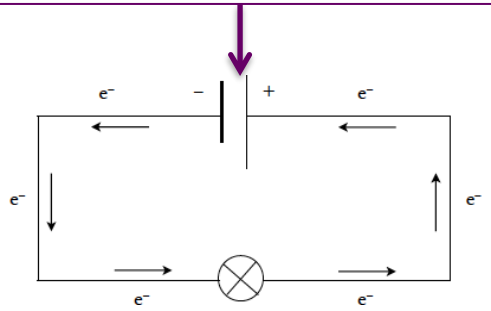
1. ELECTRICAL CHARGE CARRIERS

1. Current

Electrical current is simply the flow of charge carriers. In a standard electrical circuit the charge carriers are **electrons**.

Electrons are **repelled** away from the negative terminal of the battery and **attracted** to the positive terminal of the battery. To move from the negative terminal to the positive terminal they need to move around the circuit through the lamp as shown below.



2. Q=It

2. Q=It – The definition of current is the **electric charge transferred per unit time**.

$$Q = It \quad I = \frac{Q}{t}$$

$$1\ Ampere = \frac{1\ Coulomb}{second}$$

$$1A = 1Cs^{-1}$$

Example N5 2016 PP

Electrical storms occur throughout the world. During one lightning strike 24C of charge is transferred to the ground in 0.0012s.

a) Calculate the average current during the lightning strike.

$$\boldsymbol{Q = It}$$
$$\boldsymbol{24 = I \times 0.0012}$$
$$\boldsymbol{I = 20\,000A}$$

b) The charge on an electron is -1.6×10^{-19}C. Determine the number of electrons transferred during the lightning strike.

$$\boldsymbol{24 \div 1.6 \times 10^{-19} = 1.5 \times 10^{20} electrons}$$

c) Many tall buildings have a thick strip of metal attached to the side of the building. The strip is used to protect the building from damage during electrical storms. Explain how this strip protects the building from damage.

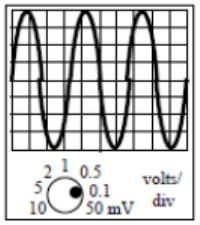
Metal strip is a conductor. More current will pass through the strip than the building.

3. AC & DC

Alternating Current (AC)

An a.c. supply produces a flow of charge in a circuit that regularly reverses direction.

In the UK mains electricity uses AC with a frequency of 50Hz. This means that in one second the current changes from flowing in one direction to another and back 50 times.



Direct Current (DC)

A d.c. supply produces a flow of charge in one direction only.