

# Electrical Quantities

## Question Paper 5

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	Electricity and Magnetism
Sub-Topic	Electrical quantities
Paper Type	(Extended) Theory Paper
Booklet	Question Paper 5

**Time Allowed:** 56 minutes

**Score:** /47

**Percentage:** /100

1 (a) The following are three statements about boiling.

- A liquid boils at a fixed temperature.
- During boiling, vapour can form at any point within the liquid.
- Without a supply of thermal energy, boiling stops.

Complete the following equivalent statements about evaporation.

- A liquid evaporates at .....
- During evaporation .....
- Without a supply of thermal energy, evaporation ..... [3]

(b) A pan containing water boiling at  $100^{\circ}\text{C}$  is standing on an electrically heated hot-plate. In 20 minutes,  $0.075\text{ kg}$  of water is lost as steam. The specific latent heat of vaporisation of water is  $2.25 \times 10^6\text{ J/kg}$ .

(i) Calculate the energy used in converting  $0.075\text{ kg}$  of boiling water to steam.

energy = ..... [2]

(ii) The hot-plate operates at  $240\text{ V}$ ,  $0.65\text{ A}$ .

Calculate the energy supplied to the hot-plate in 20 minutes.

energy = ..... [2]

(iii) Suggest why the answers to (b)(i) and (b)(ii) are not the same.

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

[Total: 8]

- 2 In Fig. 9.1, A and B are two conductors on insulating stands. Both A and B were initially uncharged.

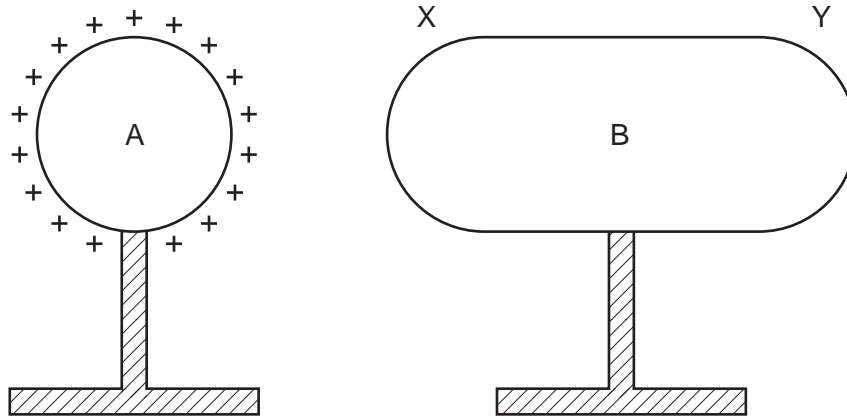


Fig. 9.1

- (a) Conductor A is given the positive charge shown on Fig. 9.1.

- (i) On Fig. 9.1, mark the signs of the charges induced at end X and at end Y of conductor B. [1]

- (ii) Explain how these charges are induced.

.....  
.....  
..... [3]

- (iii) Explain why the charges at X and at Y are equal in magnitude.

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

**(b)** B is now connected to earth by a length of wire.

Explain what happens, if anything, to

**(i)** the charge at X,

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

**(ii)** the charge at Y.

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

[Total: 8]

- 3** When he leaves work at 6.30 p.m. (18:30) one evening, a caretaker forgets to switch off the 100W lamp in his office. He doesn't discover this until he returns at 7.30 a.m. (07:30) the next morning.

The mains electricity supply is 250V.

- (a)** Calculate how much energy the caretaker has wasted.

energy wasted = ..... [2]

- (b)** Calculate the charge that passed through the lamp during this time.

charge = ..... [3]

- (c)** What happened to the energy wasted by the lamp?

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

[Total: 6]

- 4 Fig. 7.1 shows how the resistance of the filament of a lamp changes as the current through the lamp changes.

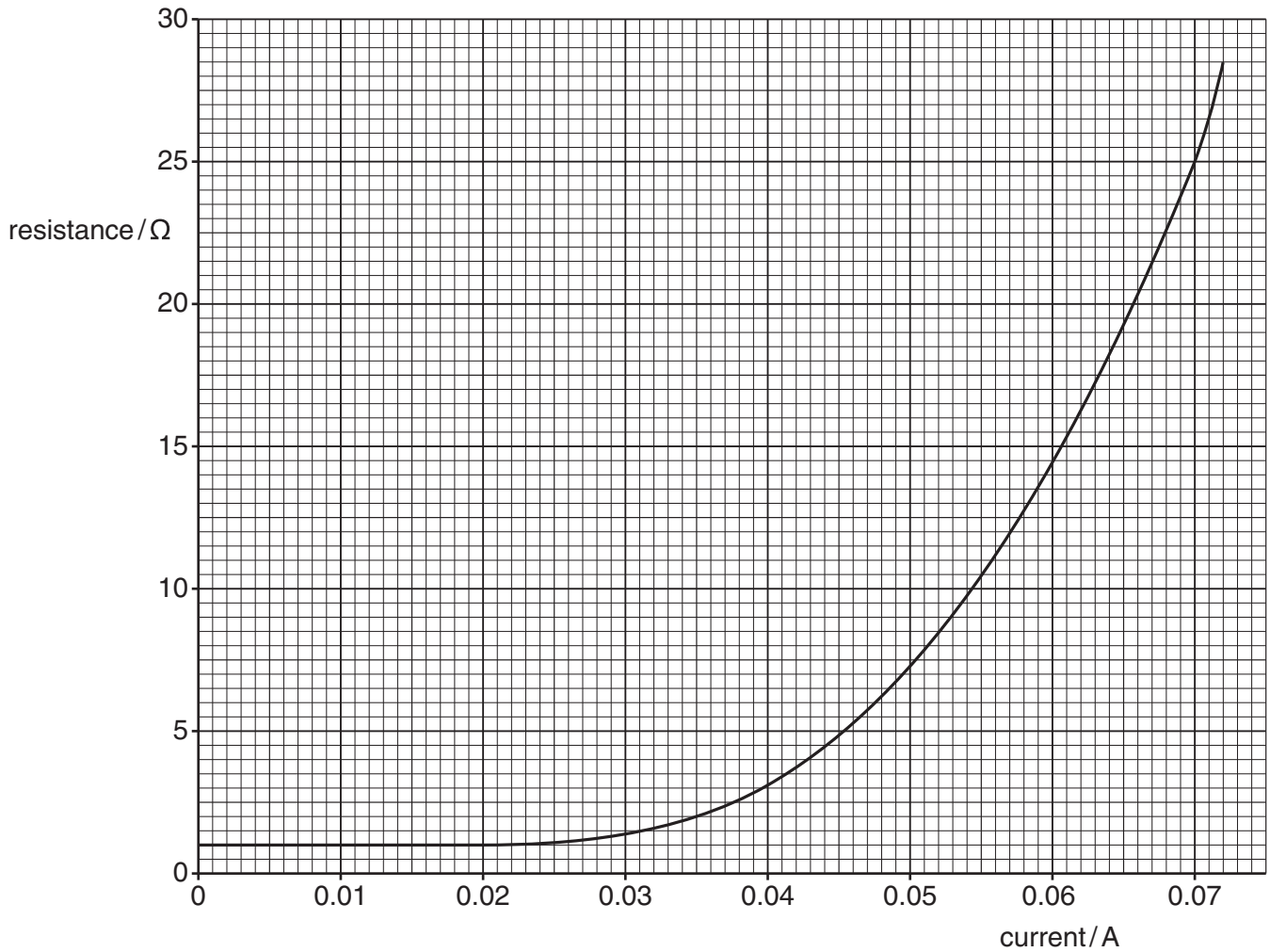


Fig. 7.1

- (a) Describe how the resistance of the lamp changes.

.....

.....

..... [2]

**(b)** For a current of 0.070 A, find

**(i)** the resistance of the lamp,  
resistance = ..... [1]

**(ii)** the potential difference across the lamp,

potential difference = ..... [2]

**(iii)** the power being dissipated by the lamp.

power = ..... [2]

**(c)** Two of these lamps are connected in parallel to a cell. The current in each lamp is 0.070 A.

**(i)** State the value of the e.m.f. of the cell.  
e.m.f. = ..... [1]

**(ii)** Calculate the resistance of the circuit, assuming the cell has no resistance.

resistance = ..... [2]

[Total: 10]

- 5 (a) Fig. 10.1 shows a positively charged plastic rod, a metal plate resting on an insulator, and a lead connected to earth.

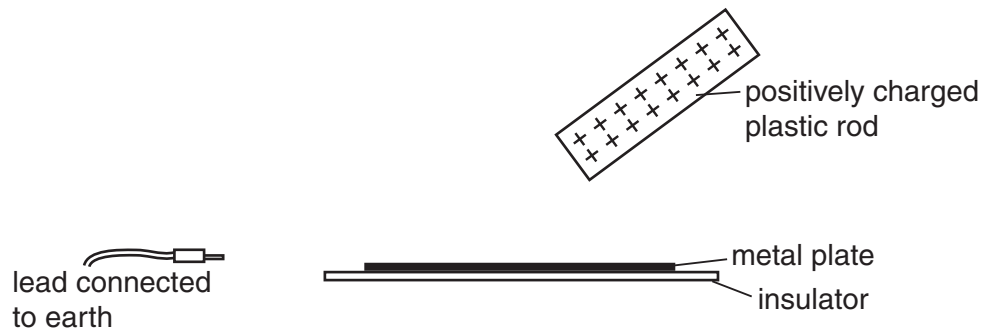


Fig. 10.1

Describe how the metal plate may be charged by induction.

.....  
.....  
.....[3]

- (b) An electrostatic generator sets up a current of 20 mA in a circuit.

Calculate

- (i) the charge flowing through the circuit in 15 s,

charge = .....

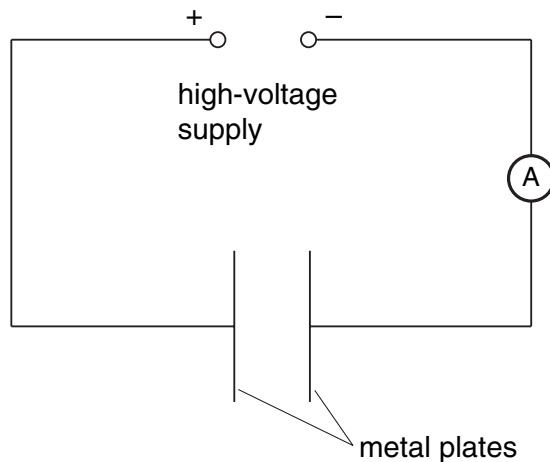
- (ii) the potential difference across a 10 k $\Omega$  resistor in the circuit.

potential difference = .....  
[3]

[ Total : 6 ]



6 Fig. 8.1 shows a high-voltage supply connected across two metal plates.



**Fig. 8.1**

When the supply is switched on, an electric field is present between the plates.

(a) Explain what is meant by an *electric field*.

..... [2]

(b) On Fig. 8.1, draw the electric field lines between the plates and indicate their direction by arrows. [2]

(c) The metal plates are now joined by a high-resistance wire. A charge of 0.060 C passes along the wire in 30 s.  
Calculate the reading on the ammeter.

ammeter reading = ..... [2]

(d) The potential difference of the supply is re-set to 1500 V and the ammeter reading changes to 0.0080 A. Calculate the energy supplied in 10 s. Show your working.

energy = ..... [3]

[ Total : 9 ]