Electric Circuits & Electrical Safety

Question Paper

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

Time Allowed 60

Score /44

Percentage /100

Question 1a

A student makes a circuit to switch on a 6.0 V lamp from two different switches X and Y.

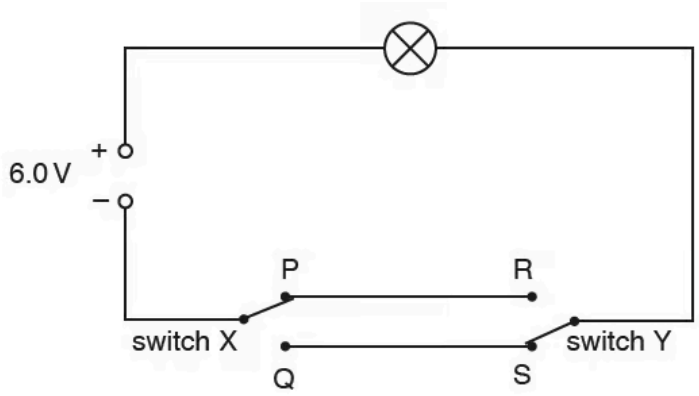


Fig. 9.1

Fig. 9.1 shows the circuit.

Switch X is in position P. State the position of switch Y for the lamp to be lit.

[1 mark]

Question 1b

The current in the lamp is 0.50 A when the potential difference (p.d.) across the lamp is 6.0 V.

Calculate the resistance of the lamp. Include the unit.

resistance = ...

[4 marks]

Question 1c

Extended tier only

The student connects another 6.0 V lamp in parallel with the first lamp, as shown in Fig. 9.2.

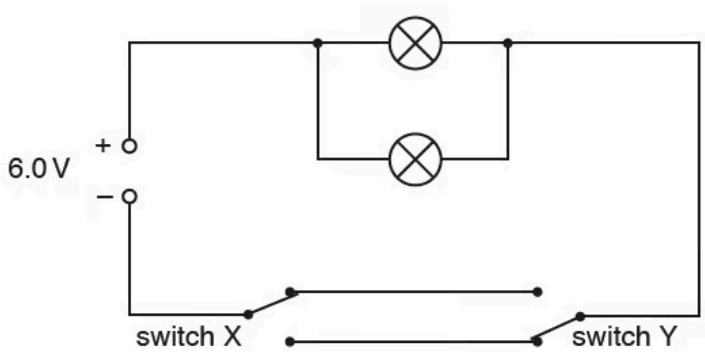


Fig. 9.2

Give two advantages of connecting the lamps in parallel.

[2 marks]

Question 2a

A student investigates the electrical resistance of some components.

Fig. 10.1 shows an incomplete diagram of the circuit used by the student.

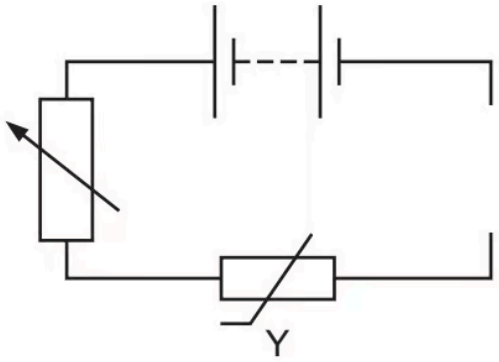


Fig. 10.1

(i) State the term used for component Y.

[1]

(ii) The student uses the circuit to measure the resistance of component Y.

Complete the diagram in Fig. 10.1 by adding electrical symbols to show an ammeter and a voltmeter correctly connected to determine the resistance of component Y.

[3]

[4 marks]

Question 2b

Fig. 10.2 shows two resistors A and B.

Fig. 10.2

(i) Resistor A and resistor B are connected in series.

State the value of their combined resistance.

..... Ω [1]

(ii) Resistor A and resistor B are connected in parallel.

Compare the combined resistance when in parallel with the resistance of resistor A alone.

[1]

[2 marks]

Question 3a

Fig. 10.1 shows a circuit for determining the resistance of a component.

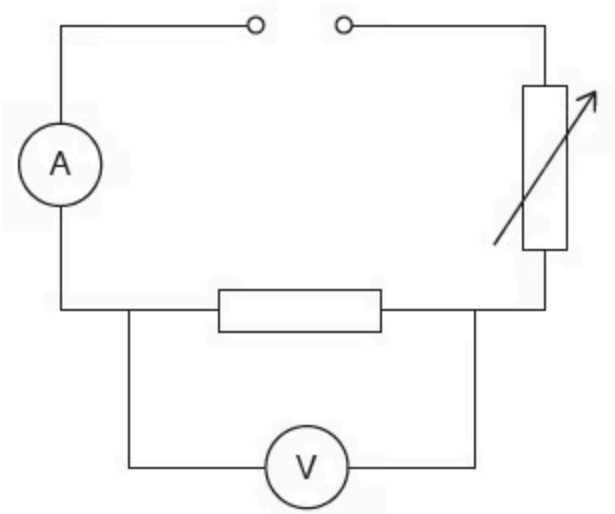


Fig. 10.1

On Fig. 10.1, label the fixed resistor, by writing the letter R.

[1 mark]

Question 3b

Two components in Fig. 10.1 measure electrical quantities.

Identify the quantity that each component measures.

Write each quantity and the unit of each quantity in the correct place in Table 10.1.

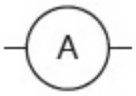
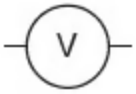
component	quantity	unit
		
		

Table 10.1

[4 marks]

Question 3c

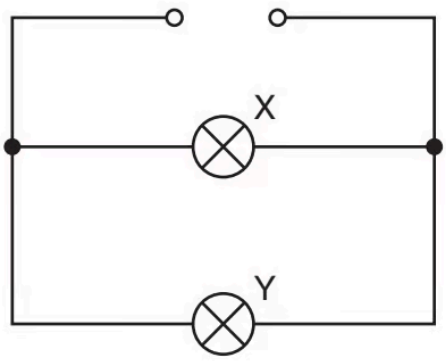
A student uses the circuit in Fig. 10.1 to determine the resistance of wires made from the same material.

State how the resistance of a wire is related to its length and its diameter.

[2 marks]

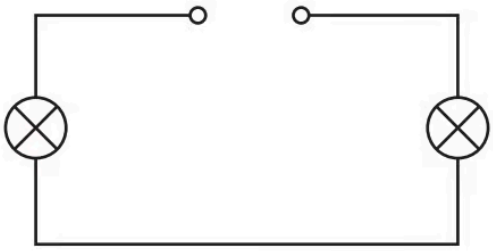
Question 4a

Fig. 9.1 and Fig. 9.2 each show an electrical circuit. Each circuit has two lamps connected to an electrical supply.



..... circuit

Fig. 9.1



..... circuit

Fig. 9.2

State the term used to describe each electrical circuit. Write the term under each circuit.

[2 marks]

Question 4b

State two disadvantages of the circuit in Fig. 9.2.

[2 marks]

Question 4c

Redraw the circuit in Fig. 9.1 with switches that will turn lamps X and Y on and off independently of each other.

[2 marks]

Question 4d

Fig. 9.3 shows another circuit.

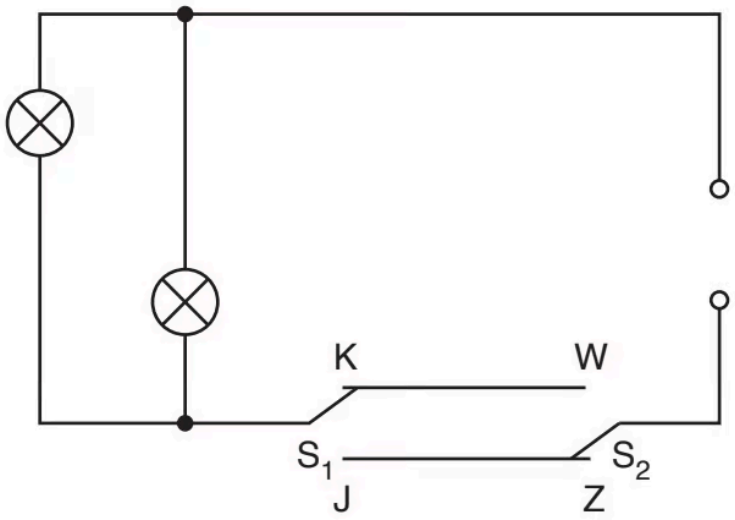


Fig. 9.3

The lamps can be turned on and off using two different switches S_1 and S_2.

Complete the table stating when the lamps are on or off. The first one has been done for you.

switch positions		lamps on or off
S_1	S_2	
K	Z	off
K	W	
J	W	
J	Z	

[3 marks]

Question 5a

Fig. 10.1 shows the symbol for an electrical component.

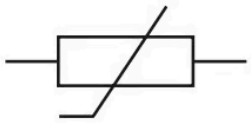


Fig. 10.1

State the name of the component shown in Fig. 10.1.

[1 mark]

Question 5b

The resistance of the component shown in Fig. 10.1 varies with temperature. Fig. 10.2 shows a graph of resistance against temperature for the component.

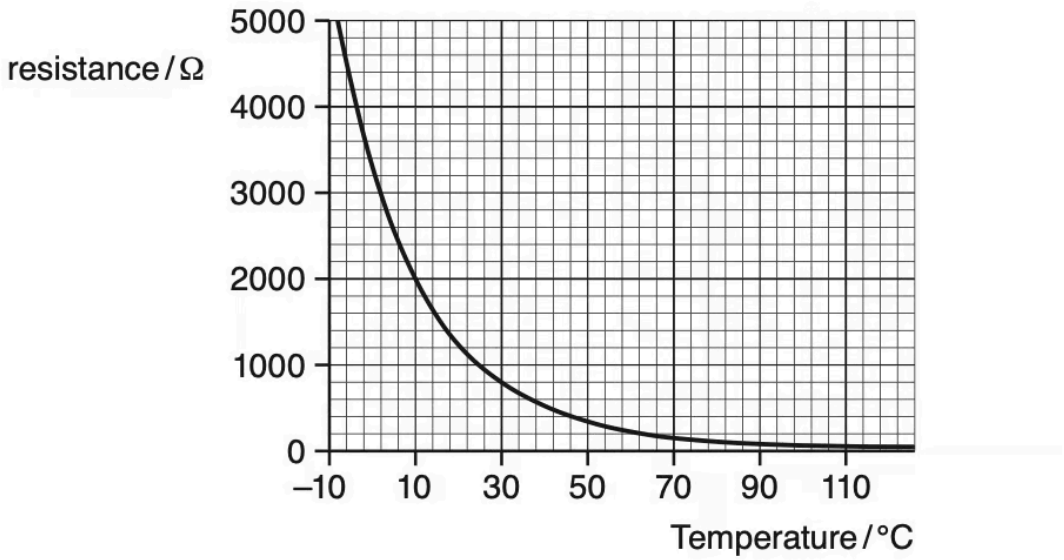


Fig. 10.2

(i) Use the graph to determine the resistance of the component at a temperature of 10 °C.

resistance = ... Ω [1]

(ii) At another temperature, the resistance of the component is 800 Ω.

Calculate the current in the component when it is connected to a 12.0 V supply.

current = ... A [3]

[4 marks]

Question 5c

The students who built the circuit in part (a) want to change it so that it becomes sensitive to light rather than heat.

State the change the students should make.

[2 marks]

Question 5d

Draw the symbol for the replacement component you suggested in part (c).

[1 mark]

Question 6a

Fig. 9.1 shows a simple circuit.

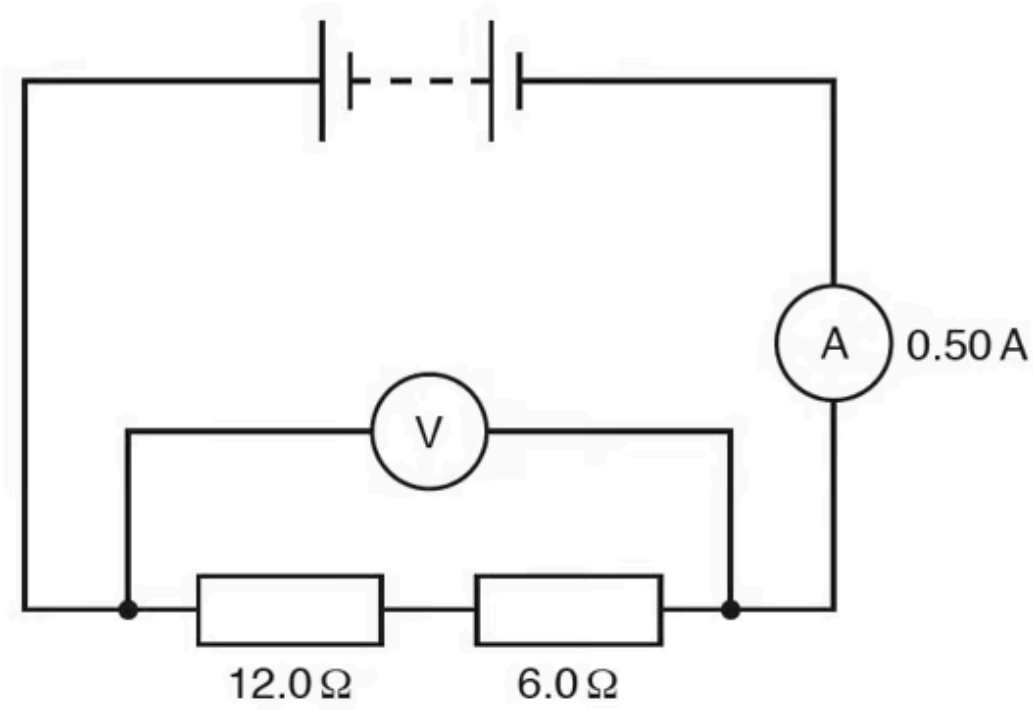


Fig. 9.1

(i) The current in the wires of the circuit is a flow of particles.
Indicate the name of these particles. Tick **one** box.

☐ electrons

☐ atoms

☐ protons

[1]

(ii) Calculate the combined resistance of the two resistors.

resistance = ... Ω [1]

(iii) Calculate the potential difference (p.d.) reading that would be shown on the voltmeter.

potential difference (p.d.) = ... V [3]

[5 marks]

Question 6b

The circuit is changed.

The two resistors are connected in parallel.

Explain what happens, if anything, to the current reading on the ammeter.

[2 marks]