

# Electric circuits

## Question Paper 7

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	Electricity and Magnetism
Sub-Topic	Electric circuits
Paper Type	(Extended) Theory Paper
Booklet	Question Paper 7

**Time Allowed:** 58 minutes

**Score:** /48

**Percentage:** /100

1 Fig. 8.1 shows a low-voltage lighting circuit.

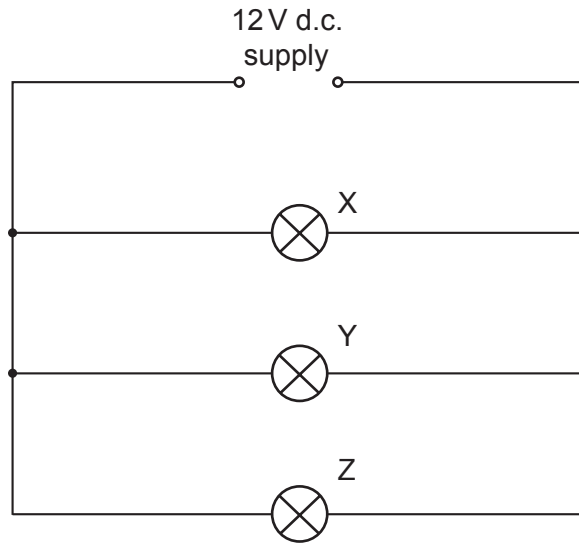


Fig. 8.1

- (a) On Fig. 8.1, indicate with a dot and the letter S, a point in the circuit where a switch could be placed that would turn off lamps Y and Z at the same time but would leave lamp X still lit. [1]
- (b) (i) In the space below, draw the circuit symbol for a component that would vary the brightness of lamp X.
- (ii) On Fig. 8.1, mark with a dot and the letter R where this component should be placed. [2]
- (c) Calculate the current in lamp Y.

current = ..... [2]

(d) The current in lamp Z is 3.0A. Calculate the resistance of this lamp.

resistance = .....[2]

(e) The lamp Y is removed.

(i) Why do lamps X and Z still work normally?

.....  
.....

(ii) The current in lamp X is 1.0A. Calculate the current supplied by the battery with lamp Y removed.

current = .....  
[2]

[ Total : 9 ]

- 2 A student has a power supply, a resistor, a voltmeter, an ammeter and a variable resistor.
- (a) The student obtains five sets of readings from which he determines an average value for the resistance of the resistor.

In the space below, draw a labelled diagram of a circuit that he could use.

[3]

- (b) Describe how the circuit should be used to obtain the five sets of readings.

.....

.....

..... [2]

- (c) Fig. 8.1 shows another circuit.

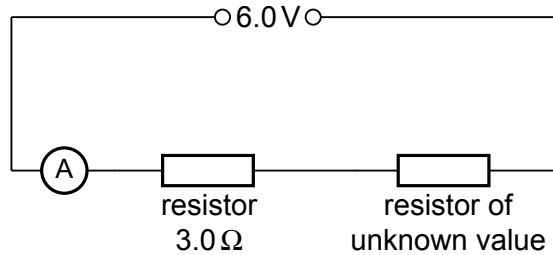


Fig. 8.1

When the circuit is switched on, the ammeter reads 0.50 A.

- (i) Calculate the value of the unknown resistor.

resistance = ..... [2]

**(ii)** Calculate the charge passing through the  $3.0\ \Omega$  resistor in 120 s.

charge = ..... [1]

**(iii)** Calculate the power dissipated in the  $3.0\ \Omega$  resistor.

power = ..... [2]

[ Total : 10 ]

- 3 Fig. 8.1 shows a 240 V a.c. mains circuit to which a number of appliances are connected and switched on.

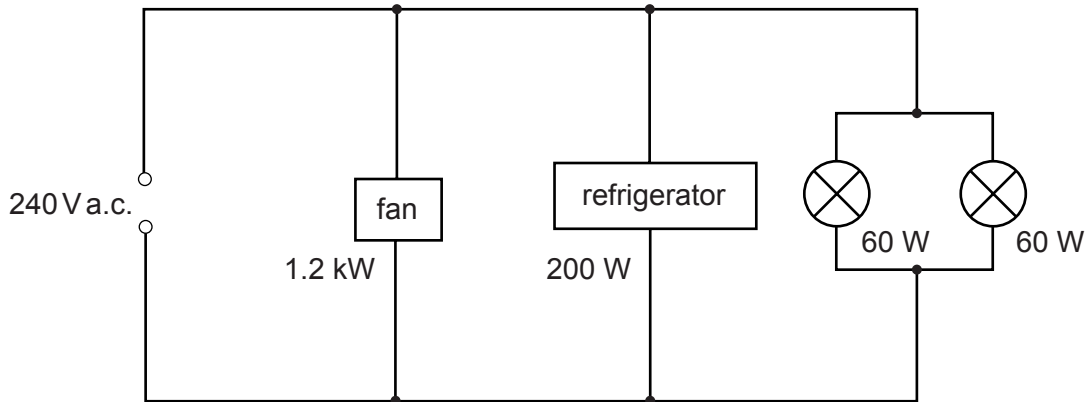


Fig. 8.1

- (a) Calculate the power supplied to the circuit.

power = .....[1]

- (b) The appliances are connected in parallel.

- (i) Explain what connected *in parallel* means.

.....  
.....

- (ii) State two advantages of connecting the appliances in parallel rather than in series.

advantage 1 .....

advantage 2 .....

[3]

**(c)** Calculate

**(i)** the current in the refrigerator,

current = .....

**(ii)** the energy used by the fan in 3 hours,

energy = .....

**(iii)** the resistance of the filament of one lamp.

resistance = .....

[ Total : 11 ]

4 Fig. 7.1 shows a 12 V battery connected to a number of resistors.

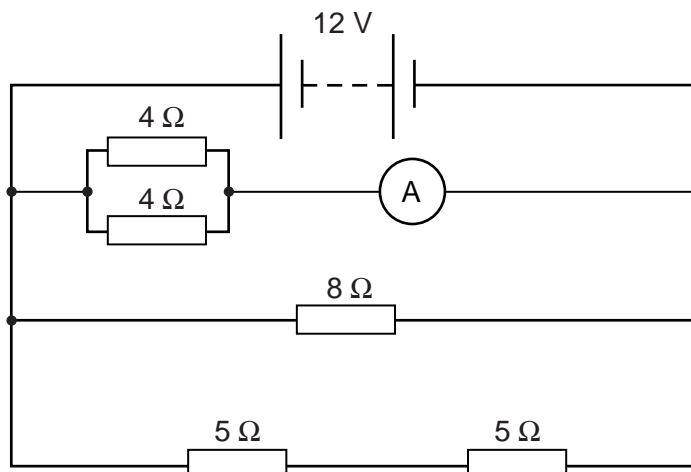


Fig. 7.1

(a) Calculate the current in the  $8\ \Omega$  resistor.

current = .....[2]

(b) Calculate, for the resistors connected in the circuit, the combined resistance of

(i) the two  $5\ \Omega$  resistors,

resistance = .....

(ii) the two  $4\ \Omega$  resistors.

resistance = .....  
[2]



- (c) The total current in the two  $4\ \Omega$  resistors is 6 A.  
Calculate the total power dissipated in the two resistors.

power = .....[2]

- (d) What will be the reading on a voltmeter connected across

- (i) the two  $4\ \Omega$  resistors,

reading = .....

- (ii) one  $5\ \Omega$  resistor?

reading = .....  
[2]

- (e) The  $8\ \Omega$  resistor is made from a length of resistance wire of uniform cross-sectional area.  
State the effect on the resistance of the wire of using

- (i) the same length of the same material with a greater cross-sectional area,

.....

- (ii) a smaller length of the same material with the same cross-sectional area.

.....

[2]

[ Total : 10 ]

- 5 Fig. 8.1 shows a battery with a resistor connected across its terminals. The e.m.f. of the battery is 6.0 V.

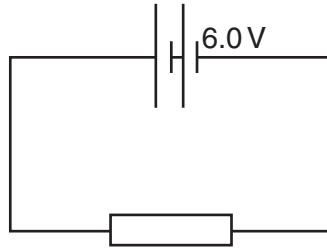


Fig. 8.1

The battery causes 90 C of charge to flow through the circuit in 45 s.

(a) Calculate

(i) the current in the circuit,

current = .....

(ii) the resistance of the circuit,

resistance = .....

(iii) the electrical energy transformed in the circuit in 45 s.

energy = .....  
[6]

(b) Explain what is meant by the term *e.m.f. of the battery*.

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

[Total : 8]