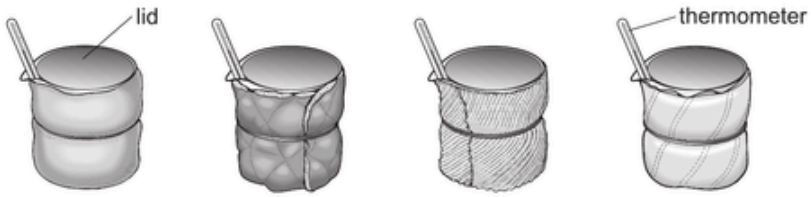
Materials and Properties

Different materials behave in different ways — understanding their properties helps explain why we choose them for different jobs, a core KS3 chemistry skill for GCSE Science.

9. A company has made a new material called 'Wellwarm'. They want to use 'Wellwarm' to make coats.

(a) A scientist tested 'Wellwarm' to see how well it insulated a beaker of hot water. She tested 'Wellwarm' and three other materials as shown below.



She wrapped each beaker in a different material.
She recorded the temperature at the start and 20 minutes later.

(i) What was the independent variable that the scientist **changed**?

9ai
1 mark

_____

(ii) What was the dependent variable that the scientist **measured** during the investigation?

9aii
1 mark

_____

(b) The results of the investigation are shown below.

time (minutes)	temperature of water (°C) wrapped in			
	material A	material B	material C	material D
0	60	60	60	60
20	34	40	38	36

(i) The scientist said that the 'Wellwarm' material is the best insulator.
Which material was 'Wellwarm'? Use the results to help you.
Tick the correct box.

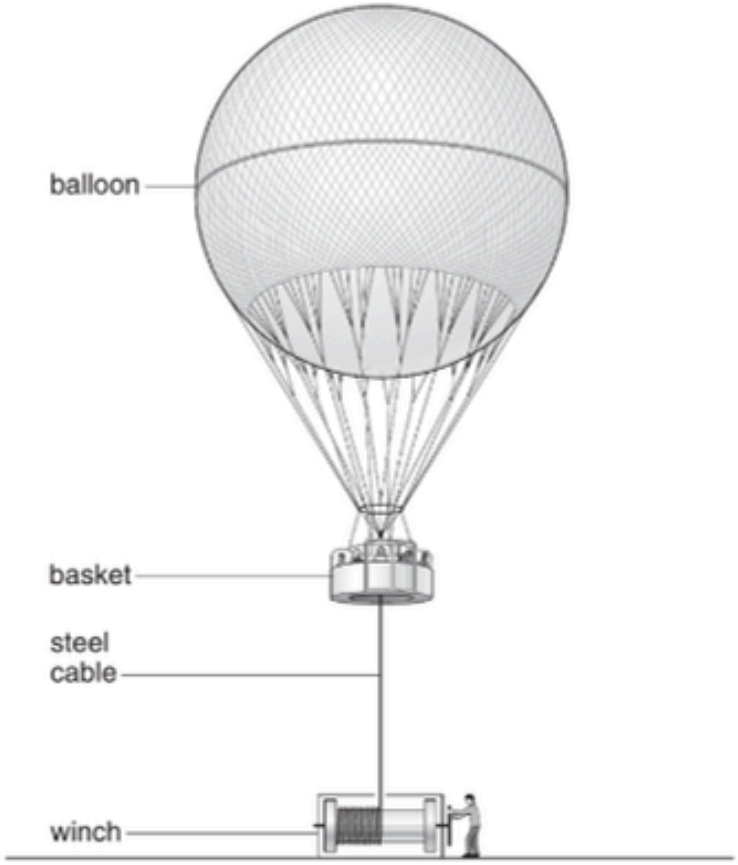
A ☐ B ☐ C ☐ D ☐

(ii) Use the evidence in the results table to explain your choice.

_____

KS3 Science SATs, Tier 3-6, Paper 1 (2009) - Q9(b)-(e)

6. The drawing shows some people in a balloon ride.
The basket of the balloon is fixed to the end of a steel cable.



(a) A man brings the balloon down by winding the steel cable around a winch.
Six properties of steel are given below.

(i) Which **two** properties of steel make it suitable for the **cable**?
Tick the **two** correct boxes.

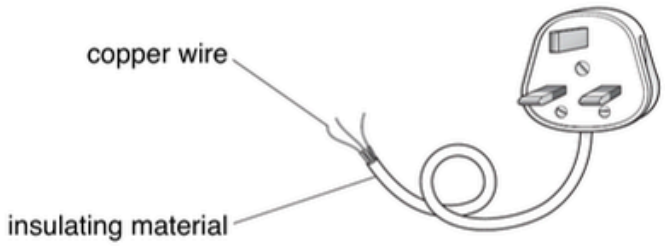
It conducts electricity.	☐	It conducts heat.	☐
It is flexible.	☐	It is magnetic.	☐
It becomes rusty.	☐	It is strong.	☐

(ii) From these six properties of steel, give **one** property that is **never** useful.

_____

Modern Tuition

(c) The drawing below shows part of an electric cable and a plug.



(i) What material could be put around the wires to insulate them?

_____ 4ci

1 mark

(ii) Why is this insulating material needed?

_____

_____ 4cii

KS3 Science SATs, Tier 3-6, Paper 1 (2005) - Q4(c)

(d) Why is copper used for wires in a circuit?
Tick the correct box.

Copper does **not** stick to a magnet.	☐	Copper is a good conductor of electricity.	☐
Copper is a brown metal.	☐	Copper is a good conductor of heat.	☐

1d

1 mark

KS3 Science SATs, Tier 3-6, Paper 2 (2008) - Q1(d)

5. (a) The drawings below show three objects made from copper.

Draw a line from each object to the reason for using copper for that object.
Draw only **three** lines.

object made from copper	reason for using copper
 base of a saucepan	It does **not** rust.
 coin	It is a good conductor of electricity.
 wires in a cable	It is a good conductor of heat.
	It is **not** magnetic.

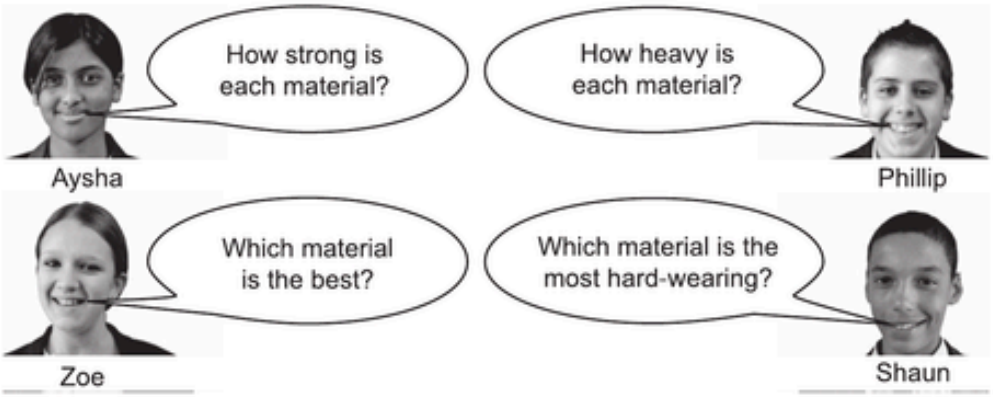
5a 1 mark

5a 1 mark

5a 1 mark

Modern Tuition

5. Some pupils investigated different materials used to make rucksacks.
Here are some of the questions they asked.



(a) Which pupil asked a question that cannot be investigated?
Tick the correct box.

5a
1 mark

Aysha ☐ Phillip ☐ Zoe ☐ Shaun ☐

Give a reason for your answer.

5a
1 mark

_____

_____

(b) Zara took four different rucksack materials and investigated how waterproof they were.

She poured 100 cm^3 of water through each material in turn.
She measured the volume of water passing through each material in 30 minutes.



Modern Tuition

(i) Give **one** way of making Zara's test fair.

_____

5bi

1 mark

(ii) Look at the photograph of the investigation.

Name **one** measuring instrument Zara used.

_____

5bii

1 mark

(c) The table below shows Zara's results.

material	volume of water passing through each material (cm^3)
A	11
B	5
C	20
D	15

Which material was the most waterproof?
Tick the correct box.

A ☐ B ☐ C ☐ D ☐

5c

1 mark

Explain your answer.

_____

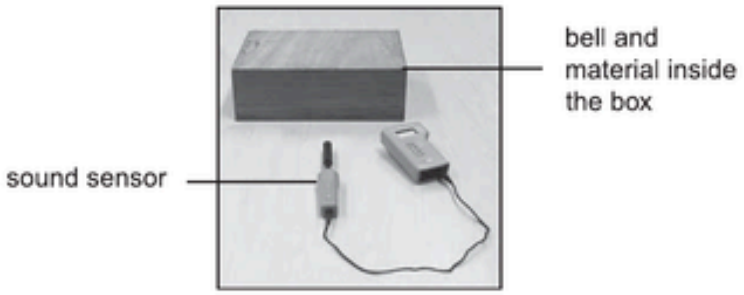
_____

5c

1 mark

Modern Tuition

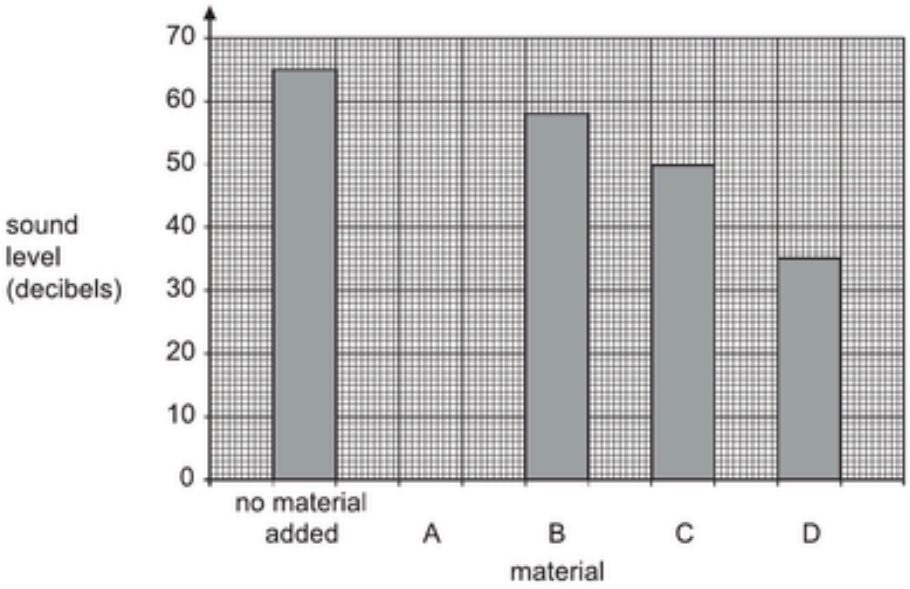
2. John investigated which material would be best for sound-proofing.
He put a bell inside a box.
He covered the bell with each material in turn.
He put a sound sensor outside the box to record the sound level.



He tested different materials and got the following results.

material	sound level (decibels)
no material added	65
A	40
B	58
C	50
D	35

(a) On the chart below, draw the bar for **material A**.



Modern Tuition

(b) How many types of material did John test?

_____

(c) Which material was best at stopping the sound going through? Give the correct letter.

_____

(d) Which **two** things should John have done to make his test fair? Tick the **two** correct boxes.

Use the same box each time.	☐
Make sure a different person recorded the results each time.	☐
Use the same material each time.	☐
Keep the distance between the sound sensor and the bell the same each time.	☐
Test each material in a different room.	☐

(b) The table below shows the mass and volume of four objects.

object	mass (g)	volume (cm^3)
aluminium figure	230	85
lead weight	800	70
steel block	200	25
wood puzzle	400	500

(i) Which object is the heaviest? _____

(ii) Which object takes up the most space? _____

(c) The frame of a bike is made of aluminium.



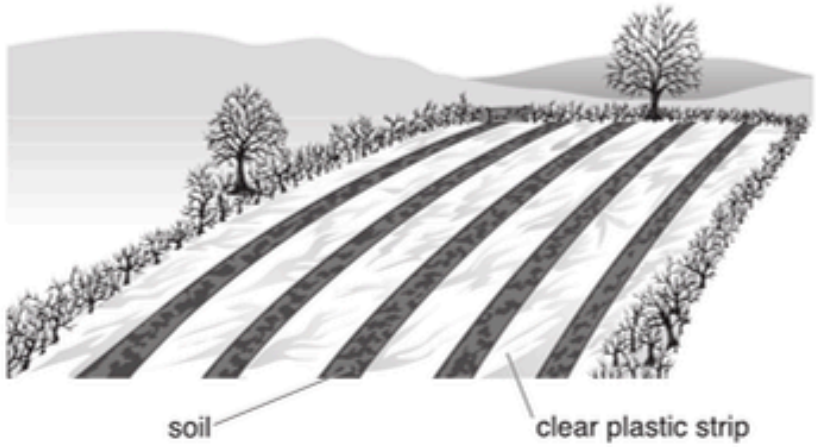
(i) Give **one** reason why aluminium is a suitable material for the frame.

_____

_____

Modern Tuition

8. Potatoes have just been planted in a field.
The rows of potatoes are covered with clear plastic strips.



(a) (i) The potatoes were planted in winter.

How will the plastic strips help the potatoes to start to grow?

8ai

1 mark

_____

(ii) Complete the sentences below with words from the list.

air **heat** **light** **water**

The plastic strips covering the growing potato plants must be **clear** so the leaves will get enough _____.

8aii

1 mark

The potato plants grow well because the gaps between the plastic strips will let _____ and _____ get into the soil.

8aii

1 mark

8aii

1 mark

(b) The plastic strips break down naturally after a few weeks.

Suggest why it is useful that the plastic strips break down naturally.

_____

_____

8b

1 mark

Modern Tuition