How to be Brilliant at Materials

Winnie Wade
Colin Hughes

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Website: www.brilliantpublications.co.uk

General information enquiries:
Tel: 01525 222292

Written by Winnie Wade and Colin Hughes

Illustrated by Kate Ford
Cover photograph by Martyn Chillmaid

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Contents

Introduction

How to be Brilliant at Materials contains over 40 photocopiable sheets for use with children working at levels 2-5 of the National Curriculum (Scottish levels C-E). The activities are designed to help children develop scientific knowledge and understanding of materials. They can be used whenever the need arises for particular activities to support and supplement your existing scheme of work for science. The activities provide learning experiences which can be tailored to meet individual children's needs.

The activities are addressed directly to the children. They are self-contained and many children will be able to work with little additional support from you. You may have some children, however, who have the necessary scientific skills and concepts, but require your help in reading the sheets.

The children should be encouraged to use the sheets for all aspects of communicating their work. Most of the activities require basic classroom science resources and these are listed in the **What you need** box on each sheet. Some of the sheets require the use of an additional resource sheet. Where this is the case, it has been indicated by a small box, with the page number in it, in the top right corner, eg 48 .

How to be Brilliant at Materials relates directly to themes 1, 2 and 3 of the programmes of study for Materials and their Properties. Pages 5 and 6 give details of those elements of the programme of study that are covered.

The following bread recipe may be used for the activity on page 29. This recipe makes two 450 g loaves.

12.5 g fresh yeast
1/2 teaspoon caster sugar
450 ml warm water
750 g wholemeal flour
1/2 teaspoon salt
12.5 g butter

Mix the flour and the salt together. Rub in the butter. Mix the yeast and sugar with a little of the water. Leave for 10 minutes. Add the rest of the water to the flour with the yeast mixture. Mix to form a dough. Knead for 8-10 minutes until smooth and elastic. Place in a clean bowl, cover with a damp cloth and leave to rise in a warm place for 2 hours (until the dough has doubled in size). Knead for a few minutes, then divide into two and place in greased 450 g loaf tins. Cover and leave in a warm place for 30 minutes (until the dough has risen to the top of the tins). Bake for 30-40 minutes at 220ºC (425ºF, gas 7). Cool on a wire rack.

Links to the National Curriculum

How to be Brilliant at Materials supports the following elements of the programmes of study.

Pupils should be taught:

Sc3 Materials and their Properties

1 Grouping and classifying materials

a to compare everyday materials and objects on the basis of their material properties, including hardness, strength, flexibility and magnetic behaviour, and to relate these properties to everyday uses of the materials;

b that some materials are better thermal insulators than others;

c that some materials are better electrical conductors than others;

d to describe and group rocks and soils on the basis of characteristics, including appearance, texture and permeability;

e to recognize differences between solids, liquids and gases, in terms of ease of flow and maintenance of shape and volume.

2 Changing materials

a to describe changes that occur when materials are mixed, *eg adding salt to water* ;

b to describe changes that occur when materials, *eg water, clay, dough*, are heated or cooled;

c that temperature is a measure of how hot or cold things are;

d about reversible changes, including dissolving, melting, boiling, condensing, freezing and evaporating;

e the part played by evaporation and condensation in the water cycle;

g that burning materials, *eg wood, wax, natural gas*, results in the formation of new materials and that this change is not usually reversible.

3 Separating mixtures of materials

a how to separate solid particles of different sizes by sieving, *eg those in soil* ;

b that some solids, *eg salt, sugar*, dissolve in water to give solutions but some, *eg sand, chalk*, do not;

c how to separate insoluble solids from liquids by filtering;

d how to recover dissolved solids by evaporating the liquid from the solution;

e to use knowledge of solids, liquids and gases to decide how mixtures might be separated.

In addition, the requirements in the following Breadth of Study section of the programme of study (National Curriculum, 1999) apply.

1 During the key stage, pupils should be taught the **Knowledge, skills and understanding** through:

a a range of domestic and environmental contexts that are familiar and of interest to them;

b looking at the part science has played in the development of many useful things;

c using a range of sources of information and data, including ICT-based sources;

d using first hand and secondary data to carry out a range of scientific investigations, including complete investigations.

2 During the key stage, pupils should be taught to:

Communication

a use appropriate scientific language and terms, including SI units of measurement, *eg metre, newton*, to communicate ideas and explain the behaviour of living things, materials, phenomena and processes;

Health and safety

b recognize that there are hazards in living things, materials and physical processes, and assess risks and take action to reduce these risks to themselves and others.

Check it out

What you need:
Magnet, bowl of water, everyday objects made from a variety of materials, *eg pieces of paper and paper, a polythene bag, metal and wooden spoons, a mug, an eraser, a kitchen towel, an empty margarine container*.

Compare some everyday objects to find out more about the properties of materials.
Test each object to find out whether it is:

Fill in the table to show the properties you have identified for each of the objects.

Object	Property						
	Hard	**Soft**	**Absorbent**	**Waterproof**	**Magnetic**	**Flexible**	**Stiff**
Polythene bag							
Kitchen towel							

Choose two of the objects. Write here why you think they are made of that particular material.

EXTRA!
Choose another everyday object. What material is it made from? What properties does that material have that make it suitable for that object?

Aluminium fact file

What you need:
A magnet, a collection of used drinks cans.

Here are some useful facts about aluminium:

1 It is a light-weight material.
2 It is soft and can be squeezed.
3 It is a good conductor of electricity.
4 It does not go rusty.
5 It reflects light.
6 It is a good conductor of heat.
7 It is an expensive metal to produce.
8 It is often mixed with other metals to make it very strong.

Look at this list of products made from aluminium. For each one match up the aluminium facts to show what makes aluminium suitable for the job it does. Write down the correct fact numbers beside each product. You may have more than one number beside each product.

Aluminium foil

Bicycle frames

Saucepans

Milk bottle tops

Aircraft

Toothpaste tubes

Pipes

Mirrors

Electrical cables

Window frames

It is a good idea to recycle things made of aluminium because it is expensive to produce. You can use a magnet to sort out the drinks cans made from aluminium, because aluminium is **not** magnetic. The magnet will only attract cans that contain iron.

EXTRA!
Make a fact file for another metal such as copper or iron.

Building a house

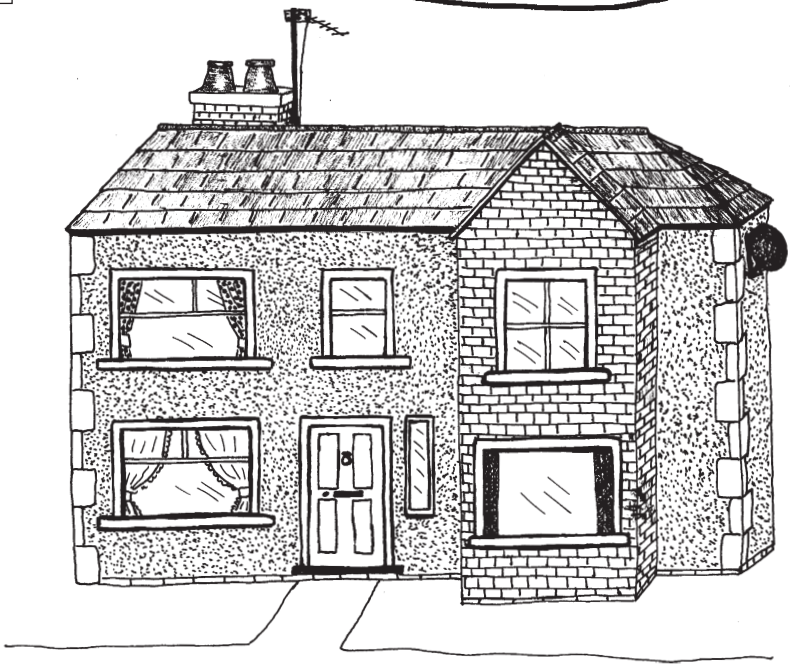
The **properties** of a material tell us what it is like and how it can be used.

What you need:
Reference books, photographs of houses from magazies.

Look at the house picture on this sheet and photographs of other houses. Mark on them the different types of materials which have been used to build them.

Look in reference books to find out some of the properties of these building materials.

Complete the table to show:
- the different building materials used;
- where they have been used;
- the properties of that material that make it particularly suited to that purpose.



Material	Where it has been used	Properties that can make it suitable
glass	window	you can see through it/ it lets in light

EXTRA!
Find out if there are any disadvantages of using any of these materials.
Hint: think about weather damage!

Materials record sheet

What you need
A collection of objects made from different materials, magnet, coin.

We can group materials according to their properties. Collect objects made from different materials, identify the material they are made from and try sorting them into groups by filling in the record sheet.

Property	Materials					
	Plastic	Wood	Metal	Paper	Cork	Rubber
Hard/soft						
Shiny/dull						
Colour						
Rusts/does not rust						
Magnetic/ non-magnetic						
Conducts electricity						
Conducts heat						
Strong/ breaks easily						
Light/heavy						
Flexible/rigid						
Transparent/opaque						
Naturally occurring/ synthetic						
Uses						