

# Tutor support material

Entry Level

Edexcel Entry Level Certificate in Science  
(8938)

Unit 8: Properties of Materials and their  
Uses

May 2008

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# Introduction

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This tutor support material accompanies the Edexcel Entry Level Certificate in Science specification and has been designed to help teachers prepare for first teaching of the qualification.

This document is for Unit 8: Properties of Materials and their Uses, and includes worksheets to aid the teaching of this unit.

Additional documents are available for all other units within the Edexcel Entry Level Certificate in Science. There is also a Teacher's guide document available on the Edexcel website, which gives more information on specialist language, assessment of practical skills and information on How Science Works.

Attention is drawn to the need for safe practice when students carry out laboratory experiments or observe demonstrations. Centres are responsible for the overall risk assessment of experimental work undertaken by learners. Reference must be made to COSHH regulations and any specific local education authority restrictions.

Relevant advice can be obtained from the following publications.

- *CLEAPSS Laboratory Handbook* (available from CLEAPSS School Science Service, website [www.cleapss.org.uk](http://www.cleapss.org.uk))
- *Control of Substances Hazardous to Health Regulations* (HSE, 2005) ISBN 0717629813
- *Hazcards* (2004 update available from CLEAPSS School Science Service)
- *Topics in Safety, Third Edition* (ASE January, 2001) ISBN 0863573169



**Worksheets for**

**Unit 8: Properties of Materials**

**and their Uses**



## Technician/teacher notes for experiments

### Testing materials

#### **Materials required**

Steel strip.

Copper strip.

Ceramic strip.

Plastic strip.

Nail.

Bowls of water.

Clamp.

### Which metals are magnetic?

#### **Materials required**

- Long pieces (strips or rods) of steel, glass, tile (ceramic), plastic and string.
- Beakers.
- Warm water.
- Simple circuit with battery, bulb and connectors (to test strips/rods for electrical conductivity).
- Magnet.

## Groups of materials

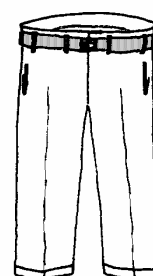
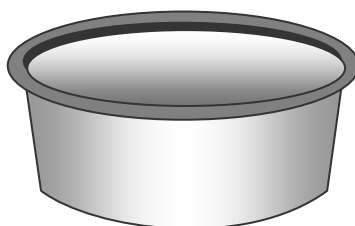
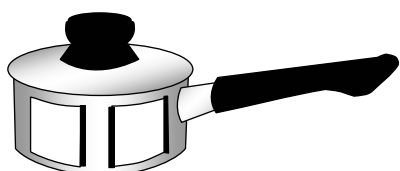
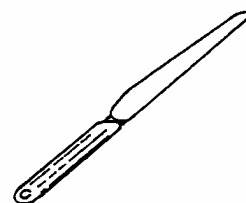
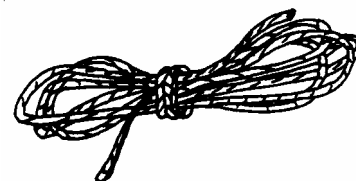
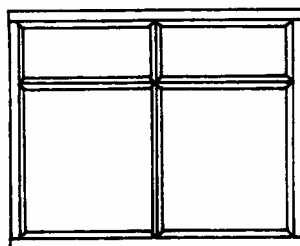
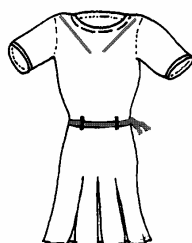
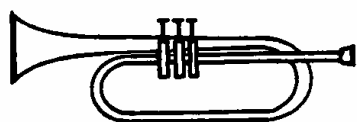
There are five groups of materials.

They are **metals**, **ceramics**, **glass**, **plastics** and **fibres**.

Fabrics are made from fibres.

The pictures show some different items.

Write down the material used to make each item underneath each picture.



## Naming materials

Collect some items from your teacher.

Spread the items on your table or bench top.

Sort the items into five groups.

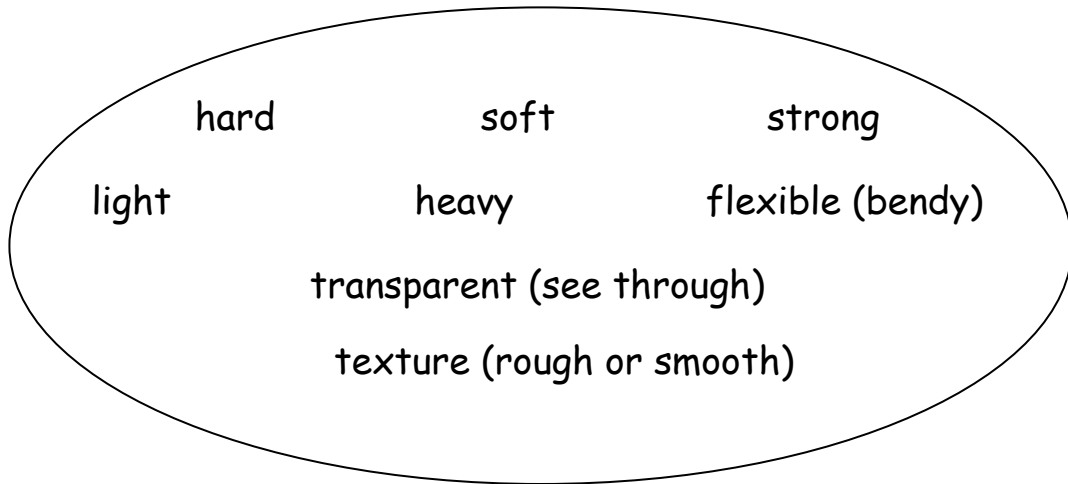
Write down the items in the table below.

a) metals
b) ceramics
c) glass
d) plastics
e) fibres and fabrics

## Properties of materials

A material has properties — things that tell us what it is like.

Here are some properties.



Write down some properties of

(i) iron \_\_\_\_\_

\_\_\_\_\_

(ii) glass \_\_\_\_\_

\_\_\_\_\_

(iii) plastic \_\_\_\_\_

\_\_\_\_\_

(iv) wool \_\_\_\_\_

\_\_\_\_\_

(v) brick \_\_\_\_\_

\_\_\_\_\_

## Useful materials

The diagrams show some objects.

The objects are made from the main types of materials that we use.



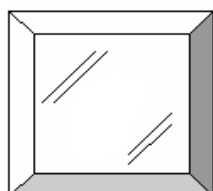
Metal cans



Plastic bottles



Fibre hat



Glass mirror



Glass drink container



Ceramic tea pot

Use the diagrams to list the different types of material in the table below.



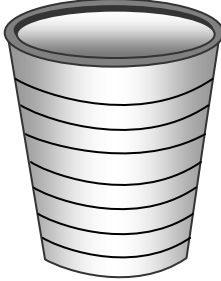

Identify another object made from each material and write this in the table.

Type of material	Object made from this material
1.	
2.	
3.	
4.	
5.	

## A material world

The diagram shows different objects you can drink from.

Objects that you can drink from are called drinking vessels.

			
Glass	Metal tankard	Plastic cup	Ceramic mug

Think about the properties of each material that makes it suitable to make a container to drink from.

Complete the table below.

Drinking vessel	Why is the material suitable?	Any disadvantages?
Glass		
Metal tankard		
Plastic cup		
Ceramic mug		

Say which material you prefer and why.


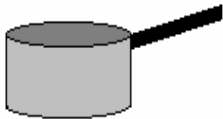
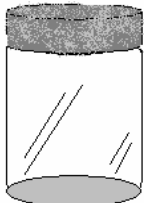


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## Uses of materials

Why are the materials used in the objects shown below?

Object	Material used	Reason why material is used
<b>Badminton racquet</b>		
	Nylon strings	
	Metal frame	
<b>Saucepan</b>		
	Metal	
	Plastic handle	
<b>Container</b>		
	Plastic lid	
	Glass jar	
<b>Light bulb</b>		
	Metal	
	Glass	
<b>Iron</b>		
	Metal base	
	Plastic handle	

## Grouping materials

Different materials have different properties.

We can group materials according to their properties.

Give examples of objects that use the properties listed in the following table.

Property of material	Examples
Electrical insulator	
Heavy material	
Material which floats	
Soft material	
Electrical conductor	
Shiny, silver coloured materials	
Heat insulator	
Heat conductor	

## Is it a natural or a synthetic (made) material?

Natural materials are found in the ground, in all living things and in the air.

Gold and wood were formed naturally.

Gold and wood can be used in their natural state.

Many things are made from natural materials, eg plastic is made from oil.

Made materials like cement and polystyrene are made in a factory.

These are called synthetic materials.

Cement is made from limestone and clay.

Cement is a synthetic material.

Look at the materials listed in the box and write them in the correct column. Decide where each material comes from.

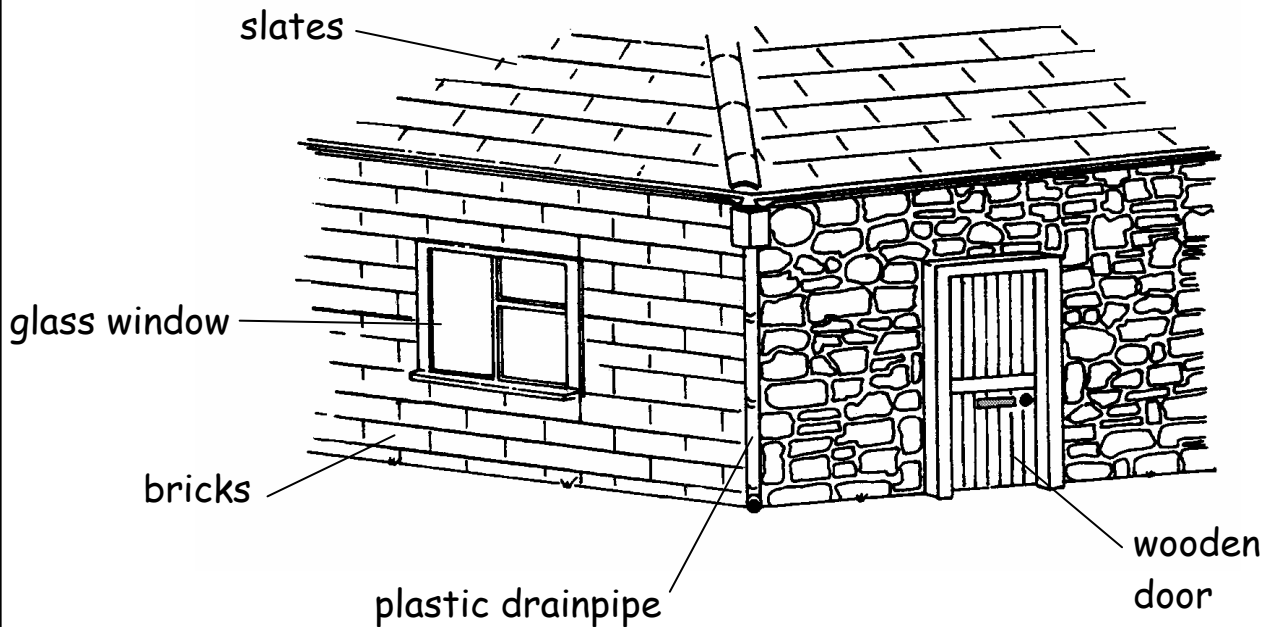
brick	nylon	copper	wool
glass	oil	steel	gold
cotton	pvc	polystyrene	stone
rubber	wood	cement	coal

Natural materials	Made materials	Where it comes from

## Natural and synthetic (made) materials

The diagram shows part of a house.

Some of the materials used to build the house are labelled.



Some of these materials are natural.

Some of these materials are synthetic (made).

Write down which materials are natural and which are synthetic.

Use the table below.

Natural	Synthetic (made)

## Plastics

Make a list of plastic things that you can think of.

- Think of things you can find in your kitchen.
- Think of things you can find in your bathroom.
- Think of things in other rooms at home.
- Think of things in cars.

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Which ones are coloured? \_\_\_\_\_.

Which ones are waterproof? \_\_\_\_\_.

Are plastics usually light to carry? \_\_\_\_\_.

Do plastics rot easily? \_\_\_\_\_.

Do they rust? \_\_\_\_\_.

Write down other properties that plastics have that make them useful.

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Write down any properties of plastics which are **not** useful.

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Write down any properties of plastics which may be dangerous.

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## Testing materials

Your teacher will provide you with some different materials.

Take one of the materials and do the tests below.

Put your results in the table on the next page.

### Testing the materials

#### Test 1

What colour is it?

#### Test 2

What shape is it?

#### Test 3

Lustre - is it shiny or dull?

#### Test 4

Transparency - try to look through the material.  
Can you see through it?

#### Test 5

Texture - does it feel rough or smooth?

#### Test 6

Hardness - use a nail to scratch the surface - is it easily scratched?

#### Test 7

Flexibility - try to bend it. If it bends easily it is flexible.

#### Test 8

Does it float or sink?

Do these tests again with the rest of the materials.  
Test one material at a time.

## Testing materials – results

<b>Material</b>				
<b>Colour</b>				
<b>Shape</b>				
<b>Lustre (shiny or dull)</b>				
<b>Transparency (see through)</b>				
<b>Texture (rough or smooth)</b>				
<b>Hardness (how easily it is scratched)</b>				
<b>Flexibility (how easily it bends)</b>				
<b>Floats or sinks</b>				

## Which metals are magnetic?

Iron is a magnetic metal.

Magnets attract iron objects.

Most other metals are non-magnetic.

### What you need

Small strips of different metals, eg copper, tin, aluminium, iron, zinc, lead.

Bar magnet.

### What you do

1. Note the appearance of each metal in the table below.
2. Hold a magnet close to the metal you are testing.
3. Record the effect of the magnet in the table.

Metal	Appearance	Effect of magnet

## Questions on magnets

1. Which metals have a similar appearance?

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2. Which metal or metals were attracted to the magnet?

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3. Why would this test be useful when sorting out drinks cans for recycling?

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4. Explain how very powerful electromagnets are used in scrap metal yards.

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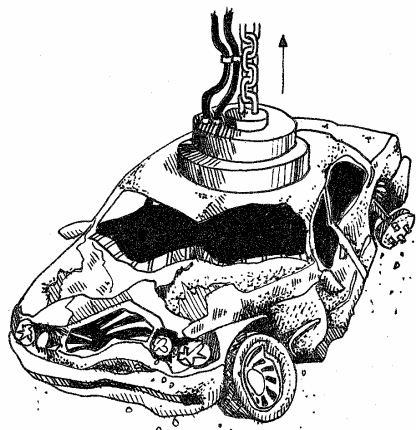
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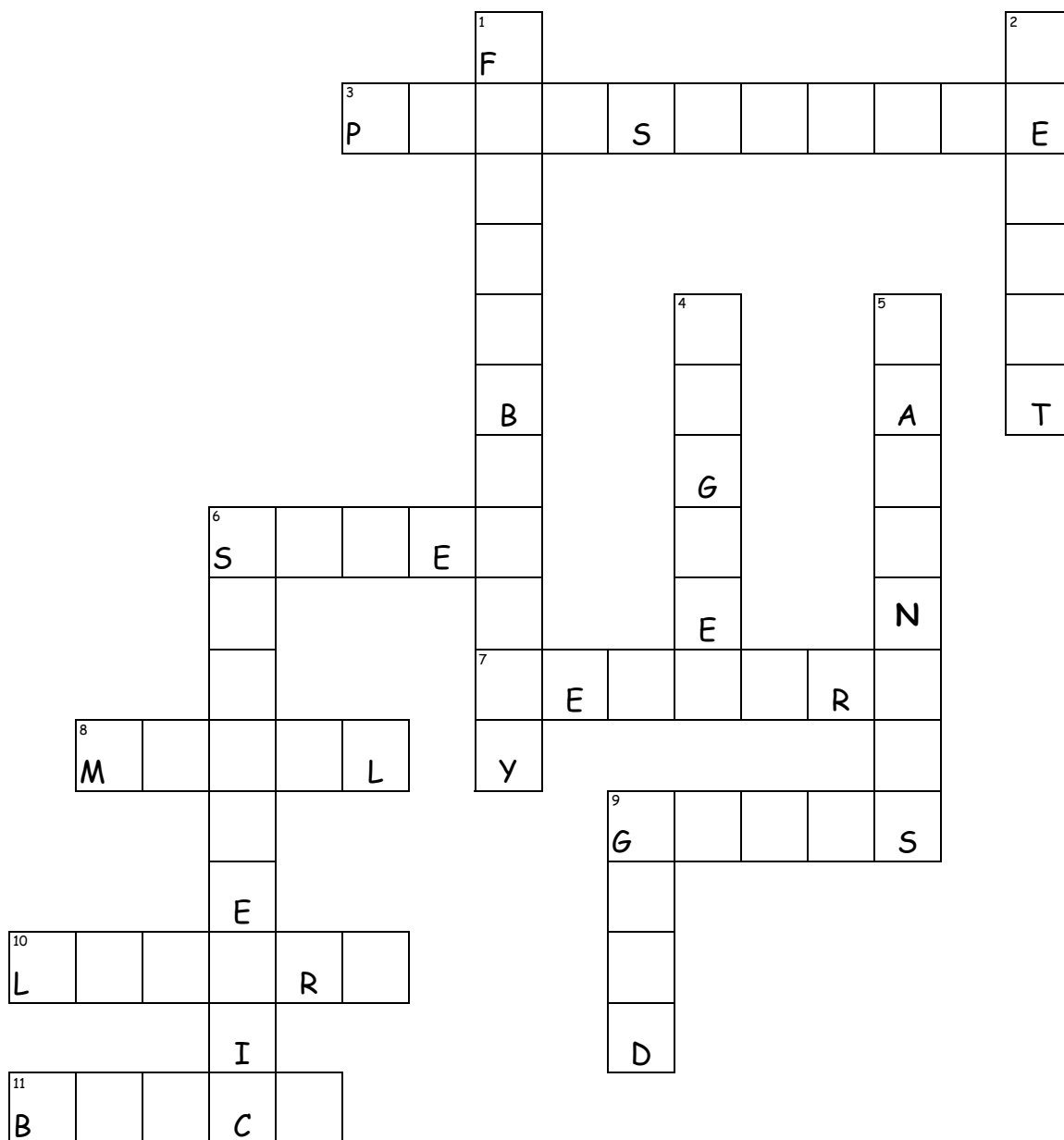


## Word search

Ceramic	Material
Conductor	Metal
Flexible	Plastic
Fibre	Soft
Glass	Strong
Insulator	Synthetic
Hard	Texture
Heavy	Transparent

S	T	R	A	N	S	P	A	R	E	N	T
H	A	R	D	M	H	E	A	V	Y	S	M
A	R	M	A	T	E	R	I	A	L	Y	S
C	S	I	F	A	P	T	R	S	M	N	G
O	T	F	O	S	O	F	A	Z	J	T	L
N	R	I	A	J	O	R	U	L	M	H	A
D	O	B	T	E	X	T	U	R	E	E	S
U	N	R	C	I	T	S	A	L	P	T	S
C	G	E	F	G	L	I	V	E	V	I	R
T	N	F	L	E	X	I	B	L	E	C	A
O	T	O	G	L	C	E	R	A	M	I	C
R	M	F	I	N	S	U	L	A	T	O	R

## Letter ladder



### Across

- 3 This is an example of a made (manufactured) material.
- 6 This metal is magnetic.
- 7 This property of a material tells us whether it feels rough or smooth.
- 8 Which type of material conducts electricity?
- 9 Which type of material can you see through?
- 10 This property of a material tells us whether it is shiny or dull.
- 11 This ceramic material is used to make buildings.

### Down

- 1 This property of a material tells us whether it can bend easily.
- 2 Which building material is made from limestone and clay?
- 4 What could be used to sort out drink cans for recycling materials?
- 5 This property of a material tells us whether it is easily scratched.
- 6 What name is given to materials that are made in a factory?
- 9 This valuable metal is found naturally.

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