Rules to determine the direction of a magnetic field

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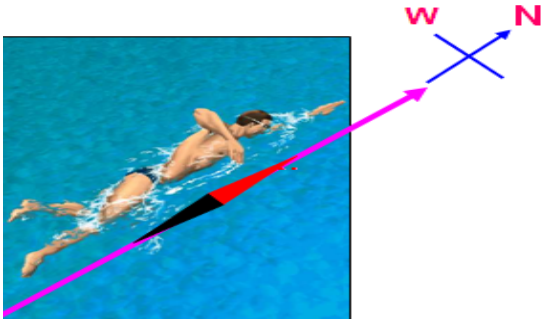
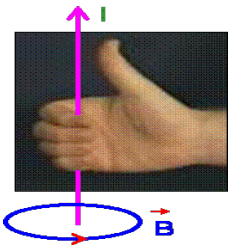
Introduction to rules to determine the direction of a magnetic field

The direction of a magnetic field around a current carrying conductor can be determined by using one of the following laws.



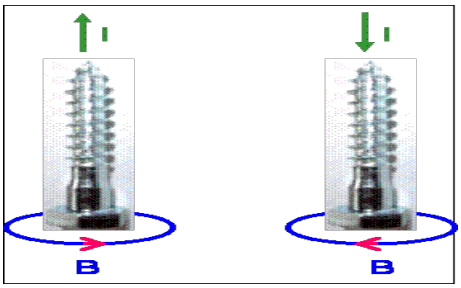
Ampere's Swimming Rule:

Picture a man swimming in the direction of a current from south to north and imagine that a magnetic needle is kept under him. As the current enters his feet, the north pole of the needle (which was facing north) will deflect toward his left hand, i.e. to the west.



Right Hand Thumb Rule or Curl Rule:

Imagine that you hold a current carryingconductor in your right hand such that your thumb points in the direction of the current. The tips of your fingers encircling the conductor will give the direction of the magnetic lines of force.



Maxwell’s Cork Screw Rule or Right Hand Screw Rule:

Suppose that an imaginary right handed screw moves forward in the direction of current flowing through a linear conductor. The direction of the rotation of the screw will give the direction of the magnetic lines of force around the conductor.

Direction of the magnetic field for a current carrying wire

In diagrams, a series of concentric rings of magnetic flux lines surrounding a conductor generally represents the magnetic field generated by the current in that conductor. Arrows are drawn on these concentric rings to represent the direction that the flux lines act toward (which is the direction that a compass needle will point to if placed in that field).

For conventional current flow (+ to -), the direction can be determined by the right-hand grip rule: grip the conductor with your thumb pointing in the conventional current direction, and the curl of the fingers will represent the direction of the field. Alternatively, use the 'corkscrew rule' -the direction of the field is the direction you would turn a corkscrew when it points in the same direction as the conventional current.

For electron flow (- to +), use the left-hand grip rule instead of the right hand. In practice, to determine the direction in which a magnetic field is acting, place the current-carrying conductor vertically, and place a compass next to the conductor -- the resulting direction of the compass needle will indicate the direction of the field (clockwise or counterclockwise).

A coil of wire behaves just like a bar magnet, with one end a north pole and the other end a south pole. To determine its polarity, place a compass near either end. The needle will point to the south pole of that electromagnet.

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About eAge Tutoring:

Reference links:

- http://en.wikipedia.org/wiki/Electric_field
- http://www.windows2universe.org/physical_science/magnetism/magnetism.html
- http://searchcio-midmarket.techtarget.com/sDefinition/0,,sid183_gci214067,00.htm

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