Static electricity

1 All matter is made of atoms. Three types of particles make up atoms. They are protons and neutrons, which are found in the nucleus, and electrons, which orbit around the nucleus.

a Which of these particles has no electrical charge?..... (1)

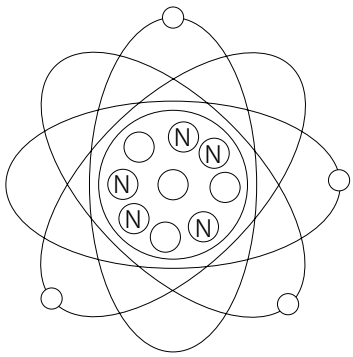
b Which of these particles has a positive charge?..... (1)

c Which of these particles has a negative charge? ..... (1)

d In a neutral atom there has to be the same numbers of which two particles?

..... (1)

2 On the diagram of the atom on the right the neutrons have been marked with the letter N.



a Mark the protons on the diagram with the letter P and the electrons with the letter E. (2)

b Which of these particles – protons, neutrons or electrons – are able to leave the atom?

..... (1)

c When these particles leave the atom, what happens to the charge on the atom?

..... (1)

3 It is possible to remove electrons from an atom by providing energy. When a balloon is rubbed on a wool jumper, the jumper gains electrons from the balloon and becomes negatively charged because it has more negative charges than positive charges.

a Why is this called a ‘static’ charge?

..... (2)

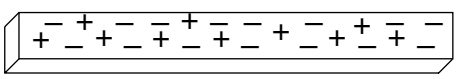
b What type of charge does the balloon have after rubbing on the jumper?

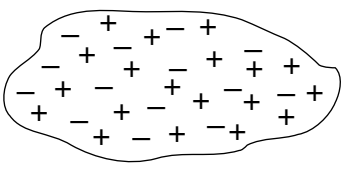
..... (1)

c What do we call materials like the wool and the balloon?

..... (1)

4 The diagram shows a polythene rod which has been rubbed by a cloth. The + and – represent charged particles. Answer the questions on the next page.


Rod


Cloth

	Rod	**Cloth**
a	Number of electrons? ..... (1)	Number of electrons? ..... (1)
	Number of protons? ..... (1)	Number of protons? ..... (1)

b Is the overall charge on the rod negative or positive? ..... (1)

c Is the overall charge on the cloth negative or positive? ..... (1)

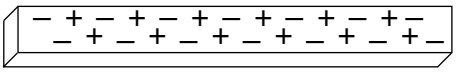
d Polythene rods when rubbed with a cloth gain electrons. Do they become positively or negatively charged?

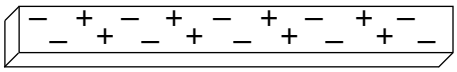
..... (1)

e Perspex rods when rubbed with a cloth lose electrons. Does the cloth become positively or negatively charged?

..... (1)

5 Look at the pairs of rods drawn below and decide whether they are positively or negatively charged and then whether they will repel or attract each other.

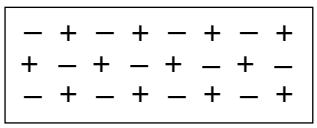
a 

b 

a	Number of electrons = ...	b Number of electrons = ...
	Number of protons = ...	Number of protons = ...
	Charge = ...	Charge = ...

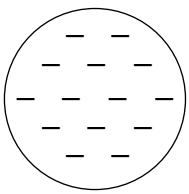
c These rods will ..... each other. (3)

6 The diagram represents a bar made of a conductor. It has equal numbers of positive and negative charges. The + and – signs are shown spread evenly throughout the bar representing the way they are arranged in a real conductor.



Conductor

If a positively charged object is brought near to the conductor, the arrangement of the charges in the conductor will change. On the diagram below, draw the new arrangement of positive and negative charges in the conductor. (2)



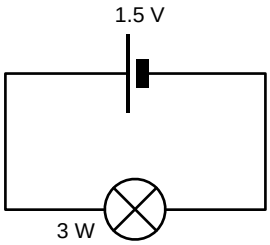
Negatively charged object

Conductor

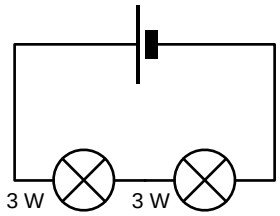
Total marks = 25

Simple circuits

1 Dan has a torch with a light bulb in it. The bulb glows normally when connected to a 1.5 V cell as shown.



Dan takes his torch apart and connects a second identical lamp to the first one as shown:



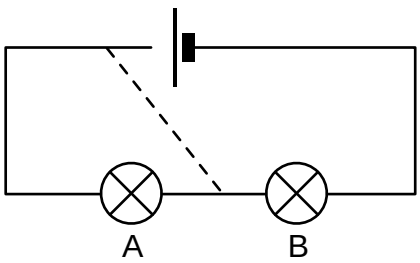
a What is the name given to the way the lamps are connected in Diagram 2?

..... (1)

b How is the brightness of the first lamp affected when the second lamp is connected?

..... (1)

Dan accidentally drops a piece of copper wire between the two lamps:



c Choose words from the following to answer the questions below:

gets brighter stays the same goes out gets dimmer

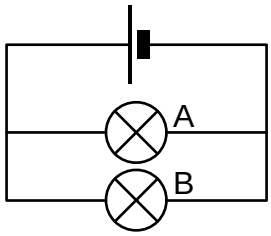
i What happens to lamp A?

..... (1)

ii What happens to lamp B?

..... (1)

Dan could connect the two lamps another way as shown in Diagram 3.



d What is the name given to the way the lamps are connected now?

..... (1)

e State two advantages of connecting lamps in this way:

..... (1)

..... (1)

f Draw on the diagram a switch which would allow Dan to switch on lamp A only. (1)

g Where in the house would you find lamps connected in this way?

..... (1)

2 The amount of electric current in a circuit changes as the following things change. Fill in the gaps using the words **higher** or **lower**.

a The more cells in a circuit, the ..... the current. (1)

b The more bulbs in a circuit, the ..... the current. (1)

c When two bulbs are connected in parallel the current is ..... than when the bulbs are connected in series. (1)

A piece of wire can be placed in a circuit to alter the current.

d The longer the wire, the ..... the current. (1)

e The thicker the resistance wire, the ..... the current. (1)

f The hotter the resistance wire, the ..... the current. (1)

g The current passing through a nichrome wire is ..... than the current passing through a copper wire. (1)

h A nichrome wire has a ..... resistance than a copper wire. (1)

Total marks = 17