

(a) (i) Copper is an electrical conductor. What is meant by a *conductor*?

.....

(ii) Ebonite, glass and polythene are electrical insulators. What is meant by an *insulator*?

.....

[2]

(b) Polythene is easily given a negative charge by rubbing it with a dry woollen cloth.

(i) Fig. 1 shows a charged polymene rod being held close to a suspended charged polythene rod.

Complete the phrase,

"Like charges ....."

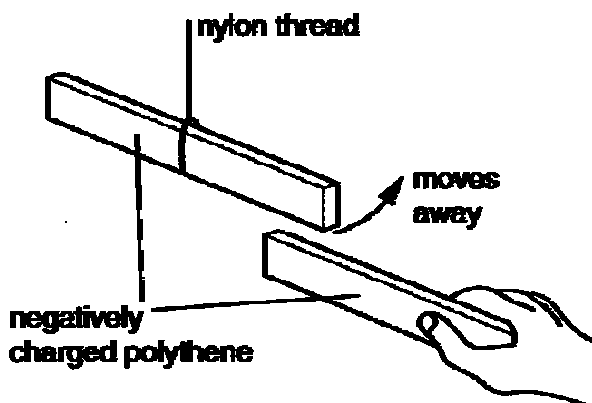


Fig. 1

(ii) Fig 2 shows rod X being held near the suspended charged polythene rod.

Tick any of the following which might correctly describe rod X.

- positively charged glass
- negatively charged ebonite
- uncharged copper
- negatively charged polythene

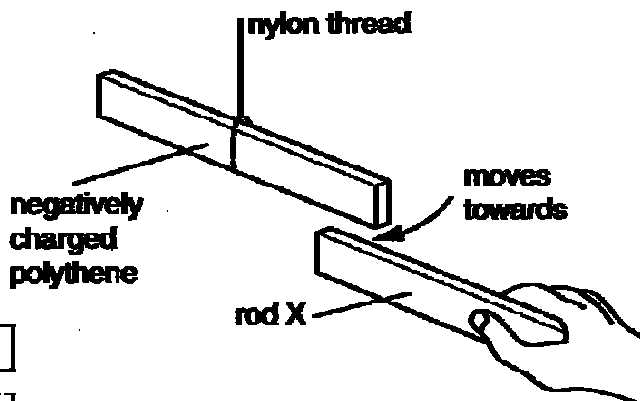
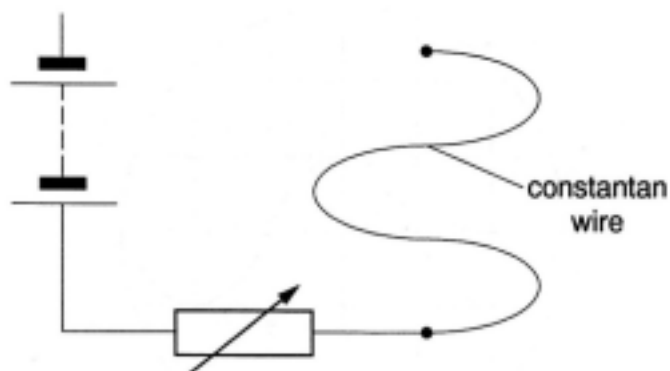


Fig. 2

[3]

A student wanted to measure the resistance of a length of constantan wire. She starts to connect the circuit as shown below.



She needs to add an ammeter and a voltmeter.

(a) Complete the circuit diagram to show how these should be connected. [2]

(b) In the experiment the voltmeter reads 6.0 V and the ammeter reads 1.5 A. Calculate the resistance of the wire.

[3]

(c) She now wants to reduce the current through the constantan wire. Explain how this could be done.

.....

.....

..... [2]

Extension 1

Fig. 4 shows a high-voltage supply connected across two metal plates.

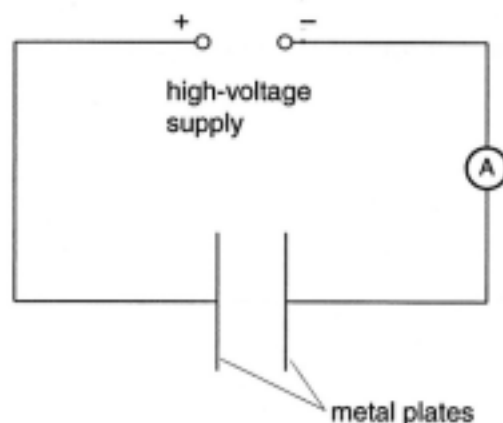


Fig. 4

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) 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]

(c) The potential difference between the plates is 5000 V.

Calculate the resistance of the constantan wire.

resistance = ..... [2]

## Answers

### Core 1

- (a)(i) A material which allows current to pass through it. ✓  
(ii) A material which does not allow current to pass through it. ✓

(b)(i) repel

(ii) positively charged glass, ✓, uncharged copper ✓

### Core 2

(a) Ammeter in series and circuit complete ✓

Voltmeter in parallel with the wire ✓

(b) resistance =  $V / I$  ✓

$$= 6 / 1.5 \checkmark$$

$$= 4 \Omega$$

(c) increase the resistance ✓ of the variable resistor ✓

### Extension 1

(a) A region in which a charged particle experiences an electric force

(b)  $q = I t = 0.06 \times 30$  ✓

$$= 1.8 \text{ C} \checkmark$$

(c)  $R = V / I = 5000 / 0.06$  ✓

$$= 8.3 \times 10^4 \Omega \checkmark$$