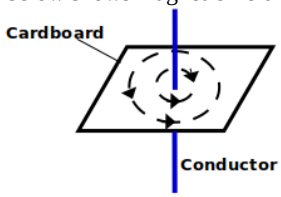
# 6. MAGNETIC EFFECT OF AN ELECTRIC CURRENT

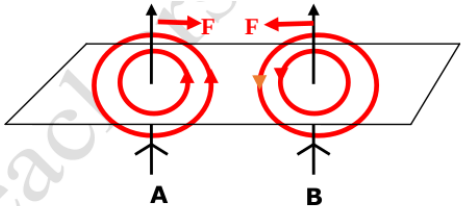
The force on a conductor carrying a current in a magnetic field can be varied by changing, among others, the magnetic field strength and the magnitude of the current. Name two other factors that can cause the force to vary.

1. State the motor rule.
2. Give a reason why a soft iron is used as a core of the coil of an electric bell..
3. The figure below shows magnetic field around a current carrying conductor.




Indicate on the diagram the direction of the current

4. The figure below shows two conducting wires A and B passing through a horizontal piece of card board.

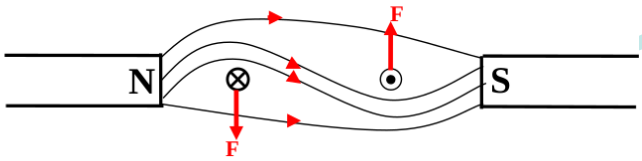



**(i)** Sketch the resultant magnetic field patterns when the current flow in both wires in the direction shown

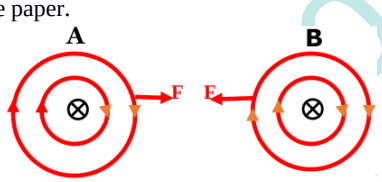
**(ii)** Show the direction of the force existing between the two wires on the diagram.

**(iii)** If the current in B were to be reversed, **state how** resulting would affect the wire conductors.

5. Sketch the resultant field pattern around the following current carrying conductors and show the direction of the forces acting on the conductor.




6. The figure below shows two parallel current- carrying conductors A and B placed close to each other. The direction of the current is into the plane of the paper.




(i) Sketch the magnetic field pattern

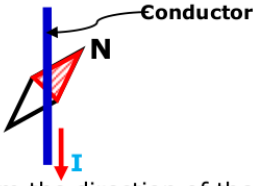
(ii) indicate the force F due to the current on each conductor

7. The figure below shows two parallel current- carrying conductors A and B placed close to each other. The direction of the current is as shown.


(iii) Sketch the magnetic field pattern

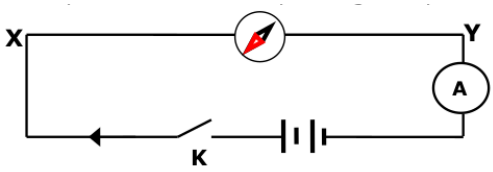
(iv) indicate the force **F** due to the current on each conductor

8. A compass needle is placed below a current carrying conductor as shown below.




Indicate on the diagram the direction of the current.

9. Figure represents a long horizontal insulated wire XY connected in an electric circuit. The circle represents where a plotting compass is placed on the wire.

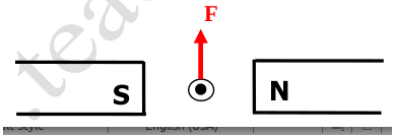



(i) In the circle put an arrow to show the direction the N pole of the compass will deflect when switch k. is closed.
(ii) State two changes which can be made in the circuit to increase the deflection.

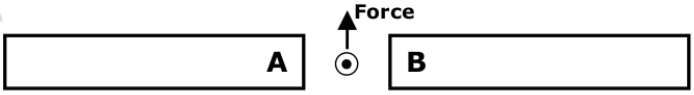
10. Show the direction of the magnetic field in the conductor carrying current shown below.

11. The figure below shows a wire in a magnetic field. A current is switched on to flow through the wire in the direction shown. State the direction of motion of the wire.


12. The above conductor was placed in a magnetic field. Show the direction of the force on the conductor.

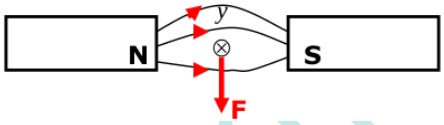



13. The figure shows a current – carrying conductor in a magnetic field direction of force on the wire is as shown by the arrow.



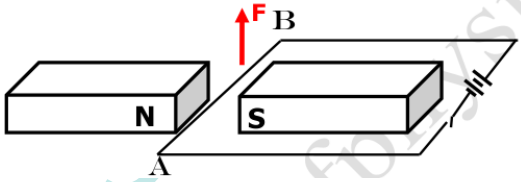

State the polarities of A and B.

14. Fig below shows a conductor y placed in a magnetic field. The conductor carries a current flowing into the paper.



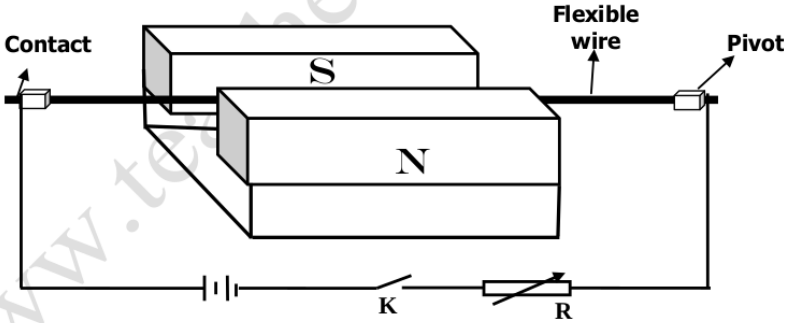

(i) Sketch the resultant magnetic field between the poles of the bar-magnet.
(ii) Show on the diagram the direction of the force, F acting on the conductor

15. The diagram in figure below shows a wire placed between the poles of two bar magnets



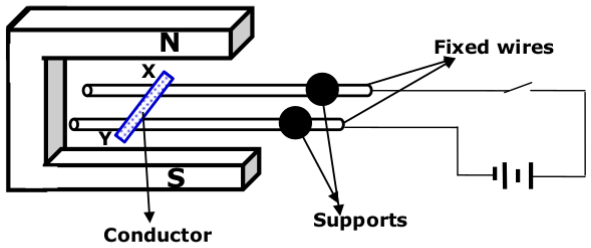

Indicate with an arrow the force that acts on the section AB of the wire.

16. The diagram in the figure below shows a flexible wire in a magnetic field.




(v) Explain the behaviour of the wire when the switch K is turned on
(vi) What is the behaviour of the wire if R is reduced?

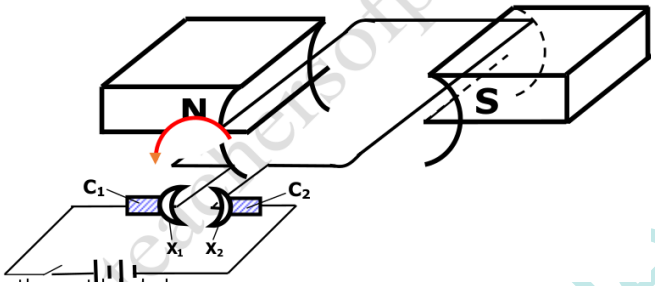
17. An un-insulated copper conductor **XY** lies over the fixed wire connected to a battery.




(i) State and explain the observation made on the conductor **XY** when the switch is closed.
(ii) In which direction does the wire **XY**- experience the force?
(iii) How do you determine the direction in (i) above
(iv) When is the force on the wire **XY** greatest?
(v) What is the effect of reversing both the magnetic field and direction of flow of current?
(vi) State TWO factors by which the force on **XY** can be increased.
(vii) Name an instrument which uses this effect

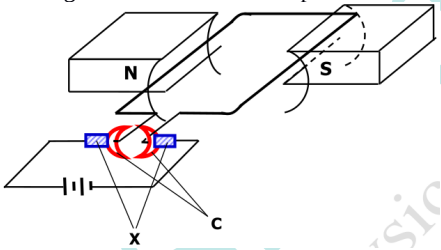
## APPLICATION

1. The coil of an electric motor is usually wound on soft iron armature. State two purposes served by this armature
2. State **two** ways in which the speed of rotation of a motor can be increased
3. Give TWO practical applications of an electromagnet
4. The diagram below shows a simple electric motor.



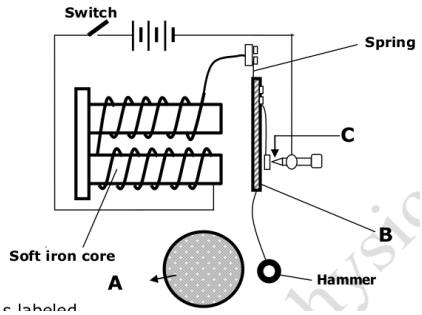

**(a)** Name the part labeled
**(i)** **X** $_1$ and **X**$_2$ state their functions.
**(ii)** **C** $_1$ and **C** $_2$ state their functions.
**(b)** What can be done to increase the speed of rotation of the motor?.
**(c)** Explain what would happen if the armature is made of steel
**(d)** By use of an arrow, show the direction in which the coil will rotate when the switch is closed.

5. The diagram below shows a simple electric motor.




**(a)** Name the parts labeled X and C
**(b)** Explain how the motor works
**(c)** In which direction will the coil rotate when the switch is closed.
**(d)** What can be done to increase the speed of rotation of the motor?

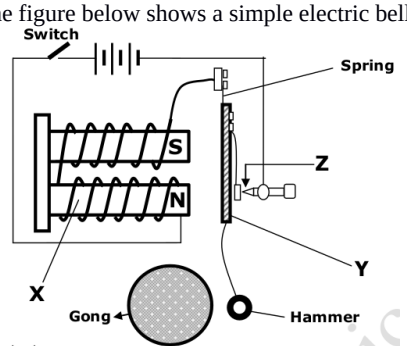
6. The figure below shows a simple electric bell circuit




i) Name the parts labeled A, B and C
ii) Describe how the electric bell works

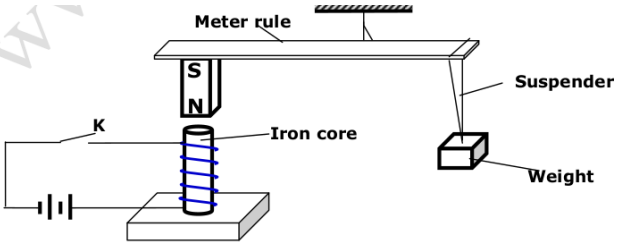
iii) State and explain what would happen if the armature is made of steel metal.
iv) What adjustment should be done to the system to make it operate effectively with a lower voltage battery?

7. The figure below shows a simple electric bell circuit



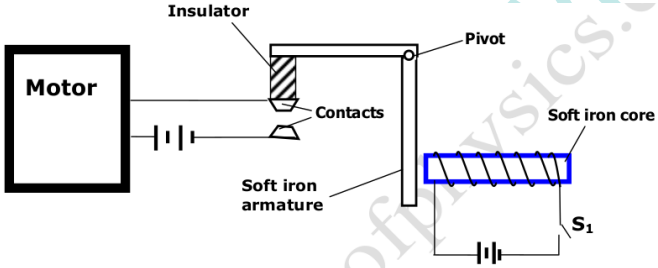

i) Name the parts labeled X, Y and Z.
ii) When the switch is closed, the hammer hits the gong repeatedly. Explain why:
I) The hammer hits the gong.
II) The hammer hits the gong repeatedly.

8. In the set up, the suspended meter rule is in equilibrium balanced by the magnet and the weight shown. The iron core is fixed to the bench.



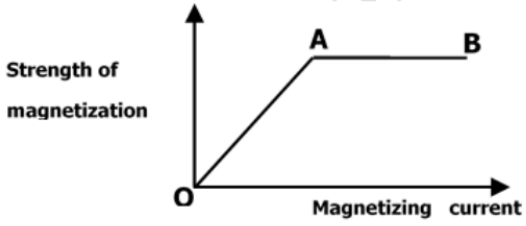

a) State and explain the effect on the meter rule when the switch **K** is closed
b) What would be the effect of reversing the battery terminals?

9. Figure shows a motor connected to a magnetic switch called a relay operated by an ordinary switch $S_1$. Use the information in the figure to answer questions that follows:




i. Explain how the relay switches on the motor when $\mathbf{S_1}$ is closed.
ii. State with a reason the effect on the motor if the iron core is replaced with a steel core and switch $\mathbf{S_1}$ is put on and then off.

10. Draw a labelled diagram of a simple dc motor.
11. In an experiment to magnetize a certain substance using a current, the graph below was obtained.




Explain with respect to the domain theory what is happening between.
a) O – A
b) A- B

12. An electromagnet is made by winding insulated copper wire on an iron core. State three changes that could be made to increase the strength of the electromagnet.
13. State TWO factors that affect the strength of an electromagnet.