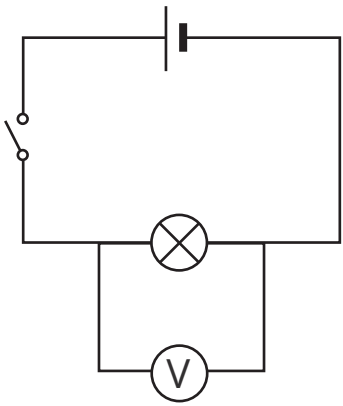


Question 1

| Question | Answers | Extra information | Mark |
|--------------|--|---|----------|
| 01.1 | correct symbol for voltmeter drawn | | 1 |
| | voltmeter drawn in parallel to bulb  | | 1 |
| 01.2 | resistance = potential difference ÷ current | Allow correct rearrangement. | 1 |
| 01.3 | resistance = $\frac{12}{6}$ | Allow correct use of equation from 01.2 . | 1 |
| | 2 | An answer of 2Ω with no working shown scores 3 marks. | 1 |
| | ohms/ Ω | | 1 |
| 01.4 | add another cell | | 1 |
| Total | | | 7 |

Question 2

| Question | Answers | Extra information | Mark |
|---|--|-----------------------------|----------|
| 02.1 | A series (circuit) | Answers in this order only. | 1 |
| | B parallel (circuit) | | 1 |
| 02.2 | ammeter | | 1 |
| 02.3 | series circuit/circuit A: | | |
| | • current is the same everywhere in the circuit | | 1 |
| | • potential difference is split between the components | | 1 |
| | parallel circuit/circuit B: | | |
| • current is shared between the components/branches | 1 | | |
| • potential difference is the same across the components in each branch | 1 | | |
| Total | | | 7 |

Question 3

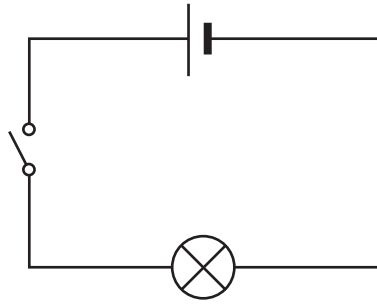
| Question | Answers | Extra information | Mark |
|-----------------|---|--------------------------|-------------|
| 03.1 | electrostatic (force) | | 1 |
| 03.2 | electrons were transferred from the student's hair to the balloon | | 1 |
| | the student's hair had more protons than electrons | | 1 |
| | protons are positively charged | | 1 |
| 03.3 | the balloon is negatively charged | | 1 |
| | opposite charges attract | | 1 |
| Total | | | 6 |

Question 4

| Question | Answers | Extra information | Mark |
|--------------|---|---|--|
| 04.1 | Any three from: <ul style="list-style-type: none"> • wrap the insulated copper wire around the iron nail • attach crocodile clips to each end of the insulated copper wire • attach the crocodile clips to the power pack • switch on the power pack to allow a current to flow through the wire | | 3 |
| 04.2 | the paperclips are magnetic/made of a magnetic material | Allow the paperclips are made of iron/ steel. | 1 |
| 04.3 | correct scale on <i>y</i> -axis all points plotted correctly straight line of best fit | Scale must take up at least half of the grid. Allow 1 mark for 4 or 5 points plotted correctly. | 1 2 1 |
| 04.4 | as the current increases, the strength of the electromagnet increases | | 1 |
| 04.5 | Any one from: <ul style="list-style-type: none"> • the electromagnet can be switched on and off • the strength of the magnetic field can be varied | | 1 |
| Total | | | 10 |

0 | 1

A student makes the circuit shown in **Figure 1**. The student wants to measure the current and the potential difference in the circuit.

Figure 1

0 | 1 | . | 1

Draw a component on **Figure 1** that would allow the student to measure the potential difference across the bulb.

[2 marks]

0 | 1 | . | 2

Write down the equation that links current, potential different and resistance.

[1 mark]

0 | 1 | . | 3

The current in the circuit is 6A. The potential difference across the bulb is 12V.

Calculate the resistance of the bulb. Give the unit.

[3 marks]

resistance = _____ unit _____

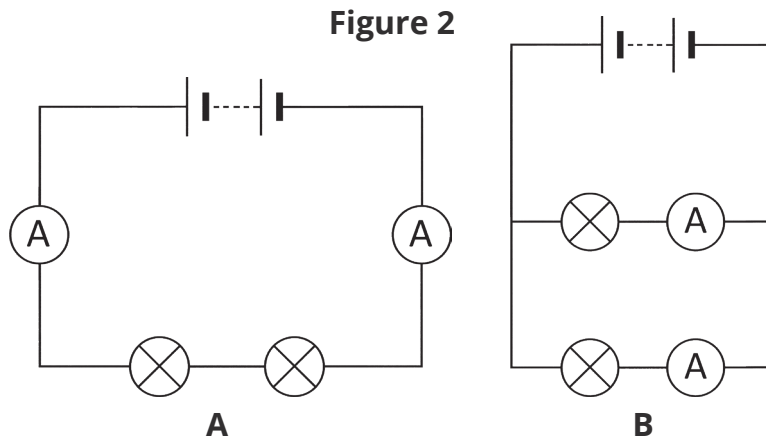
0 | 1 | . | 4

Suggest how the brightness of the bulb in **Figure 1** could be increased.

[1 mark]

0 2

Figure 2 shows two circuits, each containing two bulbs.



0 2 . 1

Name the two types of circuit shown in **Figure 2**.

[2 marks]

A _____

B _____

0 2 . 2

Name the component that is used to measure current.

[1 mark]

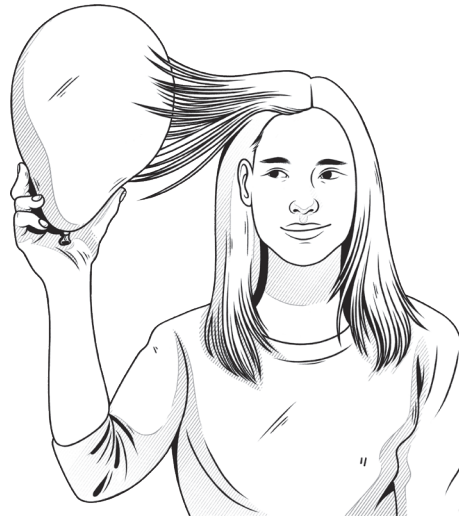
0 2 . 3

Compare the current and potential difference across the bulbs in the two circuits in **Figure 2**.

[4 marks]

03

A student rubbed a balloon against their hair and observed what happened. The outcome is shown in **Figure 3**.

Figure 3

03.1

Name the force that exists between the balloon and the student's hair.

[1 mark]

03.2

The student's hair became positively charged.

Explain how the student's hair became positively charged. You should refer to the transfer of electrons in your answer.

[3 marks]

03.3

Explain why the student's hair stuck to the balloon.

[2 marks]

0 4 . 3 The student counted how many paperclips were attracted to the electromagnet.

Their results are shown in **Table 1**.

Table 1

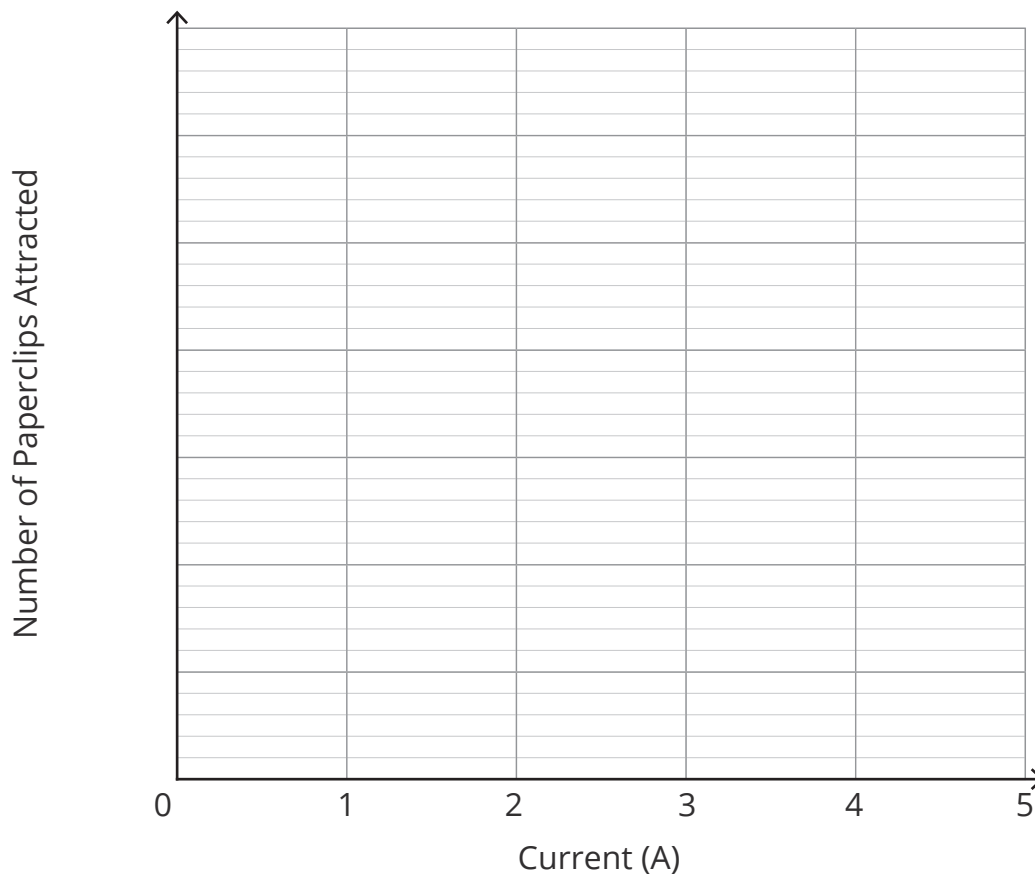
| Current (A) | Number of Paperclips Attracted |
|-------------|--------------------------------|
| 0 | 0 |
| 1 | 6 |
| 2 | 12 |
| 3 | 17 |
| 4 | 25 |
| 5 | 30 |

Use the results in **Table 1** to complete **Figure 5**.

- Complete the scale on the y -axis.
- Plot the data on the graph.
- Draw a line of best fit.

[4 marks]

Figure 5

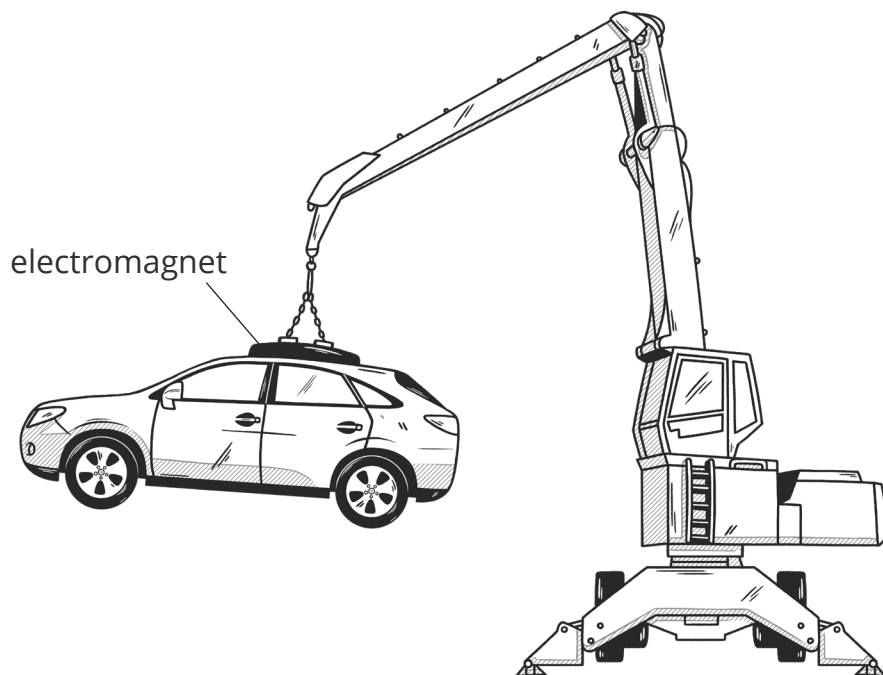


0 4 . 4 Describe how changing the current affects the strength of the electromagnet.

[1 mark]

0 4 . 5 Electromagnets are often used to lift scrap metal in scrapyards as shown in **Figure 6**.

Figure 6



Give **one** advantage of using an electromagnet instead of a permanent magnet in a scrapyard.

[1 mark]
