Resistance of a wire

Miss Walrond

Measuring Resistance

1) Write the rearranged version of V = I × R, to make R the subject.

2) Draw a circuit diagram that would allow you to find the resistance of an unknown fixed resistor.

Independent Task: Analysing data - Resistance of a wire experiment

Copy the table and fill in the blanks

Length of wire in cm	Potential difference in volts	Current in amps	Resistance in ohms
0.10	0.25	4.2	0.06
0.20	0.22	2.2	
0.30	0.35	2.5	
0.40	0.40	2.0	
0.50	0.41	1.7	0.24
0.70	0.62	1.82	
0.90	0.61	1.42	0.43

Practical: Length of wire vs resistance of wire (1 of 2)

1) What components are needed to measure the current and the potential difference?
2) What component should be included to reduce the current?
3) Draw a circuit diagram that could be used to investigate how the length of wire affects the resistance of the wire.

Practical: Length of wire vs resistance of wire (2 of 2)

Write a method to describe how you would investigate how the length of wire will affect the resistance of wire. Include:

- The independent variable
- The dependent variable
- A control variable
- A hazard
- How you will measure the resistance

Factors that affect the resistance of a wire

1) List the 4 factors that will affect the resistance of a wire.
2) Explain why the resistance of a wire increases, when the length of the wire increases. Use this sentence starter
   The resistance of a wire increases when the length of wire increases because there are more ions … so collisions are more ….
3) Explain why the resistance of a wire increases, when the temperature of the wire increases.

Fuses

1) **Draw the electrical symbol for a fuse.**
2) **Describe how a fuse works. Use the sentence starter below:**
    A fuse is a component that protects ….
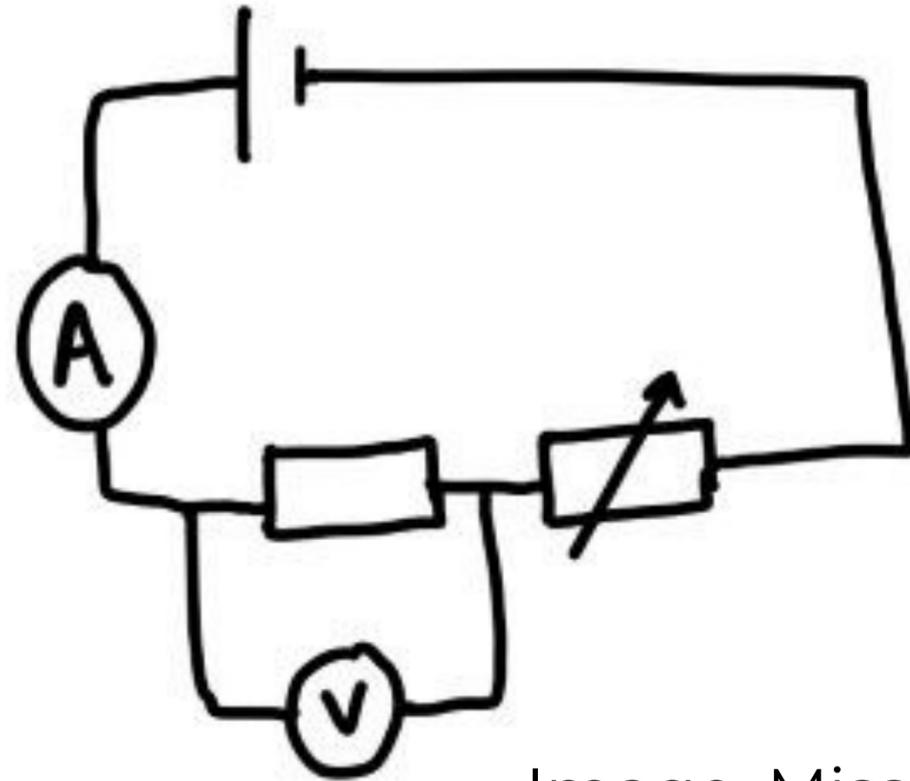   *If the current becomes too high…*

Answers

Review: Measuring resistance

1) Resistance = potential difference / current or $R = V / I$

2)

Image, Miss Walrond

Review: Analysing data - Resistance of a wire experiment

Copy the table and fill in the blanks

Length of wire in cm	Potential difference in volts	Current in amps	Resistance in ohms
10	0.25	4.2	0.06
20	0.22	2.2	**0.10**
30	0.35	2.5	**0.14**
40	0.40	2.0	**0.20**
50	0.41	1.7	0.24
70	0.62	1.82	**0.34**
90	0.61	1.42	0.43

Review of Practical: Length of wire vs resistance of wire (1 of 2)

1) An **ammeter** is used to measure the current. A **voltmeter** is used to measure the potential difference.

2) A **fixed resistor** or a **variable resistor** should be used (in series with the wire) to reduce the current.

3)
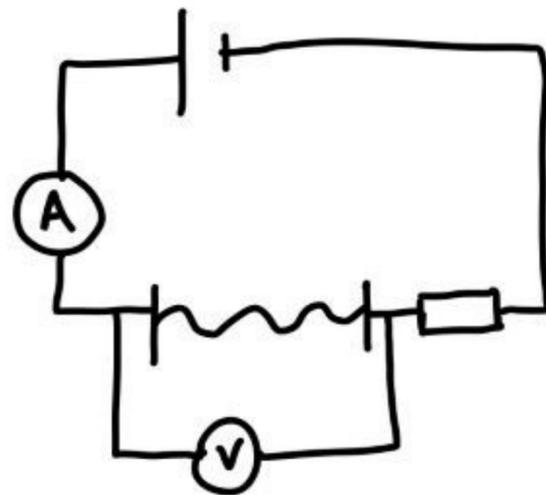
Image, Miss Walrond

Review of Practical: Length of wire vs resistance of wire (2 of 2)

Check your method includes the following points:

- The independent variable is the length of the wire.
- The dependent variable is the resistance of the wire
- The control variable is the temperature of the wire. I would turn the circuit off in between readings to reduce the temperature. **Or** The control variable is the cross sectional area / material of the wire. I would check that the wire has the same thickness or is of the same material.
- The hazard is that there may be a high current, and this could cause the wire to heat up and melt or burn you.
- To measure the resistance, I would measure the current using an ammeter and the potential difference using a voltmeter.

Review: Factors that affect the resistance of a wire

1) The resistance of a wire depends on: the length of the wire, the cross sectional area of the wire, the material of the wire and the temperature of the wire

2) The resistance of a wire increases when the length of the wire increases because there are **more ions** for the electrons to pass, so **collisions are more likely**.

3) The resistance of a wire increases when the temperature of the wire increases because **the ions vibrate more**, making it harder for the electrons to pass and **collisions are more likely**.

Review: Fuses

1)

2) A fuse is a component that protects an appliance or component.
   If the current becomes too high, the thin wire inside **melts** and the **circuit is broken**.