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IGCSE PHYSICS 0625 · TOPICAL PAST PAPERS

Electric Current

Paper 2 — Theory / Structured Questions (topical compilation)

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CURRENT ELECTRICITY P2

QUESTION # 1: M/J 2005 P2 Q8

- 8 Three cells are connected in series making a battery, as shown in Fig. 8.1. The e.m.f. of each cell is 1.5 V. A resistance of $15\ \Omega$ is connected to the battery.

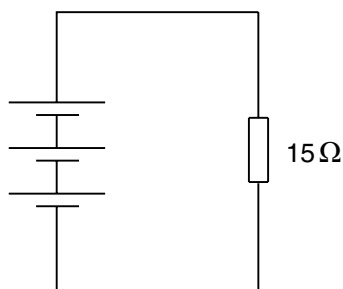


Fig. 8.1

- (a) What is the total e.m.f. of the battery?

..... [1]

- (b) Calculate the current in the circuit.

State the equation that you use.

current = [3]

- (c) A battery can be made from cells connected in parallel, as shown in Fig. 8.2.

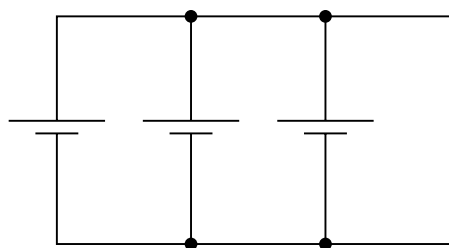


Fig. 8.2

State one advantage of connecting the cells in parallel.

.....

 [1]


QUESTION # 2: M/J 2008 P2 Q6

6 A filament lamp is labelled 240V, 0.20 A.

(a) Calculate the resistance of the lamp at normal brightness.

resistance = [2]

(b) The lamp is connected to a 240V supply and switched on at time $t = 0$.

Fig. 6.1 shows the variation with t of the resistance of the lamp.

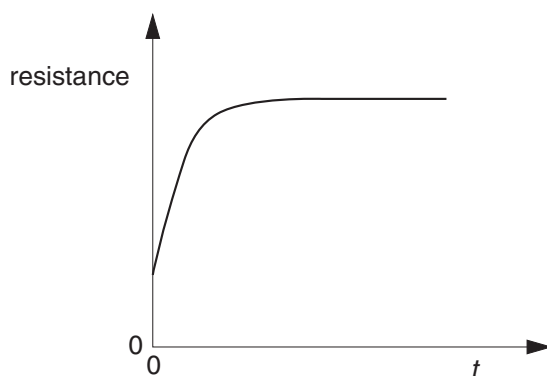


Fig. 6.1

Describe how the current in the lamp varies with t .

.....

 [2]

(c) A second filament lamp has higher resistance.

State **two** differences between the two filaments that may cause the change in resistance.

1 The filament in the second lamp is

 2 The filament in the second lamp is
 [2]


QUESTION # 3: M/J 2010 P21 Q6

- 6 Fig. 6.1 shows a circuit used in an experiment to measure the current in a lamp for different values of the potential difference (p.d.) across the lamp.

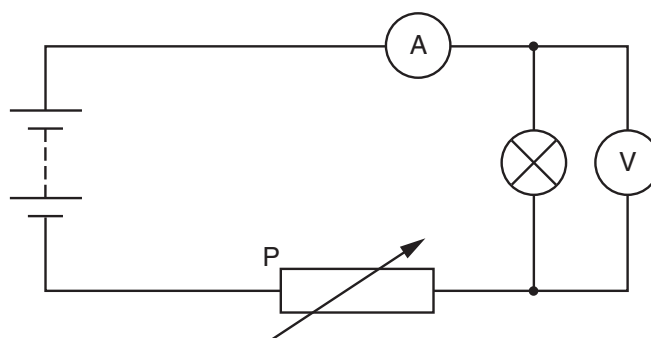


Fig. 6.1

- (a) State the name of component P.

.....[1]

- (b) On the axes below, sketch a graph of current against p.d. for a filament lamp.



[2]

- (c) (i) State how the resistance of the lamp changes as the p.d. increases.

.....[1]

- (ii) Explain how the graph in (b) shows the change you have described in (c)(i).

.....

[1]


QUESTION # 4: M/J 2013 P21 Q6

6 Fig. 6.1 is a graph of current against potential difference (p.d.) for a length of metal wire.

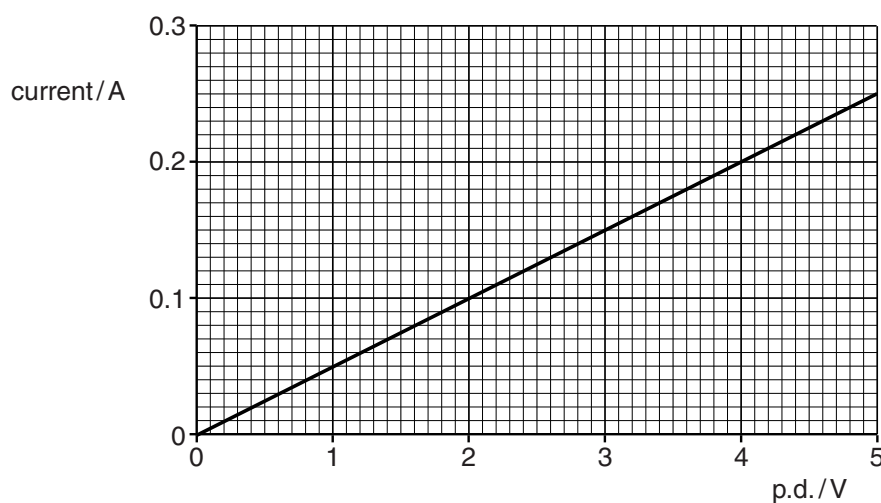


Fig. 6.1

(a) The metal wire obeys Ohm's law. State Ohm's law in words.

.....

 [2]

(b) Calculate the resistance of the metal wire.

resistance = [2]

(c) A new wire is made from the same metal as the original wire. The two wires have the same length. The cross-sectional area of the new wire is half that of the original wire.

(i) Calculate the resistance of the new wire.

resistance = [1]

(ii) On Fig. 6.1, draw a line to show how current varies with p.d. for the new wire. [2]

**QUESTION # 5: M/J 2014 P21 Q11**

- 11 (a)** A torch contains a filament lamp connected to a battery. The battery contains four 1.5V cells connected in series.

Fig. 11.1 shows the current/potential difference (voltage) graph for the filament lamp.

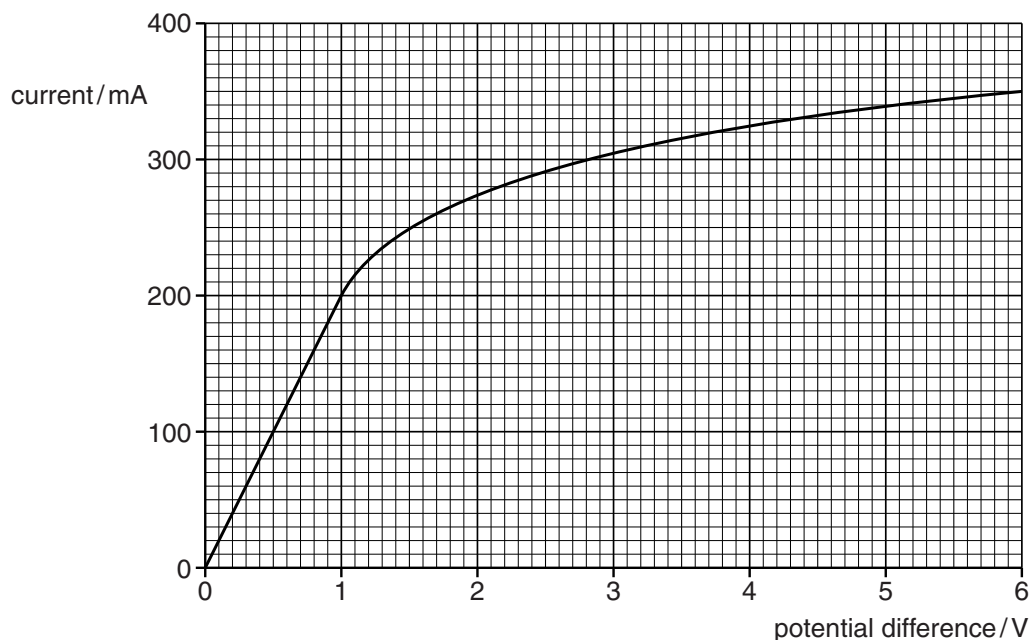


Fig. 11.1

- (i)** State what is meant by the *potential difference* (p.d.) across the lamp.

.....
..... [2]

- (ii)** Fig. 11.1 shows that the current in the lamp is not proportional to the p.d.

- 1.** State how Fig. 11.1 shows this.

.....
..... [1]

- 2.** Suggest why the current is not proportional to the p.d.

.....
..... [1]

(iii) The lamp is at normal brightness and there is a p.d. of 6.0V across the lamp.

1. Use Fig. 11.1 to find the current in the lamp.

current = [1]

2. Calculate the charge that passes through the lamp in 2.0 hours.

charge = [2]

3. The battery in the torch is able to keep the lamp lit for 2.0 hours.
Estimate the initial energy stored in the battery.

energy = [2]

4. Explain why your value is only an estimate.

.....
..... [1]

- (b) Suggest and explain an advantage of using two cells in parallel rather than a single cell.

.....
.....
..... [2]

- (c) Another torch contains a light-emitting diode (LED) instead of a filament lamp.
The battery in the torch uses four 1.5V cells, some in series and some in parallel.
The p.d. across the LED when in operation is 3.0V.

In the space below, draw a circuit diagram showing how the four cells, a switch and the LED are connected.

[3]


QUESTION # 6: M/J 2019 P21 Q5

5 A student uses the circuit shown in Fig. 5.1 to investigate a resistor R.

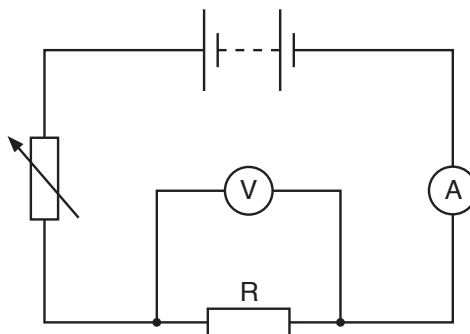


Fig. 5.1

- (a) Describe how the student uses the apparatus in Fig. 5.1 to obtain a range of ammeter and voltmeter readings.

.....
 [1]

- (b) The readings obtained are shown in Table 5.1.

Table 5.1

voltmeter reading / V	ammeter reading / mA
7.6	320
5.2	220
2.4	100

- (i) State Ohm's law.

.....

 [2]

- (ii) Using the results in Table 5.1, show that the resistor obeys Ohm's law.

.....

 [1]

(iii) The student has available an ammeter with five ranges marked:

- 0 – 10 A
- 0 – 200 mA
- 0 – 20 mA
- 0 – 2 mA
- 0 – 0.2 mA

Suggest how the student makes best use of the different ranges during the investigation.

.....

.....

.....

..... [1]

[Total: 5]

**QUESTION # 7: O/N 2011 P22 Q6**

- 6 An electrical engineer measures the potential difference across a length of metal wire and the current in the wire. He does this for different values of the current.

(a) (i) Draw a labelled circuit diagram of a circuit that enables the engineer to do this.

[3]

(ii) Describe how the circuit is used.

.....

[2]

(iii) State the equation that defines resistance.

.....[1]

- (b) The engineer performs the experiment and notices that the potential difference across the wire is directly proportional to the current in it. He calculates the resistance of the wire and plots a graph of the resistance against the current.

On Fig. 6.1, sketch the shape of this graph.

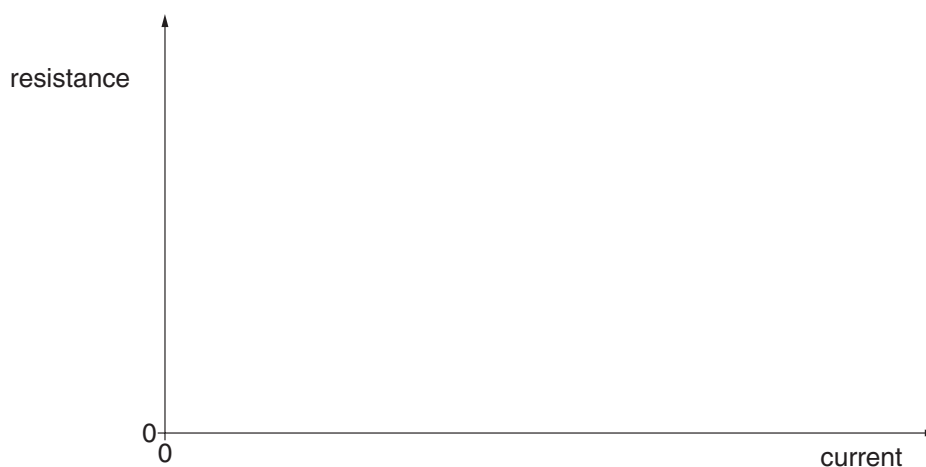
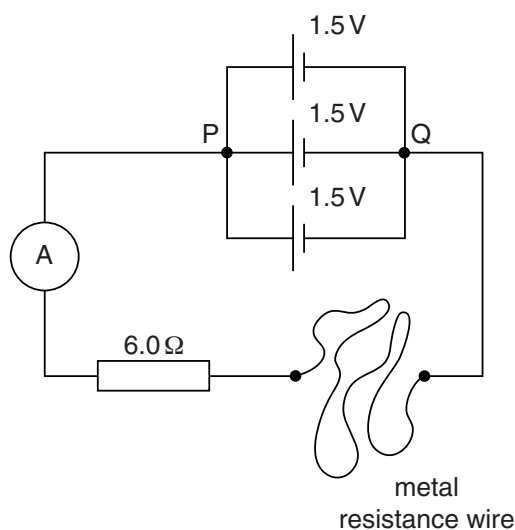


Fig. 6.1

[1]

**QUESTION # 8: O/N 2014 P22 Q7**

- 7 The circuit of Fig. 7.1 includes an ammeter, a $6.0\ \Omega$ resistor, a length of metal resistance wire and three 1.5 V cells connected in parallel.

**Fig. 7.1**

(a) State

- (i) one advantage of using cells in parallel rather than using a single cell,

.....
[1]

- (ii) the potential difference (p.d.) between points P and Q in the circuit of Fig. 7.1.

p.d. =[1]

(b) (i) The ammeter in Fig. 7.1 reads 0.075 A .

Calculate the resistance of the resistance wire.

resistance =[3]

- (ii) The temperature of the metal resistance wire increases.

State and explain the effect of this temperature increase on the ammeter reading.

.....

[2]