The magnetic effect of electric current

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INTRODUCTION :

(1) The magnet: "It is a mean to produce a magnetic force".

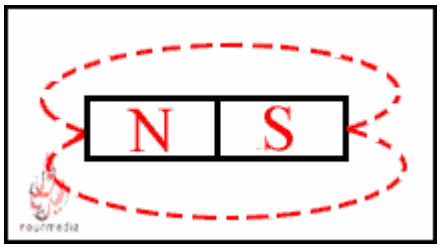
(2) Properties of the magnet:

a- It attracts the iron fillings.

b- If it is suspended freely to move in a horizontal plane.

It takes the N - S direction.

c- if it divided into two halves, it forms two magnets



(3) The magnetic field (flux):

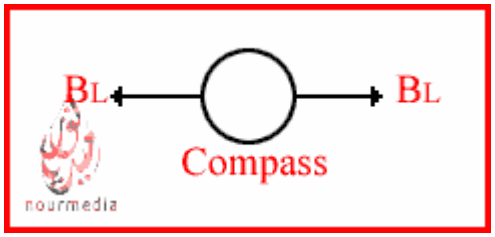
"It is the space surrounding the magnet in which its magnetic effect can be detected". It consists of imaginative lines

(4) The magnetic flux line:

"It is the path of a freely moving north pole placed in the magnetic field".

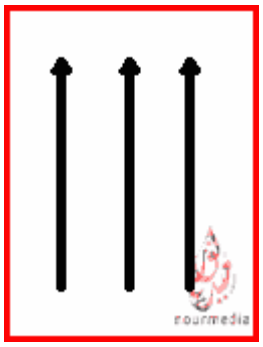
(5) The neutral point:

It is the point at which the resultant field forces = zero" the two fields must be : Equal - opposite - on the same straight line.

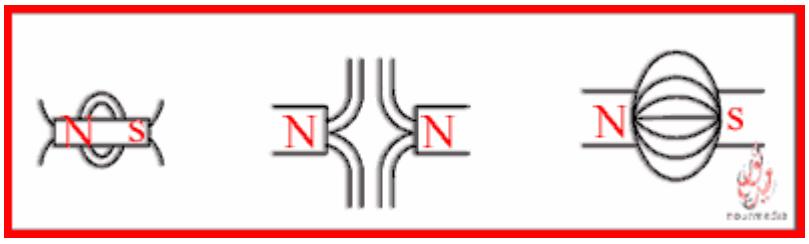


(6) The uniform field:

This field is characterized by having parallel Lines, in the same direction, its intensity in any Point is equal.



(7) Forms of some magn Fields:



(8) Properties of magn. flux lines

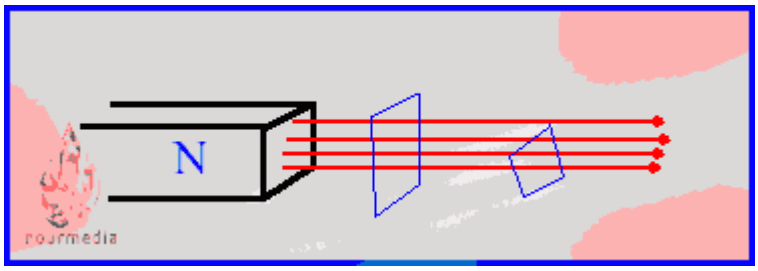
1- they are closed lines from N--> S out side the magnet and from S---> N inside the magnet.

2- they do not intersect each other.

3- their direction can be detected by the direction of N-pole magnetic needle of a compass.

4- the parallel lines of the same direction repel each other

5- Their density increases at the poles of the magnet indicating the strength of the magn. Field.



(9) The magnetic flux at point : "f"

"It is the No. of magn. lines passing normally on the area surrounding this point".

The magnetic flux density at a point: "B"

"It is the No. of magn. lines pass normally on the unit area surrounding this point".

$$\underset{(\text{weber})}{\phi} = \underset{(m^2)}{A} \times \underset{(\text{Tesla})}{B}$$

Notes:

(1) Magnetic density = magnetic induction = B

(2) 1 Tesla = Webber / m^2

(3) If the area is not normal to the magn. Lines, B is resulted: