

Electric Circuits & Electrical Safety

Question Paper

Course	CIE IGCSE Physics
Section	4. Electricity & Magnetism
Topic	Electric Circuits & Electrical Safety
Difficulty	Hard

Time Allowed	50
Score	/36
Percentage	/100

Question 1a

Fig. 11.1 shows lamps in series. Fig. 11.2 shows lamps in parallel.

The lamps are all identical 6.0 V lamps. In each circuit there are three ammeters A_1 , A_2 and A_3 .

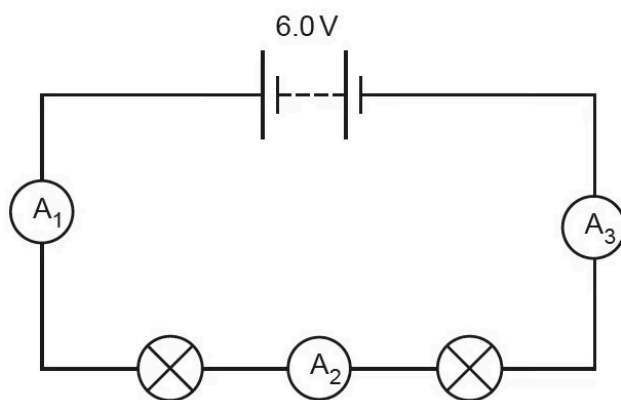


Fig. 11.1

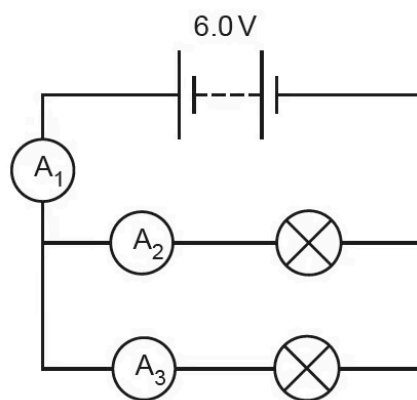


Fig. 11.2

- (i) Compare the readings on ammeters A_1 , A_2 and A_3 in Fig. 11.1. [1]

- (ii) Compare the readings on ammeters A_1 , A_2 and A_3 in Fig. 11.2. [1]

- (ii) State two advantages of connecting the 6.0 V lamps in parallel with the 6.0 V battery, compared with connecting the lamps in series with the battery. [2]

[4 marks]

Question 1b

Each lamp has a resistance of $12\ \Omega$.

- (ii) Determine the combined resistance of the two lamps connected in series.

resistance = Ω [1]

- (ii) Compare the resistance of one lamp with the combined resistance of the two lamps in parallel.

[1]

[2 marks]

Question 2a

Fig. 8.1 shows a circuit.

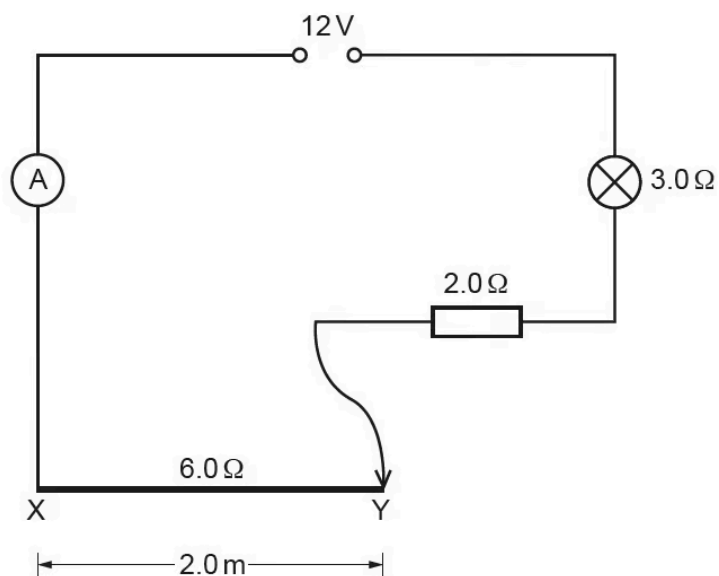


Fig. 8.1

The lamp has a resistance of $3.0\ \Omega$. Line XY represents a uniform resistance wire of resistance $6.0\ \Omega$.

Calculate the reading on the ammeter.

ammeter reading =
[3 marks]

Question 2b

Extended tier only

Fig. 8.2 shows the circuit with a different connection to the resistance wire and an added resistor.

The length XY of the whole resistance wire is 2.0 m. The contact is made at Q where the distance XQ is 0.60 m.

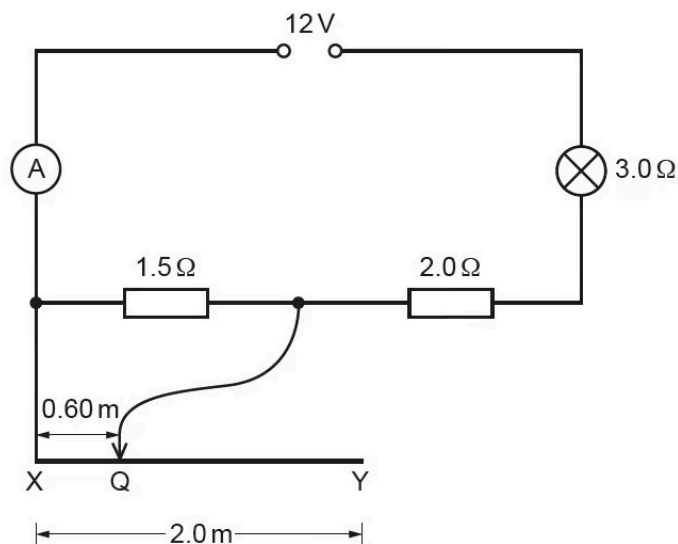


Fig. 8.2

Calculate the resistance of the circuit.

resistance =

[4 marks]

Question 3a

A teacher demonstrates the action of a device. Fig. 10.1 shows the symbol for the device.



Fig. 10.1

State the name of this device.

[1 mark]

Question 3b

Extended tier only

Fig. 10.2 shows another device being used in a circuit. The circuit contains a 6.0 V lamp.

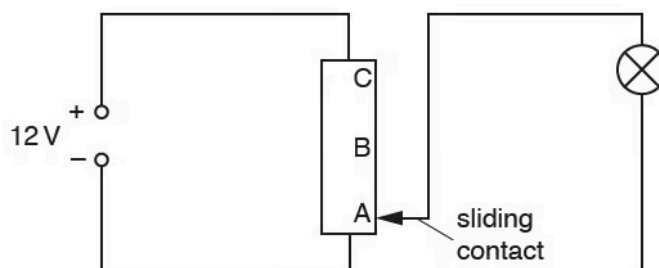


Fig. 10.2

- (i) The sliding contact of this device is at position **A**, as shown in Fig. 10.2.

Describe and explain the brightness of the lamp when the sliding contact is in this position.

[2]

- (ii) The teacher moves the sliding contact from position **A** to position **B**. Describe and explain what happens to the brightness of the lamp.

[2]

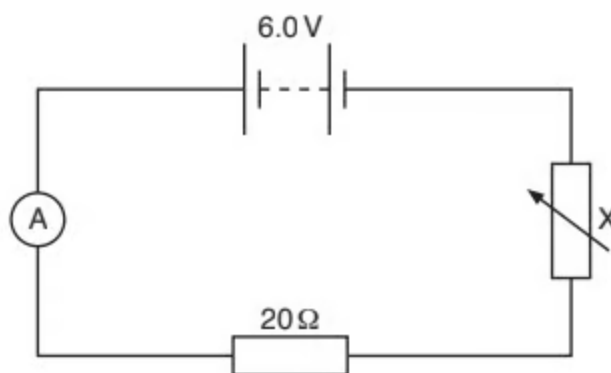
- (iii) The teacher moves the sliding contact from position **B** to position **C**. Suggest what happens to the lamp.

[1]

[5 marks]

Question 4a

Fig. 8.1 shows a circuit that contains a battery of electromotive force (e.m.f.) 6.0 V , an ammeter, a $20\ \Omega$ resistor and component X.

**Fig. 8.1**

- (i) State the name of component X.
- (ii) The potential difference (p.d.) across the $20\ \Omega$ resistor is measured with a voltmeter.

On Fig. 8.1, draw the symbol for this voltmeter connected to the circuit.

[1]
[2 marks]

Question 4b

Extended tier only

The p.d. across the $20\ \Omega$ resistor is varied from zero to $6.0\ \text{V}$. For each value of p.d. a corresponding current is measured.

On Fig. 8.2, draw a line to indicate how the current measured by the ammeter depends on the p.d. across the $20\ \Omega$ resistor.

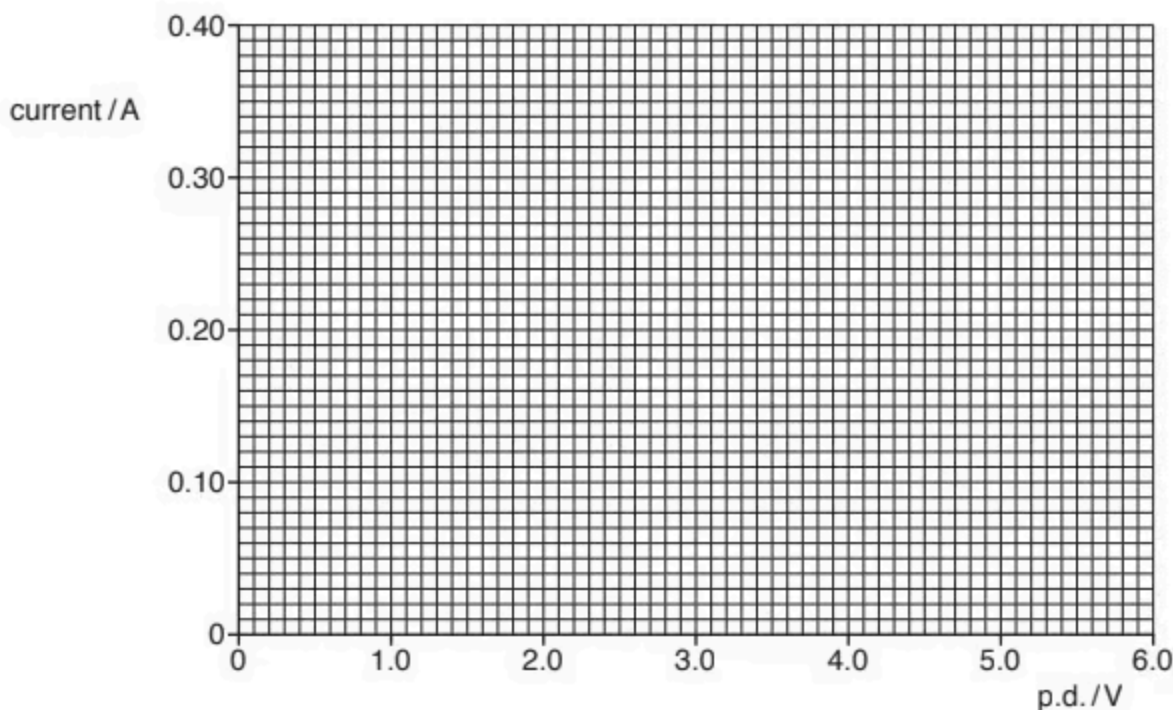


Fig. 8.2

[3 marks]

Question 4c**Extended tier only**

A second resistor is connected to the circuit in parallel with the $20\ \Omega$ resistor.

- (i) State how the combined resistance of the two resistors in parallel compares with the resistance of each of the resistors on its own.

[1]

- (ii) The p.d. across the two parallel resistors is changed and the current in the battery for each value of the p.d. is measured. A second line could be drawn on Fig. 8.2 to indicate how the current measured by the ammeter depends on the p.d. across the two resistors in parallel.

State how the second line differs from the original line. You are not expected to draw this second line.

[1]

[2 marks]

Question 5a

Extended tier only

The circuit shown in Fig. 1 includes three ammeters labelled A_1 , A_2 and A_3 , and one unknown fixed resistor, R .

The voltmeter connected across R reads 24 V.

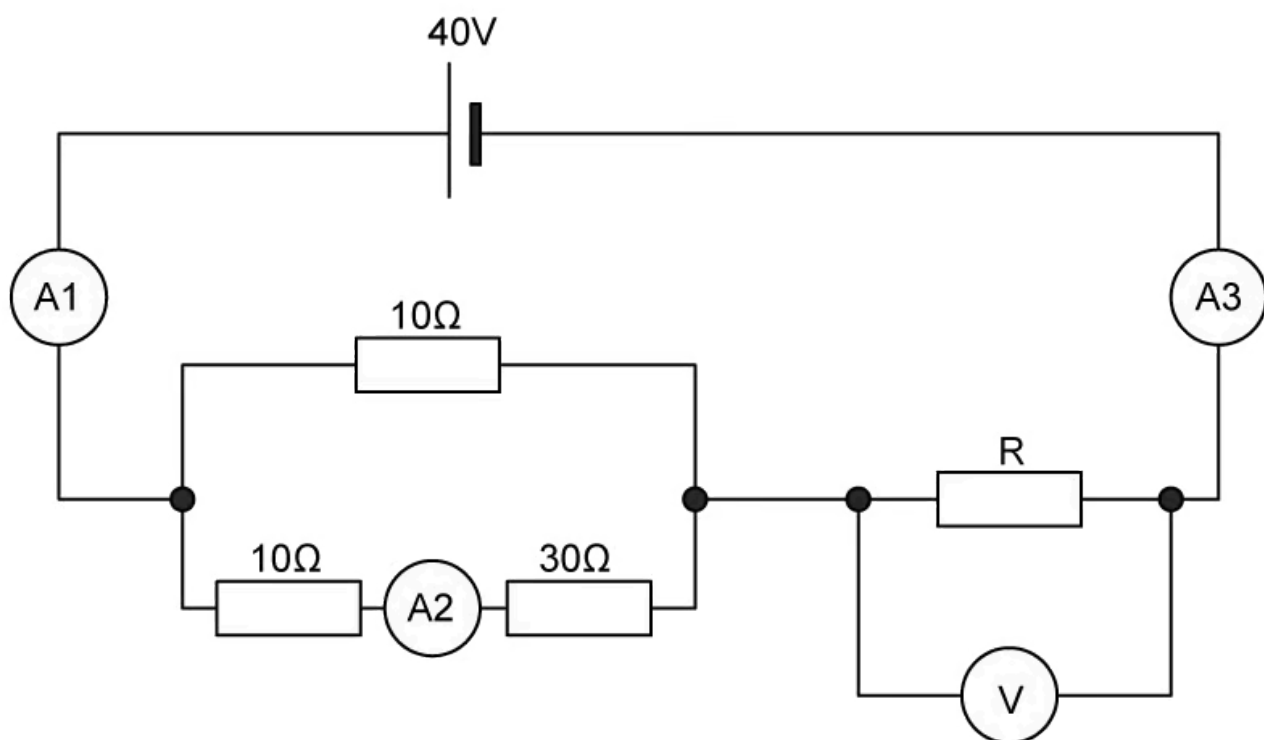


Fig. 1

For the parallel branch, determine

- (i) the voltage across the upper $10\ \Omega$ resistor.
- (ii) the voltage across the lower part of the parallel circuit.

[2]

[1]

[3 marks]

Question 5b

Calculate the current through the upper $10\ \Omega$ resistor.

[2 marks]

Question 5c**Extended tier only**

Determine the readings on

(i) ammeter A_2

[2]

(ii) ammeters A_1 and A_3 .

[2]

[4 marks]

Question 5d

Calculate the value of R .

[1 mark]