Magnetism and Electromagnetism 2

1.

Fig. 3.1 shows a vertical wire through a horizontal piece of card. There is a current down the wire.

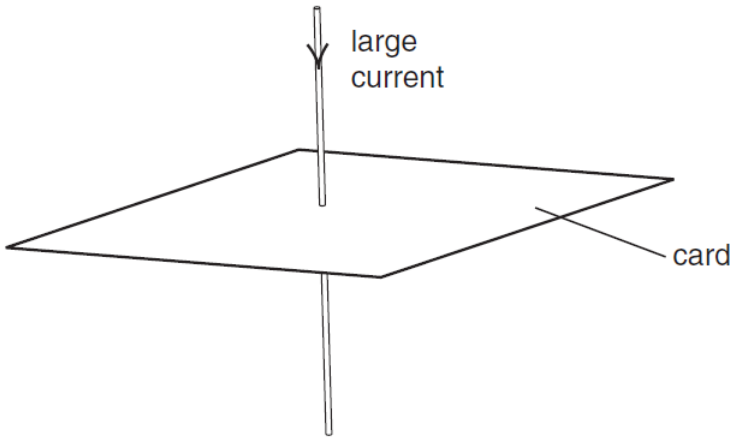


Fig. 3.1

Fig. 3.2 shows the wire and card, viewed from above.

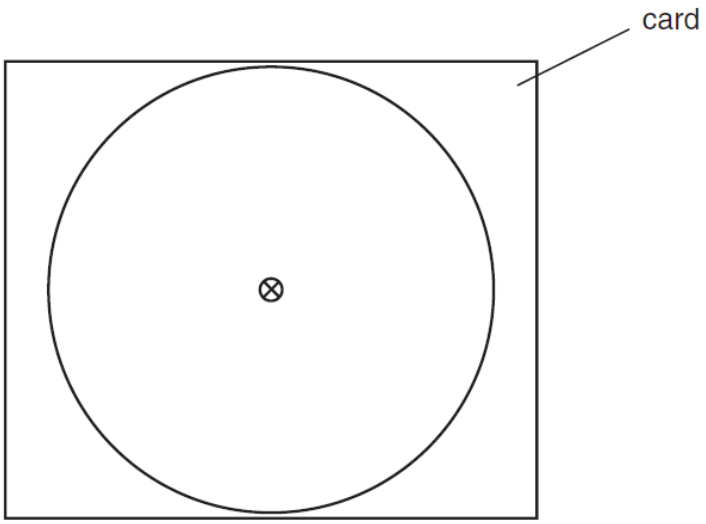


Fig. 3.2

The large circle is one of the magnetic field lines caused by the current.

On Fig. 3.2,

(a) show the direction of the magnetic field, [1]

(b) carefully draw **three** more magnetic field lines. [2]

2

A permanent magnet is placed close to a bar of soft iron PQ.

What happens?

A P becomes a north pole.

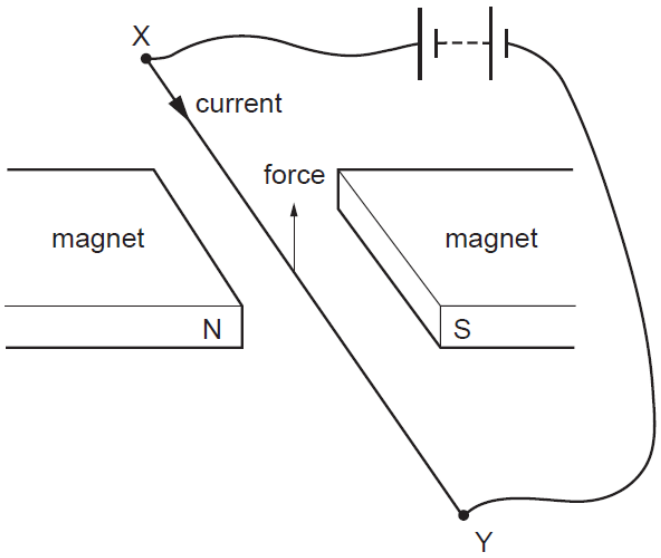
B P becomes a south pole.

C PQ does not become magnetised.

D The poles of the magnet are reversed.

3

When the electric current in wire XY is in the direction shown, there is an upward force on the wire.



If the north and south poles of the magnet exchange positions, in which direction will the force on the wire act?

A downwards

B upwards

C to the left

D to the right

(a) The apparatus shown in Fig. 10.1 can be used to indicate when there is a force on the copper rod.

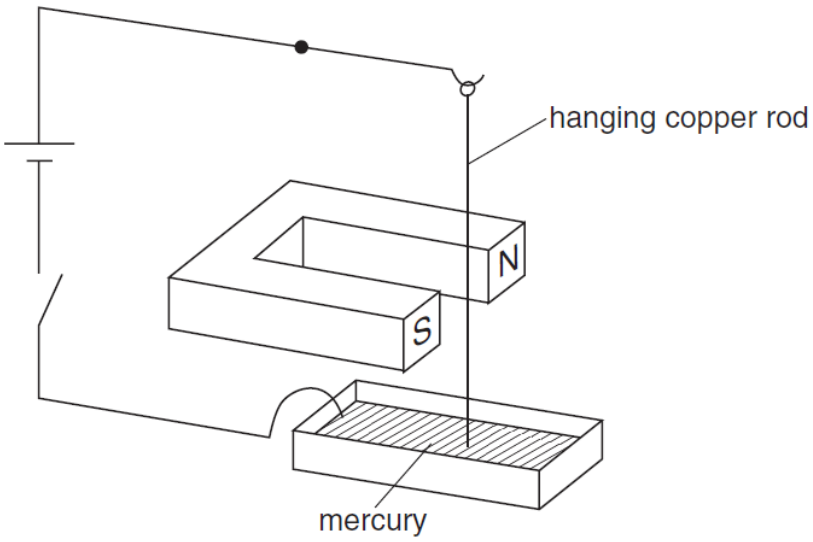


Fig. 10.1

(i) Suggest what is seen to happen to the hanging copper rod when the switch is closed.

.....

.....

(ii) Explain your answer.

.....

.....

(iii) The cell is reversed and the switch closed.

How does what is seen now differ from what you described in **(a)(i)**?

.....

[4]

(b) Fig. 10.2 represents a d.c. motor.

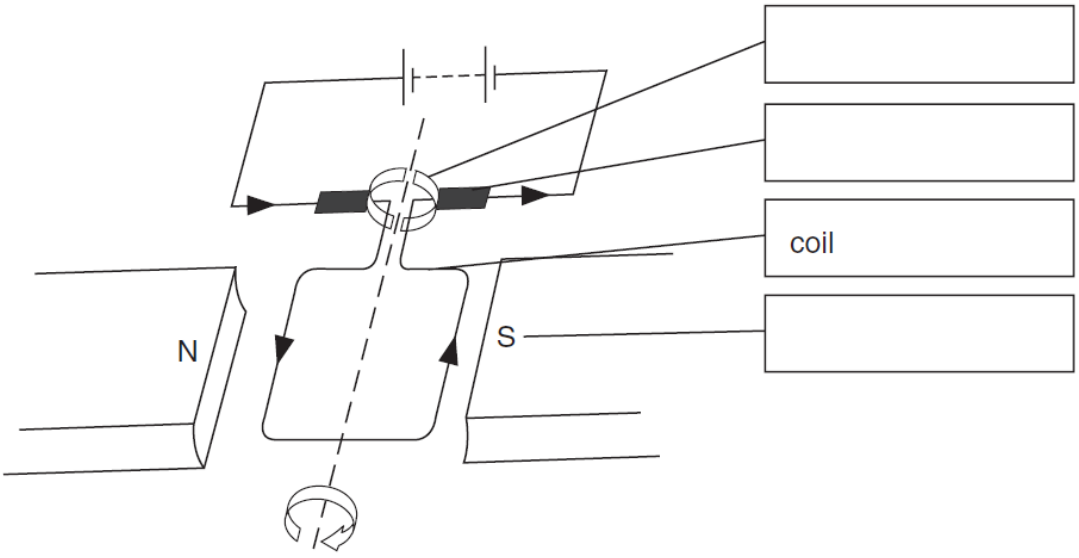


Fig. 10.2

(i) In the boxes, label the various parts of the motor. One part has been labelled as an example.

(ii) Which part of the motor ensures that the coil keeps rotating when the battery is connected?

.....

(iii) The battery is reversed. What difference does this make to the motor?

.....

[5]

5.

Fig. 8.1 shows a long straight wire between the poles of a permanent magnet.
It is connected through a switch to a battery so that, when the switch is closed, there is a steady current in the wire.

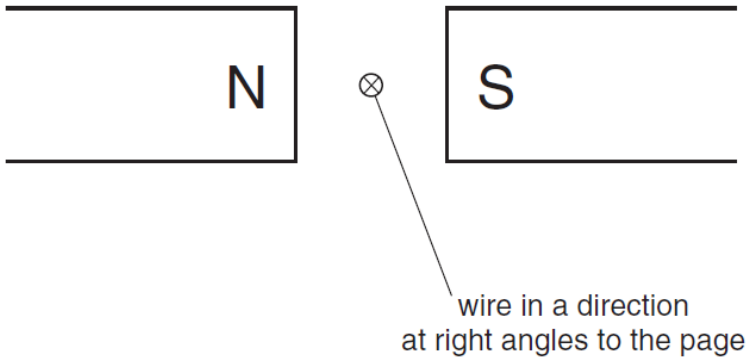


Fig. 8.1

(a) State the direction of the magnetic field between the poles of the magnet.

.....[1]

(b) The wire is free to move. The current is switched on so that its direction is into the page.

(i) State the direction of movement of the wire.

.....

.....

(ii) Explain how you reached your answer to **(b)(i)**.

.....

.....

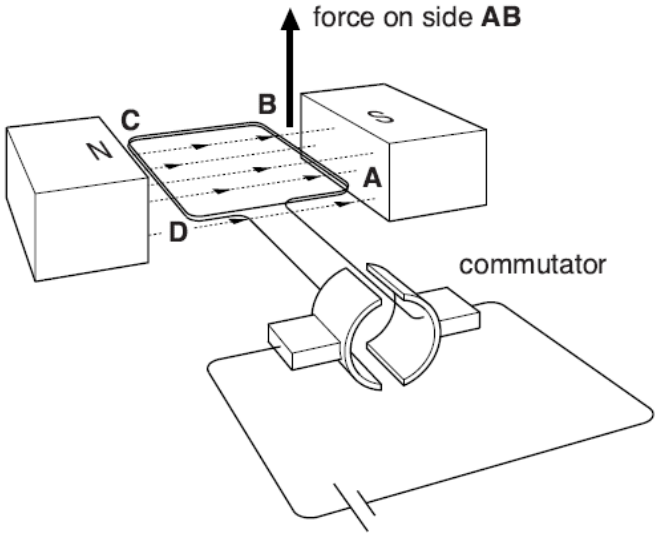
.....

[4]

6.

Lots of devices use an electric motor.

The diagram shows the main features of a motor.



(a) The arrow on the diagram shows the force acting on side **AB** when a current flows in the coil.

(i) Draw another arrow **on the diagram** showing the force on side **CD**. **[1]**

(ii) Why are there forces on sides **AB** and **CD**?

.....

.....

..... **[2]**

(b) Explain the function of the commutator in this motor.

.....

.....

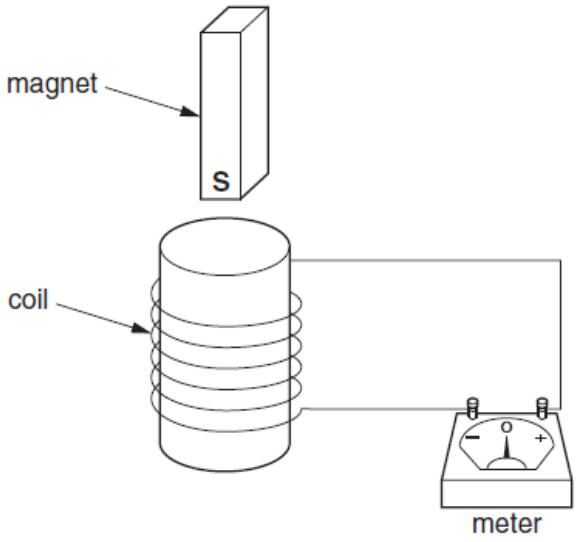
.....

..... **[3]**

7.

Electricity can be generated by moving a magnet in a coil of wire.

The diagram shows a magnet held above a coil of wire.



experiment	what happens on the meter
push the South end of the magnet into the coil	needle flicks to right
pull the South end of the magnet out of the coil	needle does not move
push the North end of the magnet into the coil	needle flicks to left
hold the magnet still in the coil	

[3]

(b) What is the name for this method of producing a voltage?

Put a (ring) around the correct answer.

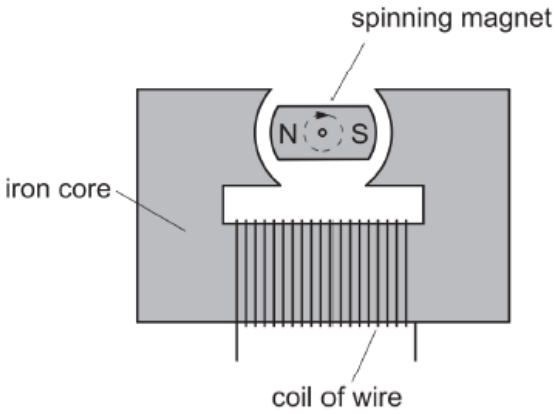
deduction **induction** **reduction** **transformation**

[1]

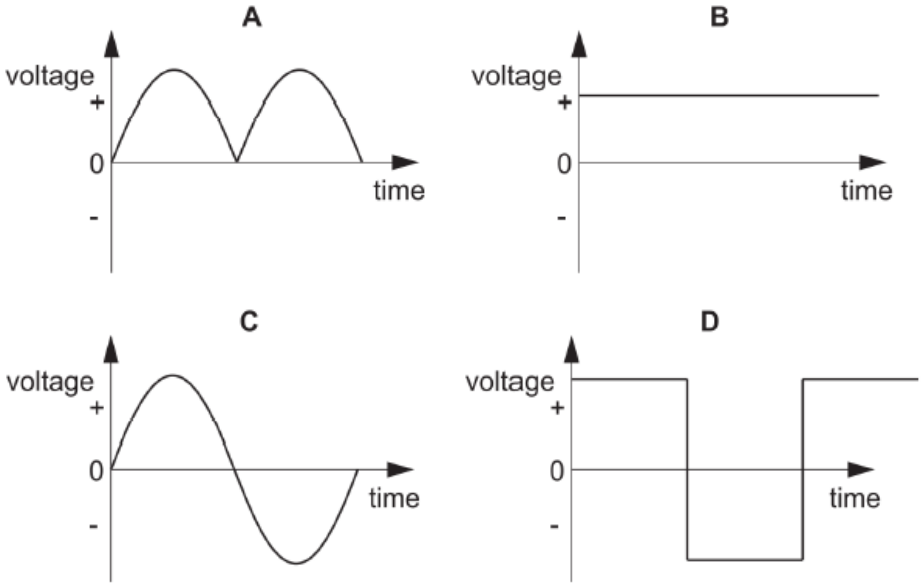
[Total: 4]

8.

Power stations generate electricity by spinning magnets close to a coil of wire.



(a) Here are some voltage-time graphs for the voltage across the coil of wire as the magnet spins round.



(i) Which **one** graph, **A**, **B**, **C** or **D**, is correct?

answer ..... [1]

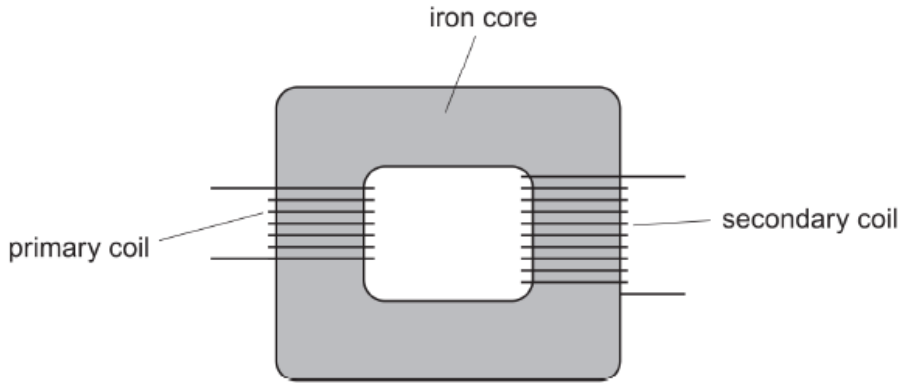
(ii) What is the name for the current produced by this generator?

Put a (ring) around the correct answer.

alternating **circular** **direct** **revolving**

[1]

(b) Electricity from a power station is transferred to the National Grid through a transformer.



(i) Complete the sentences. Choose words from this list.

charge **current** **efficiency** **power** **safety** **speed** **voltage**

A transformer increases the ..... of the electricity from the power station.

This increases the ..... of energy transfer from the power station to the consumers. [2]

(ii) These sentences describe how a transformer operates.
They are in the wrong order.

A The current in the primary coil changes.

B The magnetic field in the core changes.

C The voltage across the primary coil changes.

D A voltage is induced across the secondary coil.

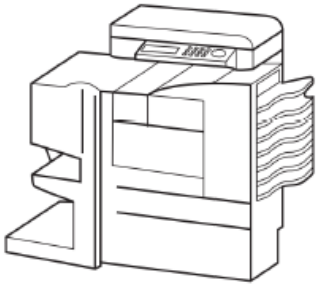
Fill in the boxes to show the correct order. The first one has been done for you.

C			

[1]

[Total: 5]

9.



Photocopiers usually plug into the mains electrical supply.

But the internal workings need a variety of different voltages.

Transformers are used to change the voltages.

(a) Which of the following statements describe how a transformer works?

Put ticks (✓) in the **three** boxes next to the best answers.

A moving magnet induces a voltage in a coil of wire.	☐
Two separate coils of wire are wound around an iron core.	☐
A changing magnetic field is produced by a changing electric current.	☐
An iron core is a good conductor of electric current.	☐
A changing magnetic field induces a voltage in a coil of wire.	☐
The voltage is changed by the transformer but the electric current stays the same.	☐

[3]

(b) One transformer in a photocopier is used to produce 6000V from 600V.

The transformer has 100 coils on the 600V side.

(i) How many coils will the transformer have on the 6000V side?

Put a (ring) around the correct answer.

10 **600** **1000** **6000** **10 000**

[1]

(ii) Which formula would allow you to correctly calculate the number of coils?

Put ticks (✓) in the box next to the correct answers.

$N_s = \frac{V_p}{V_s} + N_p$ ☐

$N_s = N_P \frac{V_p}{V_s}$ ☐

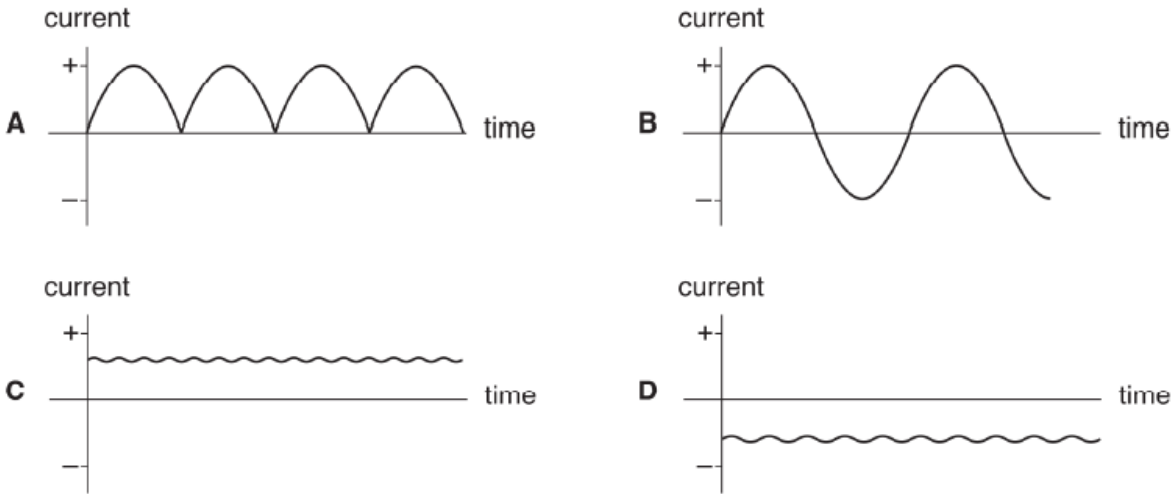
$N_s = N_P \frac{V_s}{V_p}$ ☐

$N_s = N_P + \frac{V_s}{V_p}$ ☐

[1]

(c) The alternating current from the transformer is converted into a direct current.

The graphs show how different currents change with time.



Which of the graphs **A**, **B**, **C** and **D**, show direct current?

Write down the letters of the graphs.

graphs ..... **[2]**

[Total: 7]

10.

A generator is made using a magnet which spins near a coil of wire.

The generator produces a changing voltage.

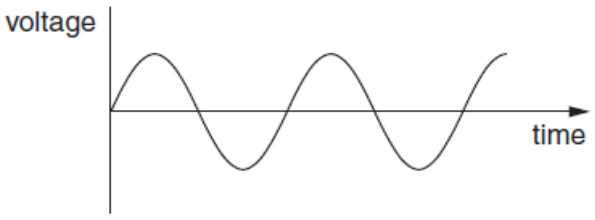
(a) **(i)** Which of the following words best describes this process?

Put a (ring) around the correct answer.

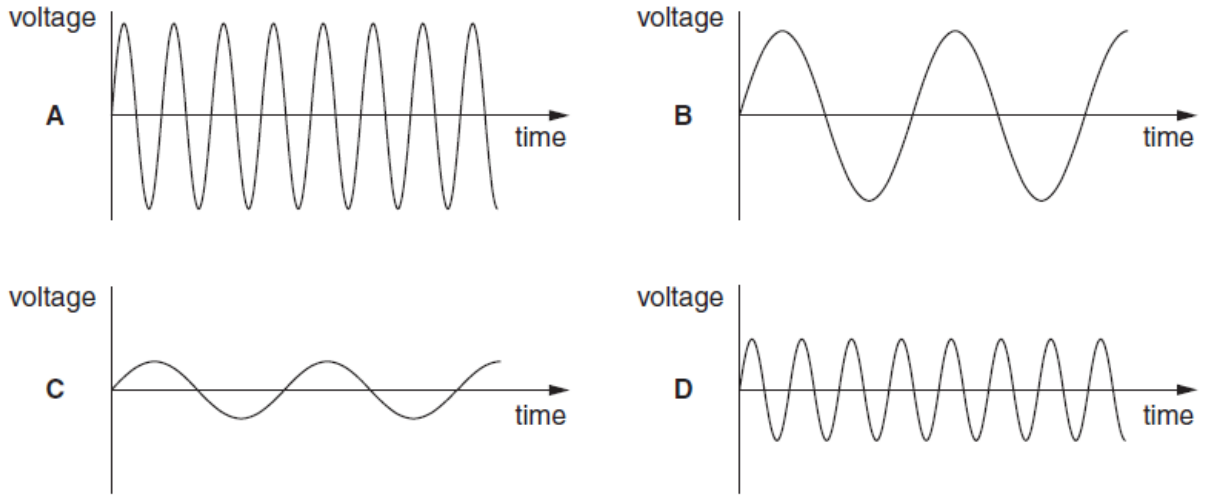
deduction **formation** **induction** **reduction** **transformation**

[1]

(ii) The graph shows how the voltage produced by the generator changes with time when the magnet spins at a particular speed.



The following graphs all have the same scales as the graph above.

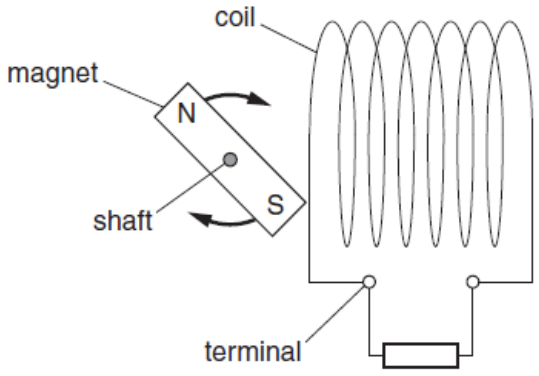


If all other factors are kept the same, complete the table with the letter of the graph that shows what would happen for each of the changes.
Each letter can be used once, more than once, or not at all.

A weaker magnet is used.	
The number of coils in the wire is increased.	
An iron core is put in the middle of the coil of wire.	
The magnet is spun faster.	

[4]

(b) A current flows in the circuit when a resistor is connected across the terminals of the generator coil.



Use the words in the list to complete the sentences describing the current.

negative

opposite

positive

potential difference

resistance

same

As the ..... increases there is a greater current in the resistor.

The current is made up of many electrons moving in the ..... direction.

As the voltage changes direction, the electrons move in the ..... direction.

The ..... electrons are always attracted to the ..... terminal of the generator coil.

[3]