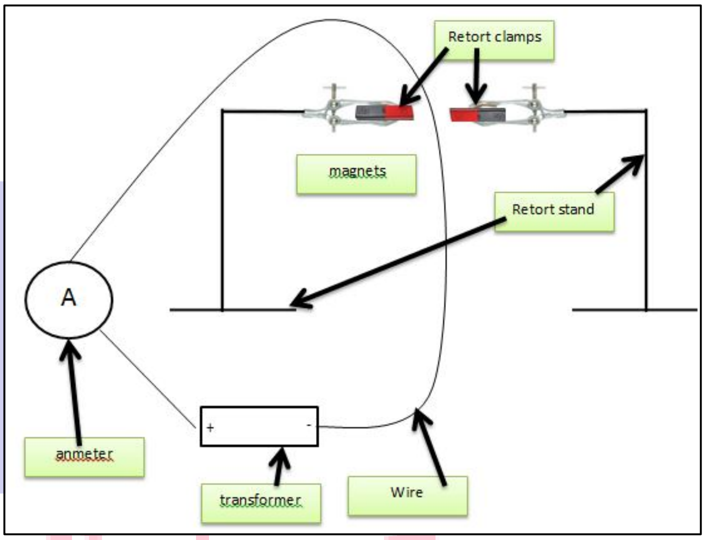
perform a first-hand investigation to demonstrate the motor effect.

- Aim
    - to demonstrate the motor effect.

- Equipment
    - 2 strong magnets
    - 2 Retort stands
    - 1 Transformer
    - 2 Clamps
    - 1 anmeter

- **Methods (chose either)**
- **Method 1**
    - Clamp two strong bar magnets horizontally with opposite poles no more than a centimetre apart using clamps.
    - Suspend a wire vertically through the space between the magnets, so that its lower end is free to move.
    - Connect the ends of the wire to a DC power supply with light, flexible leads that allow the wire to move. Switch the current on briefly, then off, observing any movement of the suspended wire. Any movement of the wire would demonstrate the motor effect.
    - Experiment with various voltage settings on the power supply, the direction of the magnetic field and the direction of the current in the wire. You could use electromagnets, instead of permanent magnets. Systematically observe and record the effects of any changes you make to the variables in the procedure.



- **Method 2**
    - Set up the equipment as on the right.
    - Turn on the transformer
    - Increase the current and observe
- Results

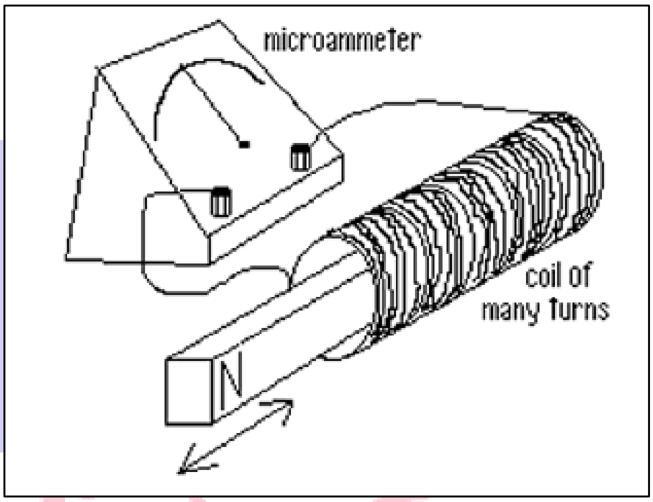
Action – variation in	**Observations**
The strength of the magnetic field	Increased
The magnitude of the current in the conductor	Increased
The length of the conductor in the external magnetic field	Increased
The angle between the direction of the external magnetic field and the direction of the length of the conductor	Reduced.

- Conclusion
    1. **The** motor effect was successfully demonstrated. The strength, orientation, magnitude and length of the conductor effects the magnetic field strength

perform an investigation to model the generation of an electric current by moving a magnet in a coil or a coil near a magnet.

- **Aim**
  - To model the generation of an electric current by moving a magnet in a coil or a coil near a magnet.

- **Equipment**:
  - Multitap coils
  - 2 bar magnets
  - Microanmeter



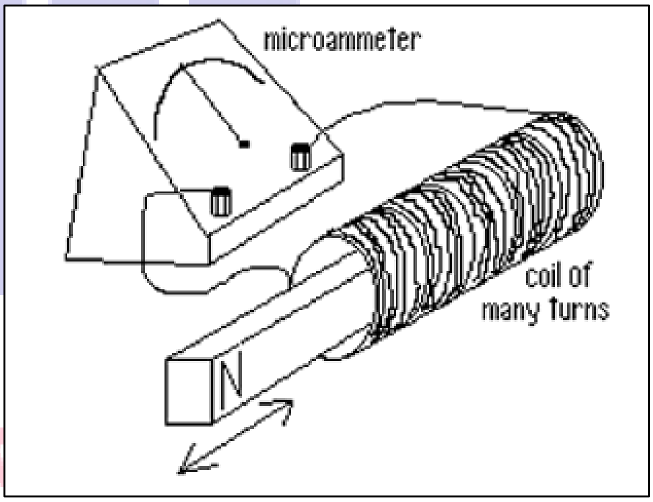
- **Method**
  1. Connect an solenoid coil to a centre-reading galvanometer graduated in microamperes (µA). The coil should have a large number of turns or loops of fine wire, around 300–500, and have space to fit a bar magnet through it.
  2. Move an magnet inside the coil and observe any movement of the galvanometer needle. A reading on the galvanometer demonstrates that an electric current has been generated.

plan, chose equipment or resources for, and perform a first-hand investigation to predict and verify the effect on a generated electric current when:

- **the distance between the coil and magnet is varied**
- **the strength of the magnet is varied**
- **the relative motion between the coil and the magnet is varied**

- **Aim**
    - To identify the factors that affect an current on an generator

- **Equipment**:
    - Solanoids (300 coils and 500 coils)
    - 2 bar magnets
    - Microanmeter



- **Method**
    1. Connect a solenoid coil to a centre-reading galvanometer graduated in microamperes (μA). The coil should have a large number of turns or loops of fine wire, around 300–500, and have space to fit a bar magnet through it.
    2. Move a magnet inside the coil and observe any movement of the galvanometer needle. A reading on the galvanometer demonstrates that an electric current has been generated.
    3. Test the different factors by
        - Moving the magnet at different speeds for 1 solenoid
        - Adding 1 or 2 more magnets
        - Changing the solenoid, with one that has more number of turns

- **Results**

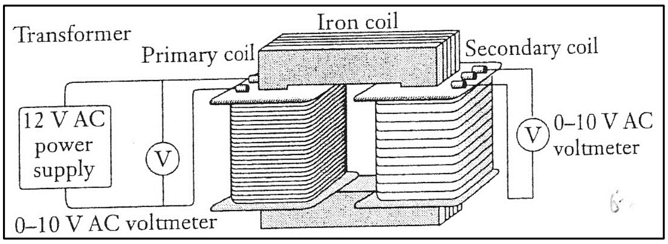
Inducing currents		
What we vary	**size**	**Current induced (μA)**
What we move	Move magnet	600
	Move coil	600
Number of turns	Large	800
	Medium	600
	Small	500
Speed of magnet	Fast	650
	Medium	720
	Slow	900
Number of magnets	1	600
	2	1200

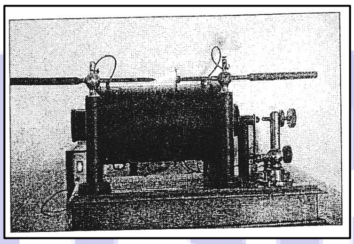
- **Conclusion**
    - The factors that affect an current on an generator were successfully investigated. The number of magnets affected the current the most.

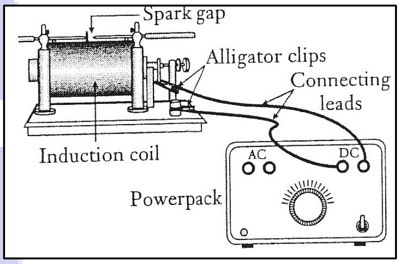
-

perform an investigation to model the structure of a transformer to demonstrate how secondary voltage is produced

- **Aim**
  - To demonstrate that a secondary voltage is produced by a transformer and an induction coil.
- **Equipment**
  - Model transformer
  - Iron core
  - AC and DC meters
  - Induction coil
  - Power pack
  - Leads
- **Method**
  1. Use a model transformer to compare the input voltage with the output voltage by using both AC and DC as shown.
  2. Switch the primary and secondary coil around and observe the voltage.
  3. Connect up the induction pack as shown below.







- **Results**

Primary coil (No. turns)	Secondary coil (No. turns)	Primary coil (Voltage)	Secondary coil (voltage
300	600	6	12
600	300	6	3

- **Discussion**
  - What happens to the voltage with step up transformers? What happens to the current? **The current is reduced. The voltage is stepped up.**
  - How would you change a step up transformer to a step down transformer? **The coil with more turns ins made the primary and the coil with less turns is made the secondary coil.**
  - How would you classify an induction coil as a step up or step down transformer? Justify your answer. **Induction coils are step up transformers. The secondary coil has a higher amount of turns. The voltage needs to be stepped up large enough in order for a spark to be induced.**
  - What is the effort of removing the iron core? Explain why this happens? **This reduces the flux density as the amount of current induced is less. The eddy currents are stronger as there is more resistance on the transformer.**
- **Conclusion**
  - It was demonstrated that a secondary voltage is produced by a transformer and an induction coil. When the primary coil was larger, a lower voltage was recorded.