

## Homework 1 - Electrical Charge Carriers and Potential Difference

1. Identify the definition of one ampere.

- A one volt per joule
- B one joule per second
- C one joule per coulomb
- D one coulomb per second
- E one ohm per volt

2. A current of 4.0 mA flows through a conductor. Calculate how much charge passes a point in the conductor in 1000 s.

- A 0.25 C
- B 0.40 C
- C 4.0 C
- D 250 C
- E 4000 C

3. The following statements are made about electrical charge carries and voltage.

- I. The voltage of a battery is the number of joules of energy it gives to each coulomb of charge.
- II. A battery only has a voltage when it is connected in a complete circuit.
- III. Electrons are free to move within an insulator.

Identify which of the statements is/are correct.

- A I only
- B II only
- C III only
- D II and III only
- E I, II and III

4. Identify the definition of the potential difference of an electrical supply.

- A the resistance of the circuit
- B the speed of the charges in the circuit
- C the energy given to the charges in the circuit
- D the energy used by the circuit each second
- E the charge passing a point in the circuit each second

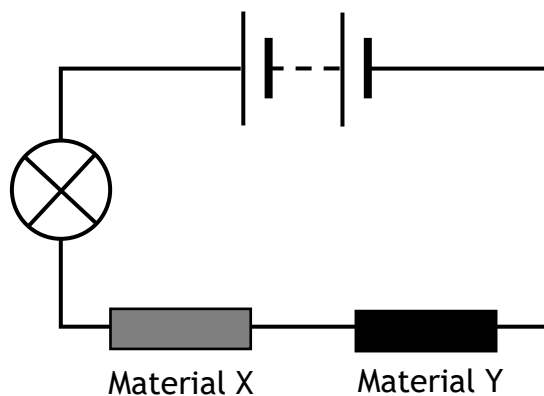
5. A student makes the following statements about electrical conductors and insulators.

- I. Only protons are free to move.
- II. Only electrons are free to move
- III. Only negative charges are free to move.

Identify which of the statements is/are correct.

- A I only
- B II only
- C III only
- D I and II only
- E II and III only

6. A circuit is set up to test electrical conduction in materials.



The lamp lights.

Identify the row in the table which shows possible materials for X and Y.

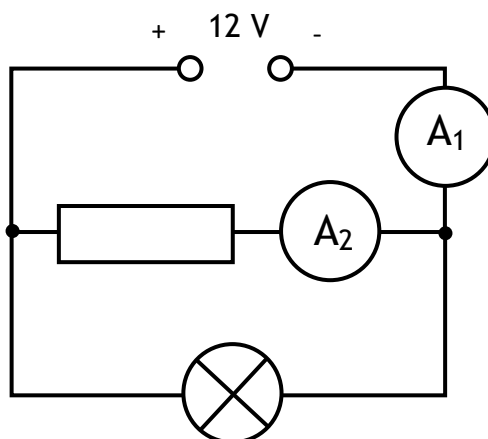
	<i>Material X</i>	<i>Material Y</i>
A	copper	wood
B	copper	aluminium
C	glass	copper
D	aluminium	glass
E	wood	glass

7. The current in an  $8\ \Omega$  resistor is 2 A.

Calculate the charge which passes through the resistor in 10 s.

- A 4 C
- B 5 C
- C 16 C
- D 20 C
- E 80 C

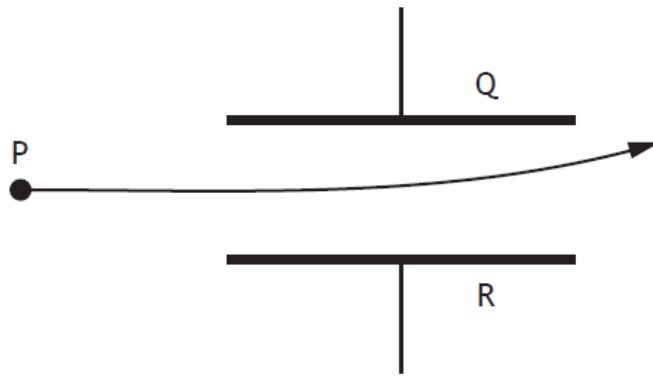
8. A circuit is set up as shown.



The reading on ammeter  $A_1$  is 5.0 A. The reading on ammeter  $A_2$  is 2.0 A. Calculate how much charge passes through the lamp in 30 seconds.

- A 0.1 C
- B 10 C
- C 60 C
- D 90 C
- E 150 C

9. An electric field exists between plates Q and R.  
The diagram shows the path taken by a particle as it passes through the field.

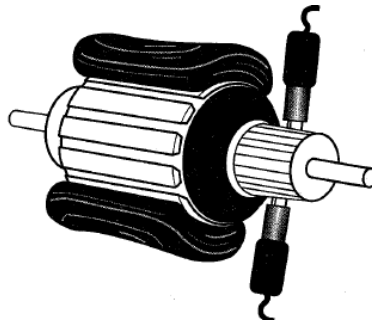


Identify the row in the table that correctly gives the charge on the particle, the charge on plate Q, and the charge on plate R.

	<i>Charge on Particle</i>	<i>Charge on Plate Q</i>	<i>Charge on Plate R</i>
A	negative	positive	negative
B	negative	negative	positive
C	no charge	negative	positive
D	no charge	positive	negative
E	positive	positive	negative

10. Calculate the time that it takes for 2900 C of charge to pass a point in a circuit with a supply voltage of 12 V and a current of 3.2 A.
- A 3.8 s
  - B 38 s
  - C 240 s
  - D 910 s
  - E 9300 s

11. A diagram of a starter motor for a car is shown below:



When the starter motor operates, a charge of 360 C is drawn from the battery. Calculate how long will it take to recharge the battery if a charging current of 5.0 A is used.

12. A technician measures the potential difference across a component in a circuit first using a digital voltmeter and then an oscilloscope.

Figure 1 shows a digital voltmeter connected to the component and figure 2 shows an oscilloscope connected to the same component.

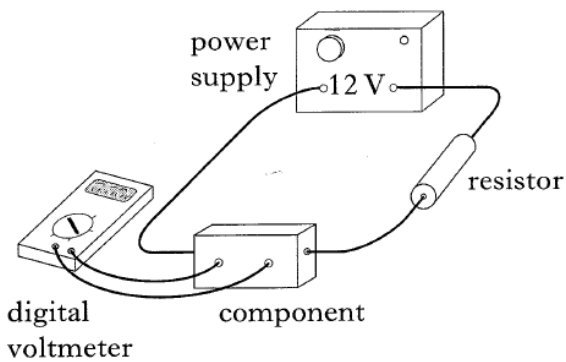


Figure 1

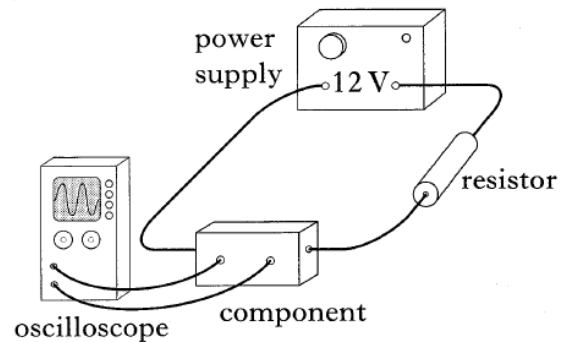
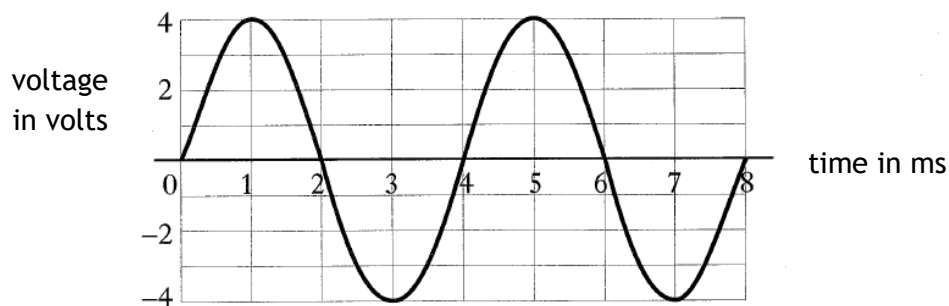


Figure 2

The graph below shows how the potential difference varies with time,



- State whether the potential difference across the component is direct or alternating.
- Describe how the size of the peak voltage compares with the voltage reading which would be shown on the digital voltmeter.