

Testing materials to choose the right one

Grade 6 science (Year 7 · Class 6) · Worksheet answers

Check each answer after you finish all the problems. Look at the method as well as the result, because the reasoning about properties earns the marks in a test.

Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** MS-PS1-3

Problem 1 What is a property?

1. A property is a feature of a material that we can observe or measure.
2. Any two of: hard, shiny, conducts electricity, conducts heat, magnetic. **Example: hard and magnetic.**

Problem 2 Conductor or insulator?

1. Conductors: copper wire, iron nail, graphite pencil lead. Insulators: rubber glove, dry wood, plastic ruler.
2. **The bulb:** it lights if the material conducts.

Problem 3 Magnet sort

1. The steel paper clip and the iron nail are attracted.
2. **No**, aluminium is not magnetic.

Problem 4 Scratch order

Q is scratched by both, so Q is softest. P scratches R, so R is softer than P. **Q, then R, then P.**

Problem 5 Match the property

(a) **Electrical conductivity.** (b) **Flexibility.** (c) **Hardness.**

Problem 6 Reading a results table

1. **K** (conducts, magnetic, hard).
2. **L** (insulator, not magnetic, soft).

Problem 7 Saucepan design

1. Metal conducts heat well, so the heat reaches the food quickly.
2. Plastic conducts heat poorly, so the handle stays cool enough to hold. **Metal base,**

insulating handle.

Problem 8 Cans at Kofi's school

1. $120 - 45 = 75$ aluminium cans.
2. $45 \div 120 \times 100 = 37.5$ % steel.

Problem 9 Bending rods

1. The plastic rod sags most, so it is **the most flexible**.
2. $12 \text{ mm} \div 1 \text{ mm} = 12$ times.

Problem 10 Electric cable

1. Copper is a good conductor, so the current flows along the core.
2. Plastic is an insulator and flexible, so it stops shocks and lets the cable bend. **Core conducts, covering insulates.**

Problem 11 Fair test: flexibility

1. Keep the same: strip length, strip width and thickness, the hanging mass, how far the strip overhangs the bench (any two).
2. Measure: the **sag of the free end** in millimetres.

Problem 12 Aluminium savings

Recycling per kg: $200 \times 0.05 = 10$ MJ. For 20 kg: $10 \times 20 = 200$ MJ.
New: $200 \times 20 = 4000$ MJ. Saved: $4000 - 200 = 3800$ MJ.

Problem 13 Stirring soup

Copper conducts heat to the hand. The plastic spoon would soften at 70°C , below the soup temperature of about 100°C . Wood is a poor conductor and does not soften. **The wooden spoon is the best choice.**

Problem 14 Could it be aluminium?

Aluminium is not magnetic, so this metal cannot be aluminium. **It could be iron or steel,** which conduct and are attracted by magnets.

Problem 15 Wrong conclusion

Diego generalised from one example. Testing a copper wire or an aluminium strip with the magnet shows they are not attracted. **Not all metals are magnetic; only iron, steel, nickel and cobalt are.**

Problem 16 Scrap yard sort

Steel: $0.40 \times 36 = 14.4$ kg. Remaining: $36 - 14.4 = 21.6$ kg. Aluminium: $0.60 \times 21.6 = 12.96$ kg. Glass: $21.6 - 12.96 = 8.64$ kg. **Steel 14.4 kg, aluminium 12.96 kg, glass 8.64 kg.**

Problem 17 Two samples in series

The current must pass through both samples. Copper and wood: wood blocks the current, so **the bulb stays off**. Copper and graphite: both conduct, so **the bulb lights**.

Problem 18 Decision matrix

A: $12 + 6 + 5 = 23$. B: $15 + 8 + 2 = 25$. C: $9 + 4 + 5 = 18$. D: $3 + 10 + 4 = 17$. **B (ceramic) has the highest score, 25.**

Problem 19 Bottle bank

1. Daily: $500 \times 0.30 = 150$ kg. Year: $150 \times 365 = 54\,750$ kg = 54.75 t. **54 750 kg = 54.75 tonnes.**

2. Glass can be melted and reshaped many times without losing its properties, so the same material is used again.

Problem 20 Mystery rod

Conducts: it is a metal. Not magnetic: not iron or steel. Scratched by steel: soft. Bends: flexible. Reddish-brown colour points to **copper**. Aluminium is silvery grey, so colour separates the two.