

Name: \_\_\_\_\_ Class: \_\_\_\_\_

# Additional Science Homework

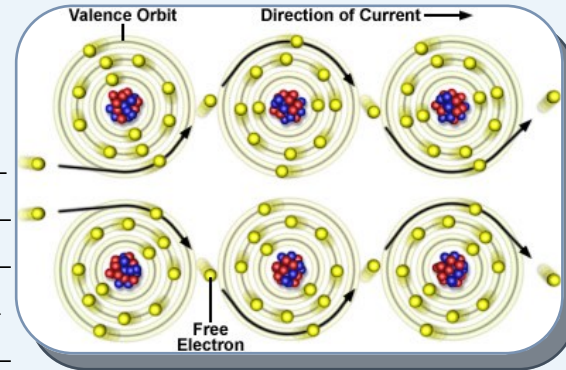
**1.10 Recall that the current in metals is a flow of electrons**

The atoms in a metal are arranged in a lattice structure. This means that: \_\_\_\_\_

When electrons conduct through a metal, they: \_\_\_\_\_

The free electrons are often referred to as a \_\_\_\_\_

The electrons conduct, because when extra electrons are added to the left side of the wire \_\_\_\_\_



**1.11 Use the equation: charge (coulomb, C) = current (ampere, A) × time (second, s),  $Q = I \times t$**

A current of 5A flows in a wire for 30s. How much charge has passed any given point?

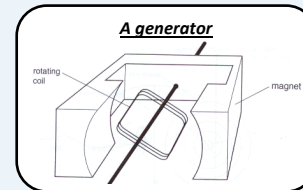
I= \_\_\_\_\_ Equation: \_\_\_\_\_  
 t= \_\_\_\_\_ Insert values: \_\_\_\_\_  
 Q=?? Answer: Q= \_\_\_\_\_ unit: \_\_\_\_\_

I=?? Equation: \_\_\_\_\_  
 t= \_\_\_\_\_ Rearranging: \_\_\_\_\_  
 Q= \_\_\_\_\_ Insert values: \_\_\_\_\_  
 Answer: I= \_\_\_\_\_ unit: \_\_\_\_\_

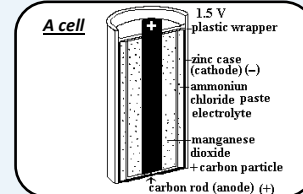
**1.12 Recall that cells and batteries supply direct current (d.c.)**

The difference between a cell and a battery is: \_\_\_\_\_

Explain why a generator produces a.c. \_\_\_\_\_



Explain why a cell produces d.c. \_\_\_\_\_



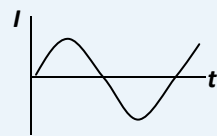
## P2 Physics for your future

### Topic 1: Static and Current Electricity



**1.13 Demonstrate an understanding that direct current (d.c.) is movement of charge in one direction only**

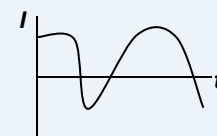
For each graph, identify if you think it represents a.c. or d.c., then explain your reason.



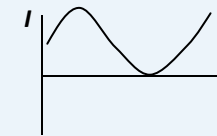
**AC/DC**  
 Because: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



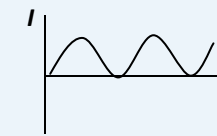
**AC/DC**  
 Because: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



**AC/DC**  
 Because: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



**AC/DC**  
 Because: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



**AC/DC**  
 Because: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**1.1 Describe the structure of the atom, limited to the position, mass and charge of protons, neutrons and electrons**

Draw a carbon atom, labelling the protons, neutrons and electrons. Complete the table of properties of these particles:

**A carbon atom**

● Proton  
● Neutron  
+ Electron

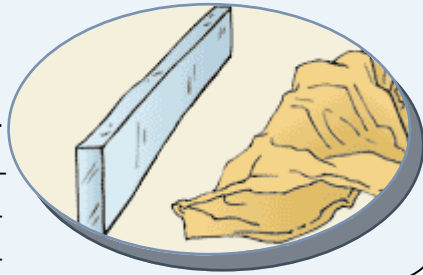
Particle	Charge	Mass	Location in the Atom
Proton			
Neutron			
Electron			

**1.2 Explain how an insulator can be charged by friction, through the transfer of electrons**

Explain what happens to the electrons in a cloth which is rubbed against a rod: \_\_\_\_\_

The rod now has a \_\_\_\_\_ charge. The cloth now has a \_\_\_\_\_ charge.

This would not work with a metal rod because: \_\_\_\_\_



**1.3 Explain how the material gaining electrons becomes negatively charged and the material losing electrons is left with an equal positive charge**

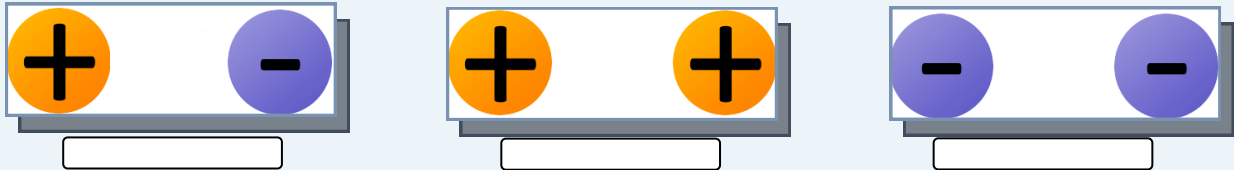
When static charge is generated, \_\_\_\_\_ are transferred from one object to another. The object which loses \_\_\_\_\_

becomes \_\_\_\_\_ charged because \_\_\_\_\_

The object which gains \_\_\_\_\_ becomes \_\_\_\_\_ charged because \_\_\_\_\_

**1.4 Recall that like charges repel and unlike charges attract**

Write the words "repel" and "attract" under these diagrams and draw arrows to show the attraction or repulsion:



**1.5 Demonstrate an understanding of common electrostatic phenomena in terms of movement of electrons, including:**

For each one, draw a diagram and explain how the charge is caused and the effect it has

**a) shocks from everyday objects**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**b) lightning**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**c) attraction by induction such as a charged balloon attracted to a wall**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**d) a charged comb picking up small pieces of paper**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**1.6 Explain how earthing removes excess charge by movement of electrons**

**1.8 Demonstrate an understanding of some of the dangers of electrostatic charges in everyday situations, including fuelling aircraft and tankers together with the use of earthing to prevent the build-up of charge and danger arising**

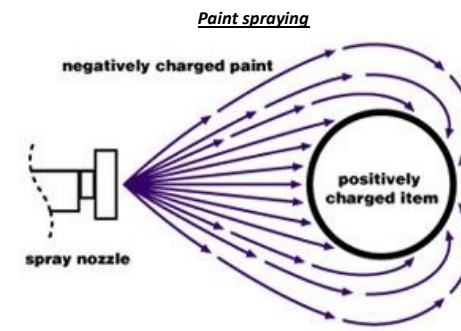
An aircraft becomes charged in flight through: \_\_\_\_\_

If the charge is not removed before the aircraft is refuelled, this is dangerous because: \_\_\_\_\_

The charge is removed by: \_\_\_\_\_



**1.7 Explain some of the uses of electrostatic charges in everyday situations, including paint and insecticide sprayers**



The two reasons the paint is charged in a paint sprayer are:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



The reason the pesticide is charged in a crop sprayer is:

\_\_\_\_\_

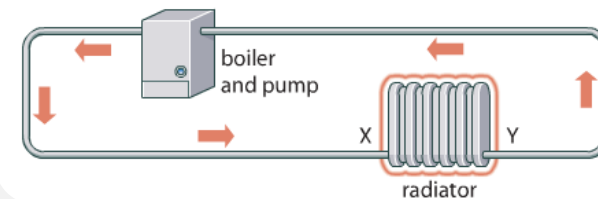
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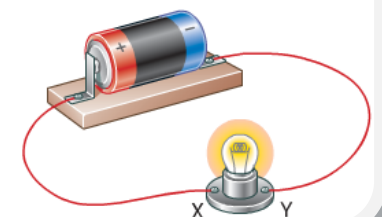
\_\_\_\_\_

**1.9 Recall that an electric current is the rate of flow of charge**

**Central heating model**



**Electricity in a circuit**



The water in the central heating model represents the \_\_\_\_\_ in the wires.

The flow of water in the central heating model represents the \_\_\_\_\_ in the electric circuit.

The boiler and pump in the central heating model represent the \_\_\_\_\_ in the electric circuit.

The radiator in the central heating model represents the \_\_\_\_\_ in the electric circuit.