216 - (0625-S 2017-Paper 6/2-Q1) - *ELECTRICITY, ELECTRON AND ELECTRONICS*

The class is investigating the resistances of two resistance wires.

The circuit used is shown in Fig. 1.1.

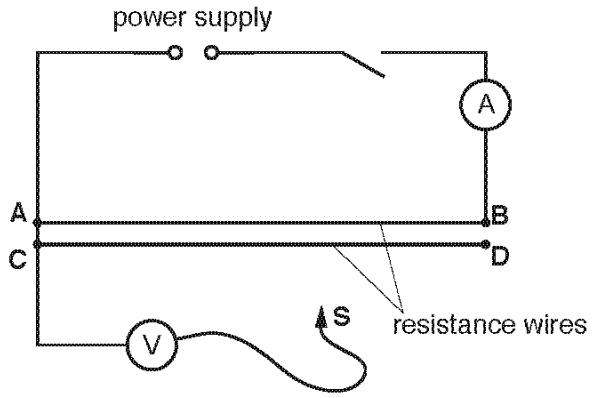


Fig. 1.1

(a) A student places a sliding contact **S** on the resistance wire **AB** at a distance $l = 0.200\,\text{m}$ from point **A**. She measures the current I in the circuit and the potential difference V across the length $l = 0.200\,\text{m}$ of resistance wire.

Figs. 1.2 and 1.3 show the voltmeter and ammeter readings.

(i) Write down the readings shown on the meters in Figs. 1.2 and 1.3.

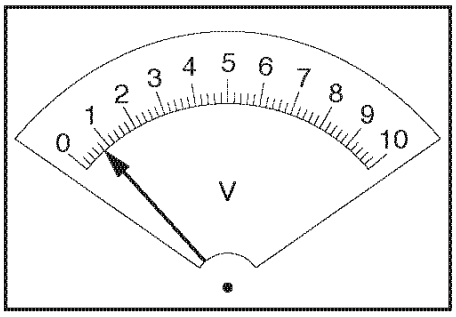


Fig. 1.2

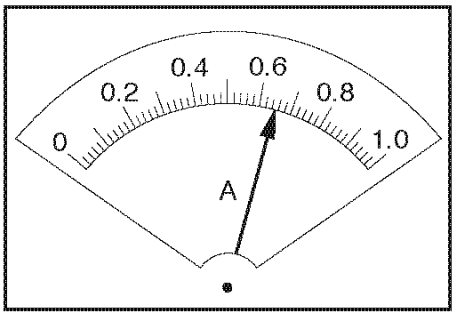


Fig. 1.3

$V =$ ..... $I =$ .....

[2]

(ii) Calculate the resistance R of the length $l = 0.200\,\text{m}$ of resistance wire, using the equation $R = \frac{V}{I}$.

$R =$ .....[1]

(b) The student repeats the procedure using the distance $l = 0.400\,\text{m}$. Her result is shown.

$R =$ 2.54 Ω

(i) Calculate the difference between the two values for R.

difference = ...[1]

(ii) Suggest a relationship between the length l and the resistance R of the wire that matches the results, within the limits of experimental accuracy.

.....

.....[1]

(c) Using the same method as in **(a)**, the student determines the resistance R_1 of the resistance wire **AB** of total length $l = 0.500\,\text{m}$.

$R_1 =$ 3.08 Ω

She then uses a short lead to connect points **B** and **D**. She uses the same method again to determine the combined resistance R_2 of the resistance wires **AB** and **CD** connected together.

$R_2 =$ 1.50 Ω

Use the student's results to compare the resistance R_1 of wire **AB** with the resistance R_2 of wires **AB** and **CD** connected together.

Tick the box next to the description that most closely matches the results.

- ☐ $R_1 = R_2$
- ☐ $R_1 = 2R_2$
- ☐ $2R_1 = R_2$
- ☐ There is no simple relationship between R_1 and R_2.

[1]

(d) Suggest **two** reasons why different students, all carrying out this experiment carefully, with the same apparatus, may **not** obtain identical results.

1. .....

.....

2. .....

.....

[2]

217 - (0625-S 2017-Paper 6/3-Q2) - *ELECTRICITY, ELECTRON AND ELECTRONICS*

Some students are investigating the resistance of a power supply.

They are using the circuit shown in Fig. 2.1.

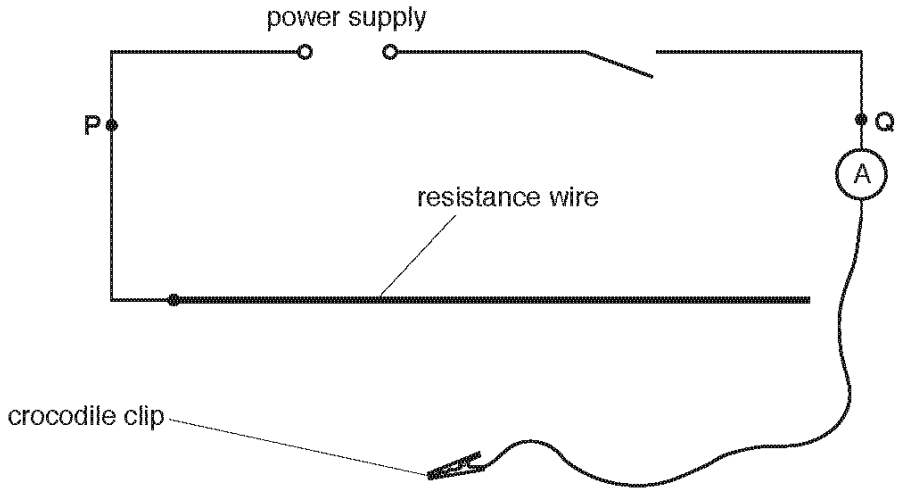


Fig. 2.1

(a) (i) A student connects the crocodile clip to the resistance wire at positions which give particular values of the potential difference *V* between terminals **P** and **Q**. He measures the current *I* in the circuit for each position.

On Fig. 2.1, draw a voltmeter connected to measure the potential difference *V* between terminals **P** and **Q**. [1]

(ii) Fig. 2.2 shows the ammeter reading for a value of $V = 2.2$ V.

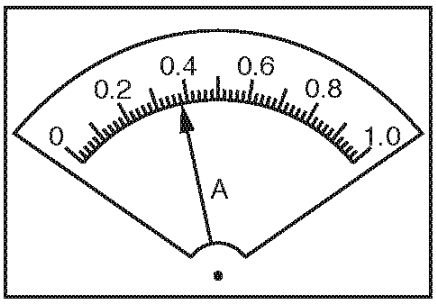


Fig. 2.2

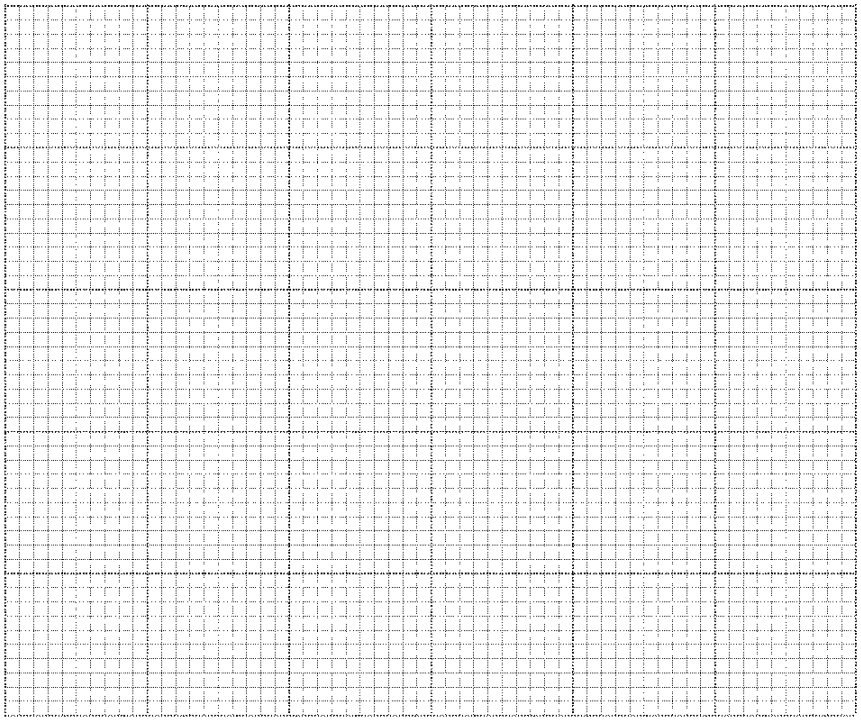
Read, and record in Table 2.1, this value of I.

Table 2.1

I/A	V/V
	2.2
0.47	2.0
0.55	1.8
0.69	1.6
0.76	1.4

[1]

(b) Plot a graph of V/V (y-axis) against I/A (x-axis).



[4]

(c) **(i)** Determine the gradient *M* of the line you have drawn.

Show clearly on the graph how you obtained the necessary information.

M = ... [1]

(ii) The gradient *M* is numerically equal to the resistance *R* of the power supply.

Write down the resistance *R* to a suitable number of significant figures for this experiment.

R = ... [2]

(d) Suggest **one** practical reason why the crocodile clip should not be connected to very short lengths of resistance wire in order to obtain smaller potential differences.

.....

.....

.....[1]

(e) In this type of experiment, it is possible to change the potential difference by using a variable resistor rather than using different lengths of a resistance wire.

In the space below, draw the standard circuit symbol for a variable resistor.

[1]

218 - (0625-S 2017-Paper 6/1-Q5) - *ELECTRICITY, ELECTRON AND ELECTRONICS*

A student is investigating whether the resistance of a wire depends on the material from which the wire is made.

Resistance R is given by the equation $R = \frac{V}{I}$.

The following apparatus is available to the student:

ammeter
voltmeter
micrometer screw gauge
power supply (0–3 V)
variable resistor
switch
connecting leads
wires of different materials.

Plan an experiment to investigate whether the resistance of a wire depends on the material from which it is made.

You should:

- draw a diagram of the circuit you would use to determine the resistance of each wire
- explain briefly how you would carry out the investigation, including the measurements you would take
- state the key variables that you would control
- draw a suitable table, with column headings, to show how you would display your readings (you are **not** required to enter any readings in the table).

219 - (0625-S 2017-Paper 6/2-Q5) - *ELECTRICITY, ELECTRON AND ELECTRONICS*

A student is investigating the effect of draughts (moving air) on the rate of cooling of hot water.

The following apparatus is available to the student:

an electric fan with four speed settings
a supply of hot water
thermometer
250 cm^3 beaker
250 cm^3 measuring cylinder
stopwatch
clamp, boss and stand.

Plan an experiment to investigate the effect of draughts on the rate of cooling of hot water.

You should:

- explain briefly how you would carry out the investigation
- state the key variables that you would control
- draw a table, or tables, with column headings, to show how you would display your readings (you are **not** required to enter any readings in the table)
- explain how you would use your readings to reach a conclusion.

You may draw a diagram if it helps your explanation.