsuitable materials *eg 'Would this paper make a good rainhat?' 'Would you like a scarf made of this plastic bag?'*	• identify reasons for using materials for particular purposes *eg wood for doors because it is strong, wool for a scarf because it keeps me warm* • identify a range of materials and correctly associate them with properties and uses *eg glass, transparent, windows*	

LEARNING OBJECTIVES CHILDREN SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES CHILDREN	POINTS TO NOTE
• to suggest how to test an idea about whether a fabric or paper is suitable for a particular purpose	♦ Show children different fabrics and papers. Remind them of work they did earlier in grouping papers and ask for their ideas about which would be best for wrapping a parcel. Discuss what the material would need to be like *eg strong, easy to write on, easy to fold*. Discuss with children how they could find out which papers are *eg strong*. Give children different papers and ask children to test their ideas. Discuss what they did *eg by asking 'How did you try to find out?'*	• make a suggestion of what paper for wrapping a parcel should be like • suggest a way of testing the papers appropriate to the characteristic chosen	
• to suggest how to test whether materials are waterproof • to explore ways of answering the question • to communicate what they did and what happened, making simple comparisons • to use what happened to draw a conclusion and to say what they found out	♦ Give children a different selection of materials and say you want to make a toy umbrella. Ask them what the material for an umbrella would need to be like *eg waterproof, won't let water through.* Help children to decide how to test the materials *eg by exploring what happens using small quantities of water*. Ask them to compare how waterproof the materials are. Ask children to describe what they did and help them to tell others what they found out.	• recognise that an umbrella would need to be waterproof • find a way to decide whether a material is waterproof *eg putting a material on a table, adding a few drops of water and seeing if the table is wet, holding the material over a container and dropping water on it* and describe this to others • use their results *eg to order materials or to group materials into waterproof and not waterproof materials*	This activity offers children the opportunity to carry out a whole investigation. It may be helpful to concentrate on the aspects of investigation highlighted in the learning objectives.
	Review and bring together information *eg by helping children to make an information chart about materials and their uses for another class.* Ask children to suggest names of materials, characteristics *eg rough, transparent, magnetic,* and uses. This could be IT-based (see IT Unit 1B 'Using a word bank').		

Lesson 1: Are all rocks and stones the same?

Prior Knowledge / Work:

The children should be familiar with handling different materials and discussing characteristics of them, using appropriate vocabulary.

Learning Objectives:

- To appreciate that every material has many properties which can be recognised using our senses and described using appropriate vocabulary
- To record observations of materials
- To use a varied vocabulary to describe
- To group materials together and make a record of groupings

Subject Links:

- **Numeracy** – Grouping and counting objects
- **Literacy** - Speaking and Listening skills

Resources:

- Selection of rocks, as in a 'rock pack'
- Selection of gravel pieces (from builder's merchants)
- Selection of stones / rocks (from a garden or school grounds)

Background Information:

The Earth's crust is made of rock. In some places, such as cliffs, mountains and quarries, this rock can be seen, but in many cases, it is hidden away soil or water.

We tend to think of rock being large chunks of material. In fact, rock does not need to be large, or hard. Chalk is a kind of rock. The words 'stone', pebbles' and 'sand' all describe rock in slightly different sizes and shapes. There are many different types of rock. They come in different colours, can be hard or soft and have been formed in a variety of different ways.

We use rocks for many different purposes. Some are used in a fairly natural state, that is, they are not changed much from the form in which they are quarried (removed from the ground). An example of this is stone quarried for use in buildings. Many other substances are made by changing the rocks quarried in some way. Sometimes the rock is heated or it is crushed and mixed with other materials.

Bricks are made from clay and shale (a rock made from clay). The clay is crushed into small pieces, mixed with water and other ingredients and then moulded into a brick shape. They are then fired in a kiln to make the particles of clay bond together.

Glass is made by melting together several minerals at very high temperatures. Silica in the form of sand is the main ingredient and this is combined with soda ash and limestone and melted in a furnace at temperatures of 1700°C.

Concrete is made when water, sand and gravel or aggregates are mixed with cement. (Cement is made by heating limestone or shale to 1400 ° c). Concrete is then used for many building jobs from building houses and offices to bridges and pavements! Concrete is the most versatile building material in the world. It can made into blocks or can be taken to site in a liquid and set into any moulded shape as a solid. It gets stronger with time as crystals grow and interlock.

Most of our roads are covered in **asphalt**. This is made from a mixture of aggregate and bitumen.

Even **toothpaste** contains limestone and salt!

So, quarried materials are all around us and we use them all the time in our everyday lives.

Through use of this unit, children will come to understand a little more about rocks, where they come from, how they differ and how they contribute to our everyday lives.

Activity:

Make a collection of rocks. Some of these can be from a 'rock pack' made up of the main different types of rocks. Some can easily be purchased from a builder's merchants, in the form of gravels and other samples. These can be supplemented with stones collected from the garden or school grounds. Try to collect those with different shapes, colours and textures.

Ask the children what they all are. You will probably find a range of vocabulary used; rocks, stones, pebbles, gravel etc. Explain to the children that they are all correct and these words are all used to describe different rocks.

Ask the children where they think these have all come from. Initially, they will say they came from the garden, or a shop. Discuss this further, developing a basic understanding that our Earth is made up of rock and that if they dug down under their feet, they would eventually get to rock. Explain that the rock is made in different ways and that is why it can look different and also that rocks have different things inside them that can make them different colours and textures.

Look at the collections together. Ask questions such as;

- Can anyone see a smooth rock?

- Can anyone see a rough rock?
- Can anyone see a dark coloured rock, etc

Such questions encourage a varied use of vocabulary linked in with the appearance and texture and encourage the children to look closely at the samples.

Allow groups of children to have a small selection of samples. Give them time to hold them and look closely at them. Encourage them to use sight, smell and touch to explore their rock. Ask the children to select one rock, then choose individual children to stand up and describe their rock to the other children.

Ask the children to sort the rocks they have into groups. They can decide how they do this. They may choose to sort according to size, shape, texture or colour. Once they have done this, ask each group to describe how they chose to group their samples. Encourage the children to try and sort under different criteria – you may ask them to sort them into a line, with the smallest on the left and the largest on the right.

Finally, explain to the children that there are special places called 'Quarries' where rock is removed from the ground. Show them the 'Virtual Quarry' tour to show them some aspects of quarries and quarrying.

Lesson 2: Is that really made from rock?

Prior Knowledge / Work:

Following Lesson 1, the children should have a basic understanding of what rock is and that quarries are places where rock is removed from the ground. This lesson aims to make the children more aware of how these rocks can then be used and changed into many different products that we use in our everyday lives.

Learning Objectives:

- To ask questions and to explore materials and objects made from quarried materials
- Using appropriate senses, make observations and communicate these
- For children to appreciate that there are many things made from quarried materials and these can be named and described

Subject Links:

- **Literacy** - Speaking and listening skills

Resources:

- A feely bag
- A selection of items that are made from quarried materials. These could include:
    - Glass items (fairly sturdy for feely bag!)
    - Tube of toothpaste
    - Small mirror
    - Small terracotta plant pot
    - Pot of talcum powder
    - Brick
    - China item (cup, saucer)
    - Chalk
    - Bathroom tile

Background Information:

See background information for Lesson 1.

Activity:

Place the items in, one at a time and allow children to come up, describe what they feel and try to guess what the item is. Work through the items, lining them up in front of the children once they have guessed what they are. (Ensure hands are washed thoroughly after this activity.)

Once all the items have been through the feely bag, tell the children that all the items have

something in common. Discuss what this could be. They will be very surprised when you tell them that rocks are used in some way to make all of the things they can see! Using the information in the introduction and information on the website, explain, in simple terms how this is.

Take glass as a very common material made from quarried materials. Make sure the children understand that mirrors are made of glass. Talk about glass things they might see or use in school. Show them examples. In groups, get them to think of all the glass things they have at home. Can these be sorted into different rooms that they are found? Repeat the activity for china or brick.

Lesson 3: What a collection!

Prior Knowledge / Work:

That gathered from Lessons 1 and 2

Learning Objectives:

- To appreciate that objects are made from materials, and different, everyday objects can be made from the same materials

Subject Links:

- **Literacy** – Speaking and listening skills

Resources:

- Collections of different items made from a particular quarried material, i.e. china items, glass items etc. (Great care will need to be taken with glass, in particular.)

Background Information:

As in lesson 1.

Activity:

Make a collection of different items made from a quarried material, i.e. china. China and porcelain is made from 'china clay', a soft rock extracted from the ground. This is mined from quarries mainly in Devon and Cornwall. Alternatively, pictures could be collected of all the different things made from brick or glass. Encourage children to discuss why these items form a group and what the link with quarries is.

Allow children to choose particular item and to draw them and describe why they like that item.

Unit: Does that really come from a Quarry?

Website Links:

- www.tarmac.co.uk/quarryville
  Select 75 Stone Street for some good images and activities linked to everyday items made from quarried materials.