(Metallic bonding)

Q1. (2021)

This question is about metals.

Table 3 shows information about four substances.

Table 3

Substance	Melting point in °C	Boiling point in °C	Does it conduct electricity in the solid state?	Does it conduct electricity in the liquid state?
A	–117	79	No	No
B	801	1413	No	Yes
C	1535	2750	Yes	Yes
D	1610	2230	No	No

Which substance could be a metal?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

Q2. (2021)

Explain why alloys are harder than pure metals.

[3 marks]

Q3. (2022)

Aluminium is a metal.

Describe how metals conduct electricity.

Answer in terms of electrons.

[3 marks]

Q4. (2023)

This question is about uses of metals in electrical wires.

Electrical wires can be made from:

- aluminium
- copper
- silver.

Figure 6 shows three uses of electrical wires.

Figure 6

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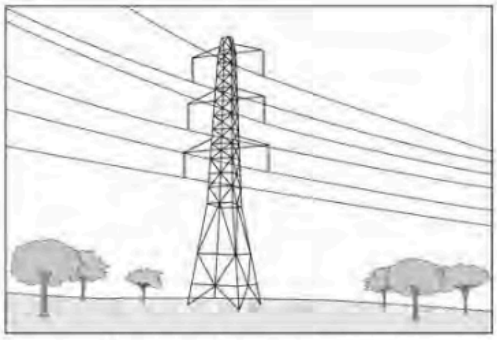
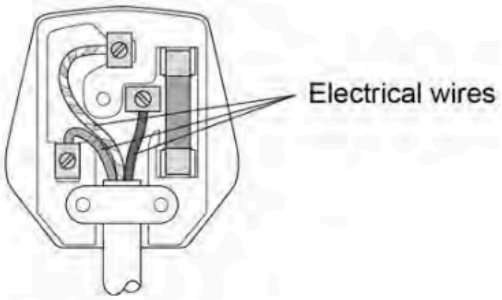
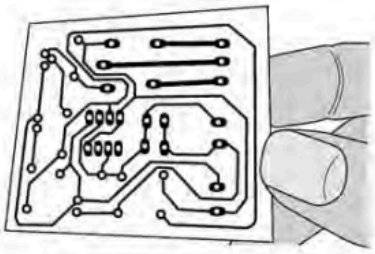
Figure 6



Overhead power cables



Wiring in homes



Printed circuit boards

Table 5 shows information about the metals.

The higher the value for electrical conductivity, the better the metal is at conducting electricity.

Table 5

	Aluminium	**Copper**	**Silver**
Electrical conductivity in arbitrary units	37.7	59.6	63.0
Density in g/cm^3	2.7	9.0	10.5
Cost of metal per kg in £	1.50	7.00	640.00

Evaluate the use of aluminium, copper and silver for the types of electrical wires shown in **Figure 6**.

Use **Table 5**.

[4 marks]

Q5. (2023)

Describe how metals conduct electricity.

[3 marks]

Q6. (2023)

Electrical wires are usually made of pure metals and **not** alloys. This is because pure metals are better electrical conductors.

Suggest why alloys do **not** conduct electricity as well as pure metals.

Answer in terms of structure and bonding.

[2 marks]

Q7. (2024)

This question is about iron.

Iron is a metal.

Describe how iron conducts thermal energy.

[2 marks]

Q8. (2024)

Pure iron is too soft for many uses.

Explain why mixing iron with other metals makes alloys which are harder than pure iron.

[3 marks]