



# Physics

## 7. Magnetism and Electromagnetism

### Revisiting Booklet

Name:

# Magnetism and Electromagnetism

## Topics:

- Poles of a magnet
- Magnetic fields
- Electromagnetism
- Flemings left hand rule (HT only)
- Electric motors (HT only)
- Loudspeakers (HT only) (Triple only)
- Induced potential (HT only)
- Uses of the generator effect (HT only)
- Microphones (HT only)
- Transformers (HT only)

# Poles of a Magnet

## Define a permanent magnet

A material that is \_\_\_\_\_ magnetic, making its own \_\_\_\_\_ force.

## Define an induced magnet

When close to a \_\_\_\_\_ the material acts like a magnet  
When the magnet leaves, the material is not \_\_\_\_\_  
any more

## Define the pole of a magnet

A pole of a magnet is where the magnetic field is \_\_\_\_\_

**Complete the table to show the observations that would be made if the poles of two magnets were brought together**

	North	South
North		
South		Repel

## Magnetic fields

Define a magnetic field using the keywords:

**Region, magnetic materials, wires, currents, force.**

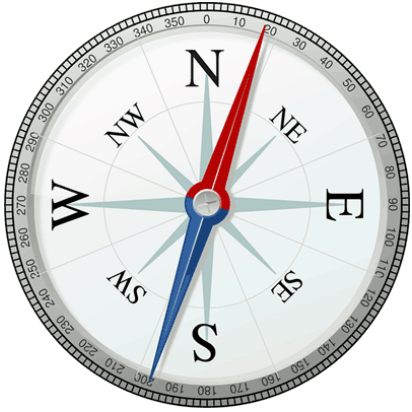
Draw the magnetic field lines around the magnet below.

Annotate:

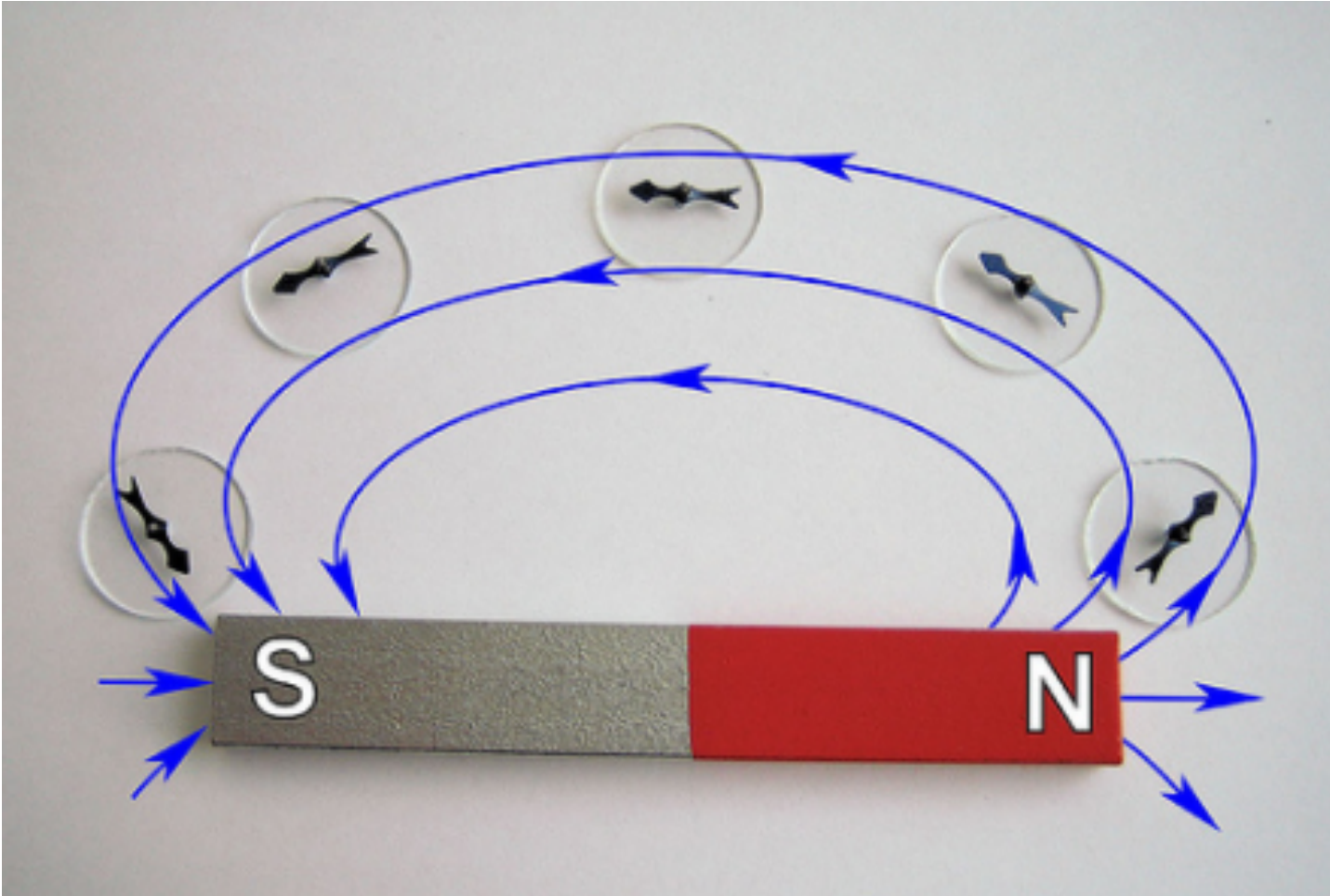
- The poles
- The direction of the field
- The strongest parts of the field



Describe how a compass works



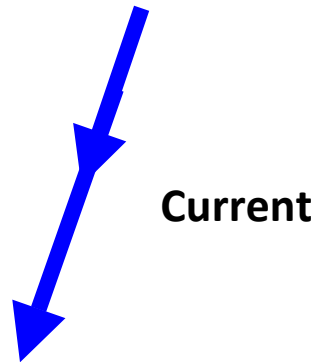
Using the image describe how a compass can be used to draw the field lines of a bar magnet



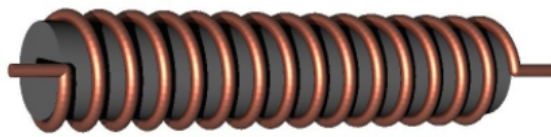
# Electromagnetism

A magnetic field is produced by current flowing through a wire. Draw the field lines around a single wire and a wire wrapped in a coil around a cored to form a solenoid.

## Current carrying wire

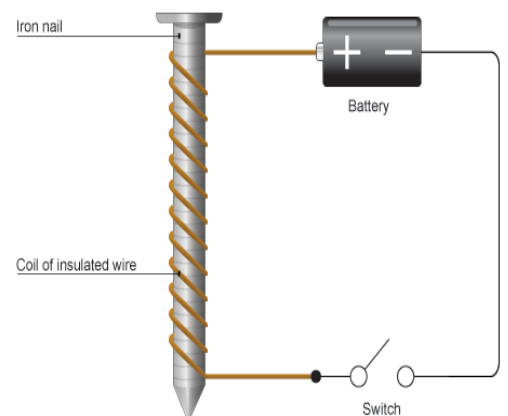


## Solenoid



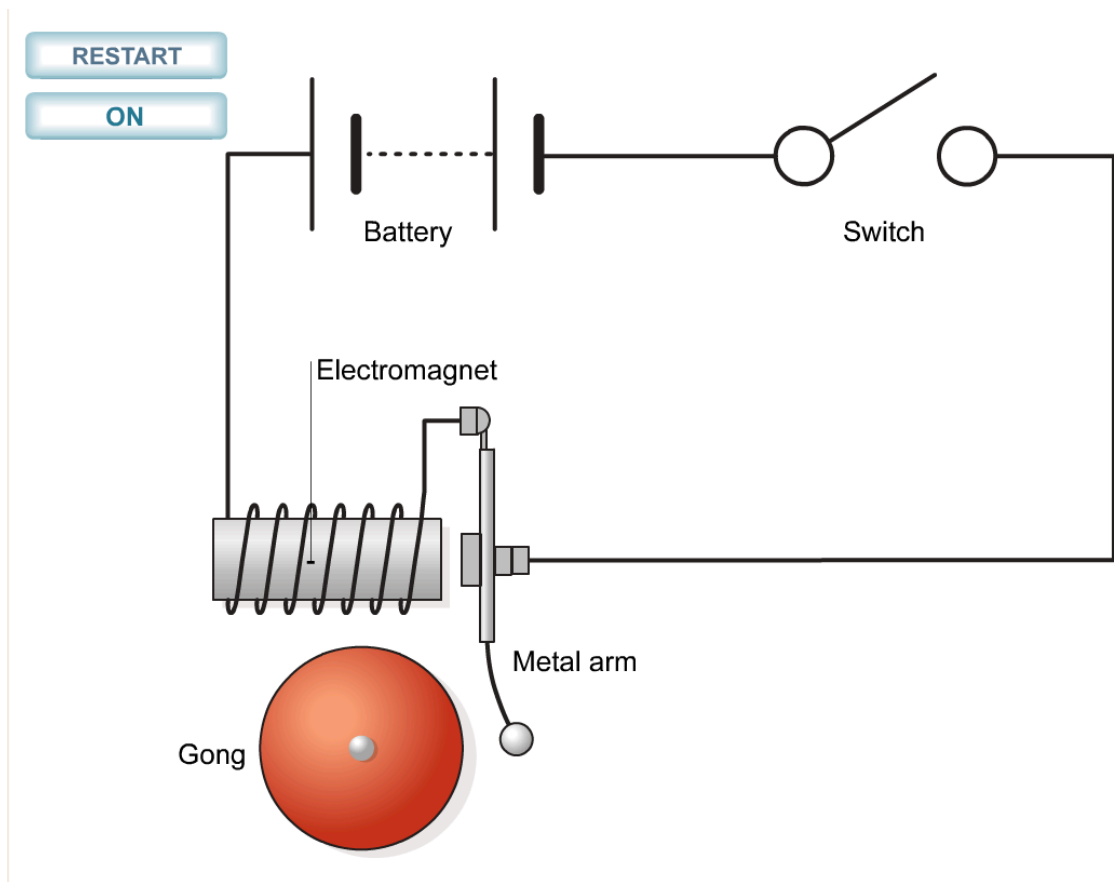
## Demonstration of Electromagnetism

Using the image describe how electromagnetism can be demonstrated. State 3 factors that would change the strength of the magnetic field



**(Triple only) You will be shown circuits with electromagnets and asked to explain how they work**

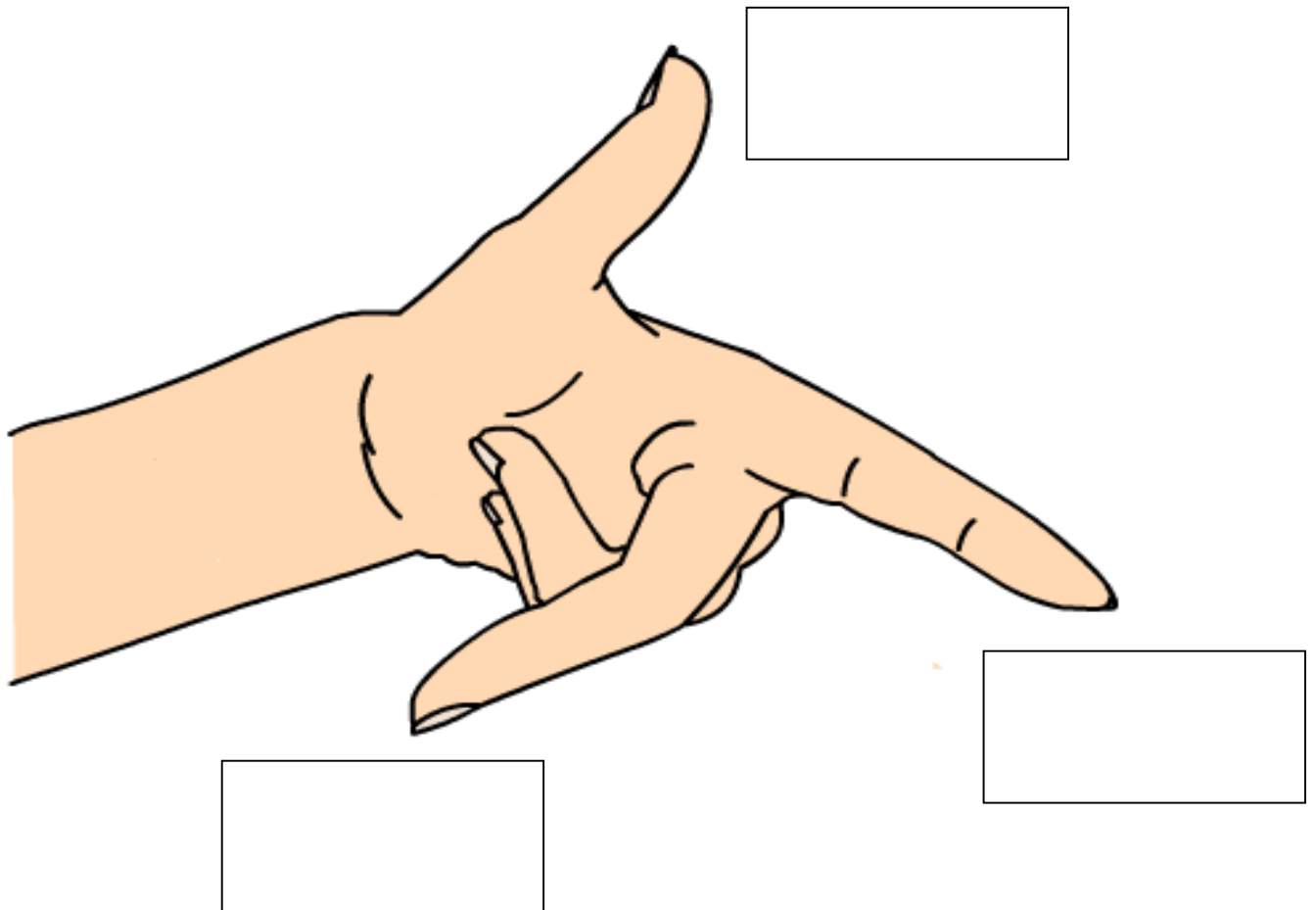
Look at the picture below. Explain how electromagnetism is used to make the bell ring



A large empty rectangular box provided for the student to write their explanation of how electromagnetism is used to make the bell ring.

## FLHR (HT ONLY)

Describe how the direction of force from a magnetic field can be ascertained using Fleming's left hand rule. Label the hand below (4 points to cover)

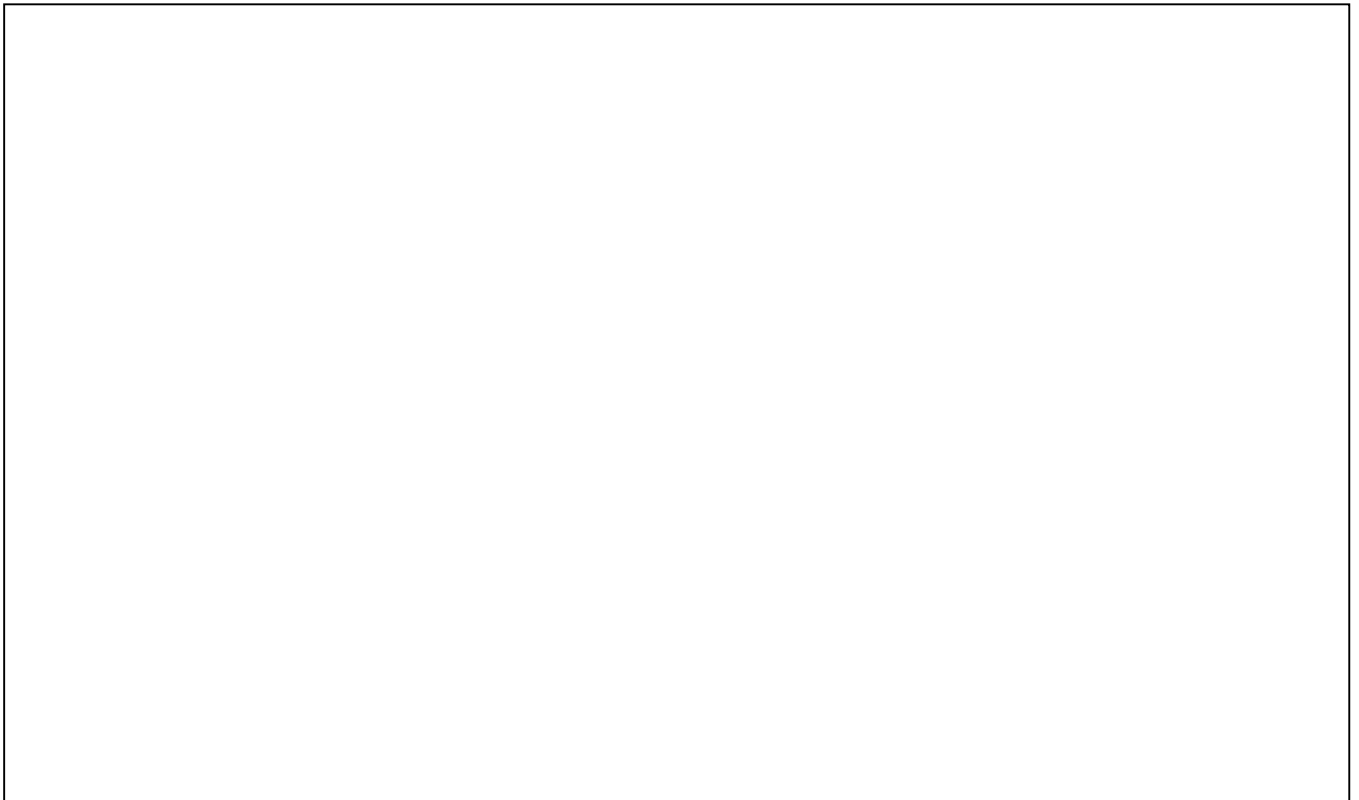




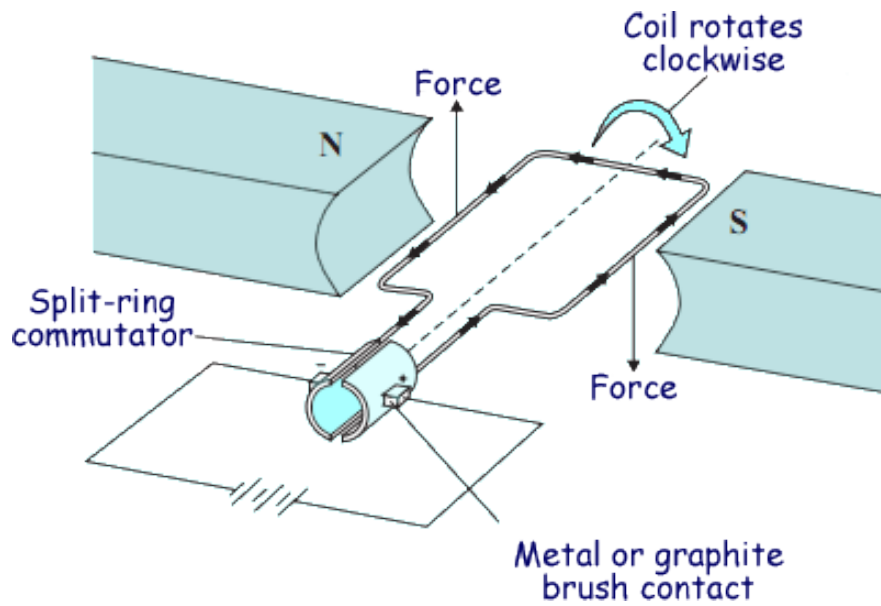
State the three factors that affect the force acting on a conductor in a magnetic field

- 1)
- 2)
- 3)

Combine these equations to create an equation for the force acting on a conductor in a magnetic field. Define all quantities and state the units for each.

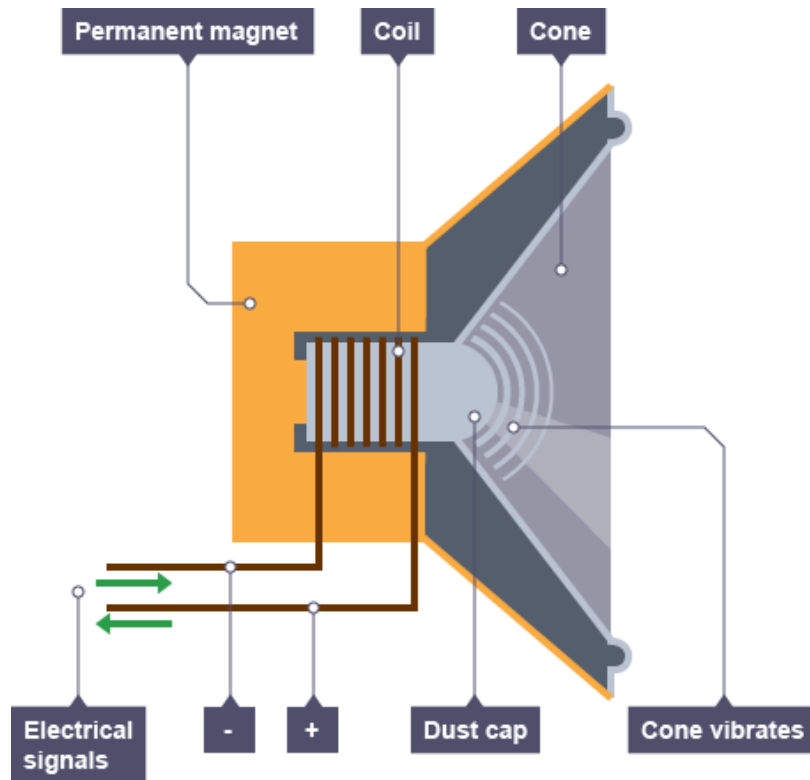


## Electric Motors (HT ONLY)



Using the diagram above explain how a magnetic field is used to cause a current carrying wire to spin

## Loudspeakers (HT ONLY)



Using the diagram above explain how a magnetic field is used in a loudspeaker

## Induced Potential (HT ONLY)

If an electrical conductor moves \_\_\_\_\_ to a magnetic field or if there is a change in the magnetic field around a \_\_\_\_\_, a \_\_\_\_\_ is induced across the ends of the conductor. If the conductor is part of a \_\_\_\_\_ circuit, a current is induced in the conductor. This is called the \_\_\_\_\_.

An induced current generates a \_\_\_\_\_ that opposes the original change, either the movement of the conductor or the change in magnetic field.

### **Conductor, Potential difference, Complete Relative, Magnetic Field Generator effect**

1. Using the fill in the gaps state the two ways a potential difference can be induced across the ends of a conductor

1.

2.

2. What two factors will affect the size of the induced P.d?

1.

2.

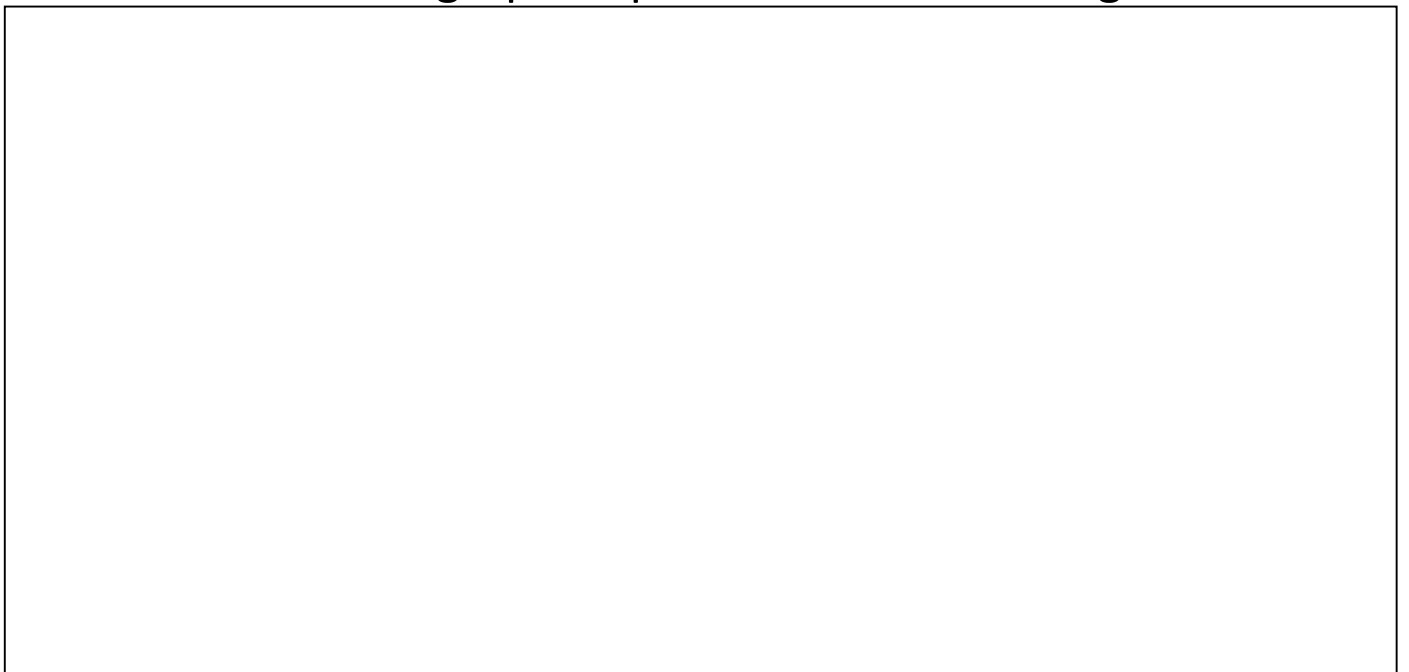
3. What will happen to the direction of the current if the direction of the magnetic field is reversed?

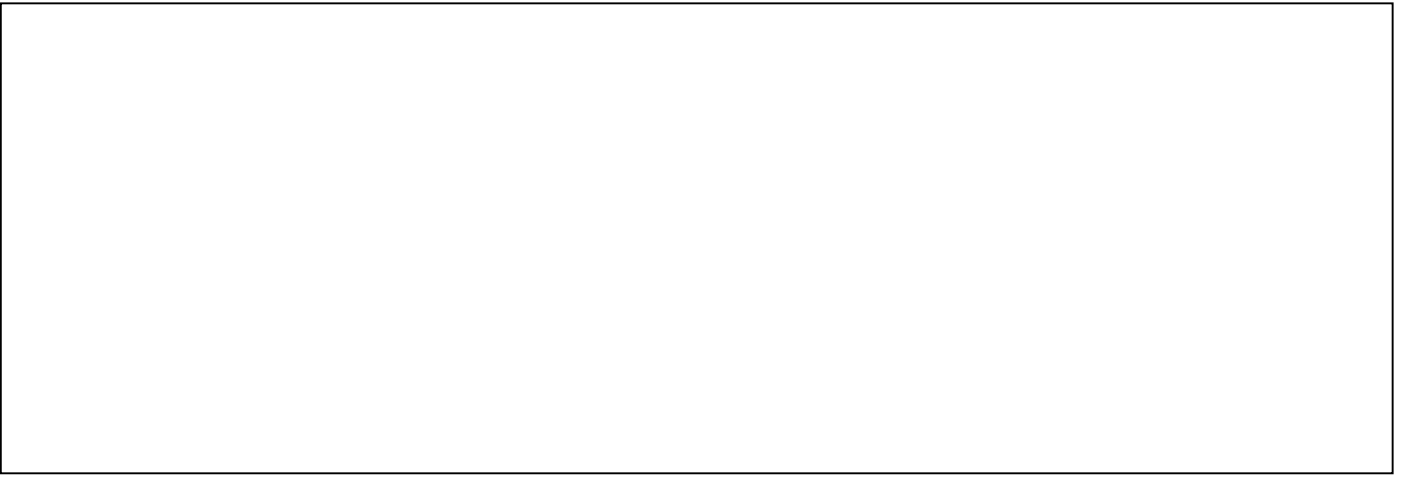
4. Describe one situation involving the generator effect. Draw a diagram in your answer

### **Uses of the generator effect (HT only)**

Read pg 305 of the GCSE AQA textbook

1) Draw a diagram and explain how an alternator works. For each sketch a graph of potential difference against time.

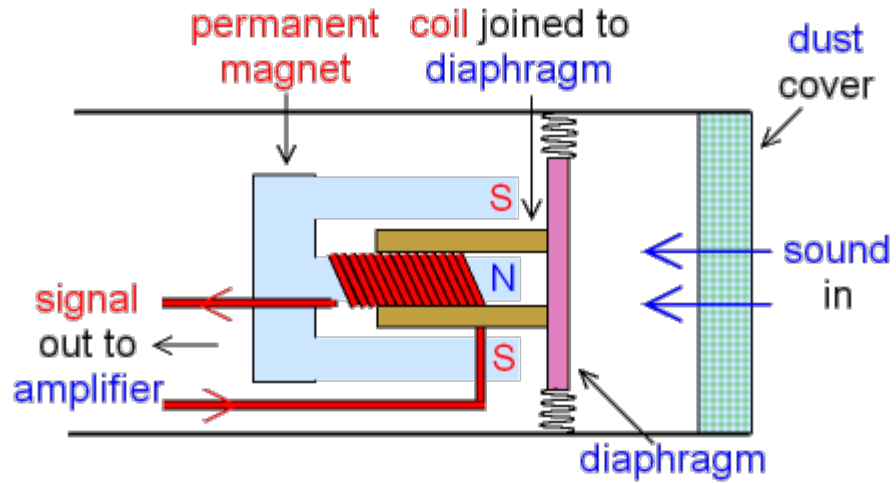




2) Draw a diagram and explain how a dynamo works



# Microphones



Using the diagram above explain how a magnetic field is used in a microphone.

# Transformers

1) State the function of a transformer

2) What material is a transformer usually made from and why?

3) The following equation is given in the physics data sheet. Define what is meant by each term used.

$$\left[ \frac{V_p}{V_s} = \frac{N_p}{N_s} \right]$$

4) What is the ratio of  $V_p$  to  $V_s$  for

a) A step up transformer

b) A step down transformer

5) The following equation is given in the physics data sheet. Define what is meant by each term used.

$$V_s \times I_s = V_p \times I_p$$



6) What quantity is given by potential difference  $\times$  current?

7) Use the above equation to explain why electricity transmitted over large distances is given a higher potential difference by a step up transformer.