Artificial Magnetic Fields - Electromagnetism

Hans Christian Oersted experimented with current carrying conductors in the early 19th century and discovered one of the most important discoveries of the time. Previously the areas of electricity and magnetism were thought to be separate, but he found that they were both different sides of the same phenomenon - namely electromagnetism.

Oersted's Principle : Charge moving through a straight conductor produces a circular magnetic field around the conductor. The field is represented by concentri rings around the conductor.

http://micro.magnet.fsu.edu/electromag/java/compass/index.html

How do we draw the direction of this magnetic field?

Left Hand Rule #1(LHR#1) Grasp conductor with left hand such that the thumb is pointing in the direction of current flow. The curved fingers point in the direction of the magnetic field.

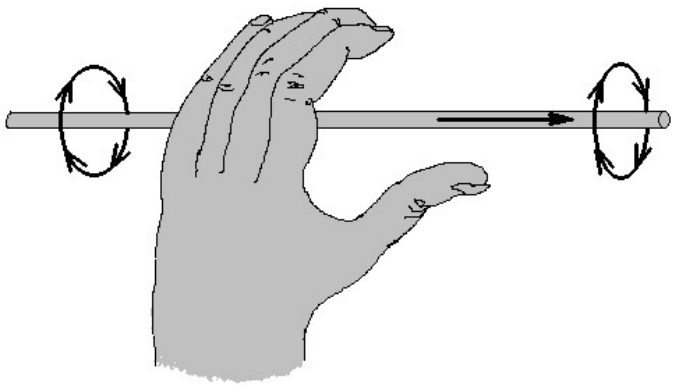
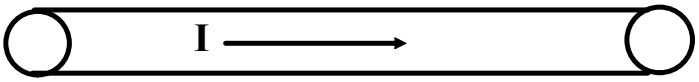
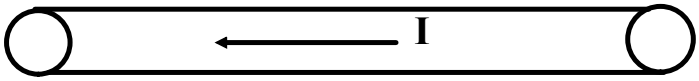


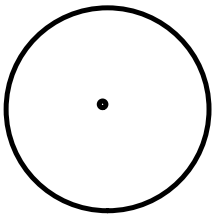
FIGURE 8: Left hand rule for current flow through a wire generating magnetic flux lines.

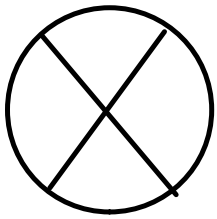
Stress that magnetic fields can be created in other ways than by the use of a magnet.

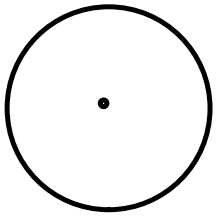
Sketch the fields generated around a wire with current flowing right and left. then do into and out of the board. Introduce convention of (x) as into the board and (.) as out of the board. Talk about having a dart thrown at you.

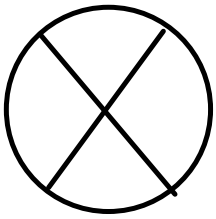

I

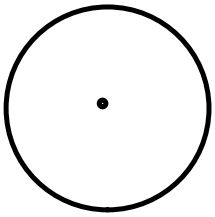

I

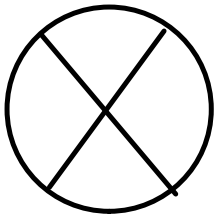


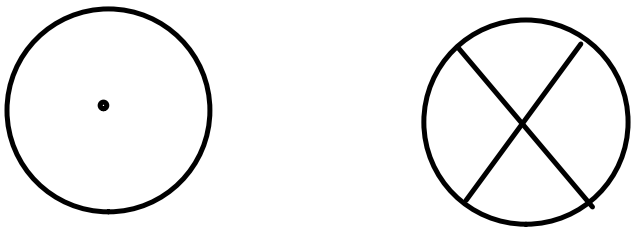










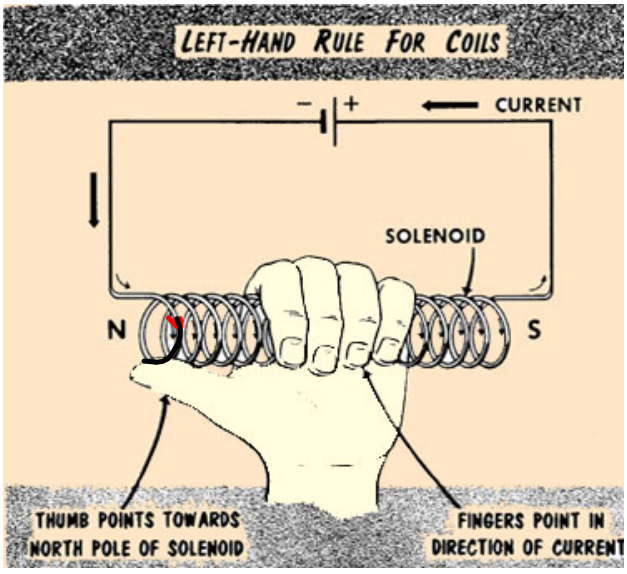


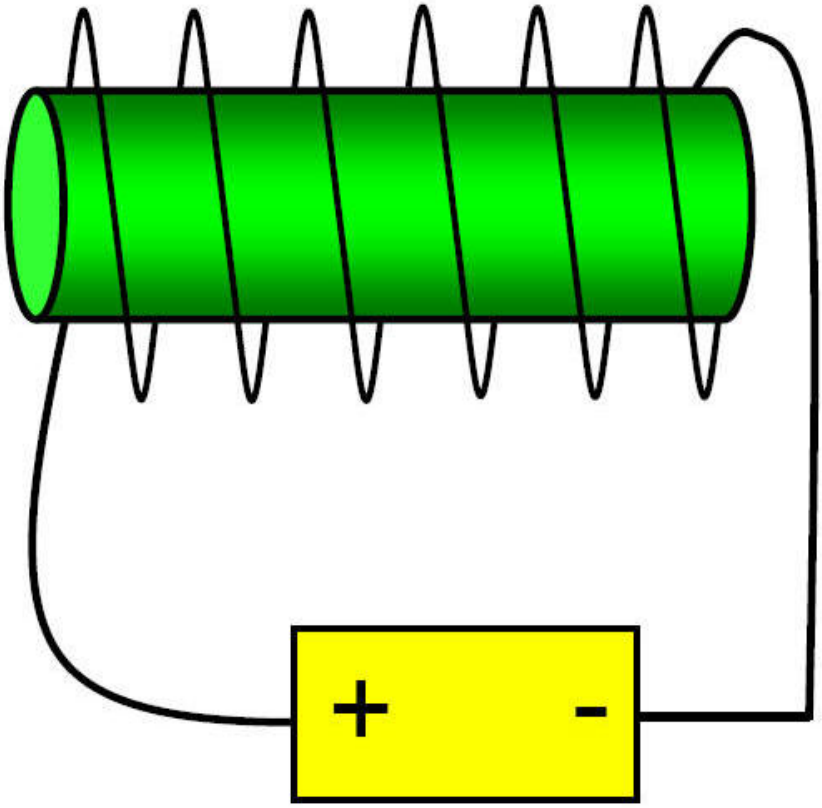
Definition of the Ampere:

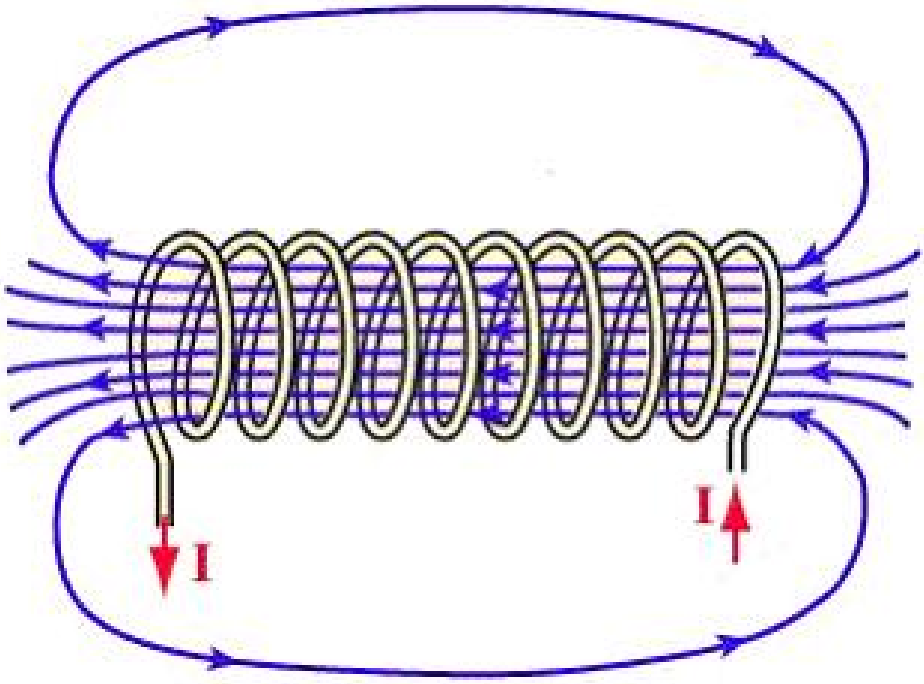
1 Ampere is the current in 2 parallel wires, that are 1m apart, that causes a force of 2×10^{-7} N/m on each wire

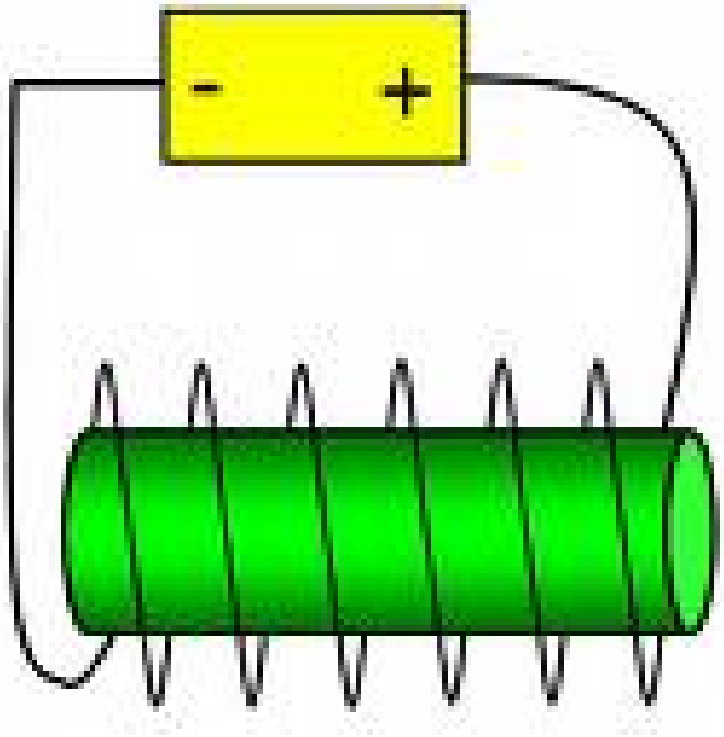
Left hand rule #2 (LHR#2) for a coiled conductor/solenoid:

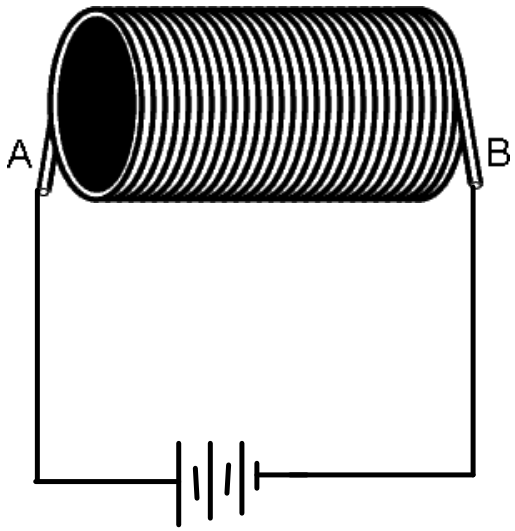
Grasp the coil with the left hand so that the fingers curl in the direction of the current. The thumb will point to North.

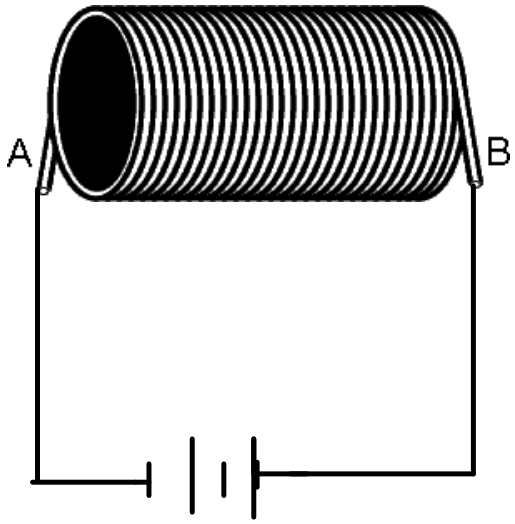





I
I




A
B

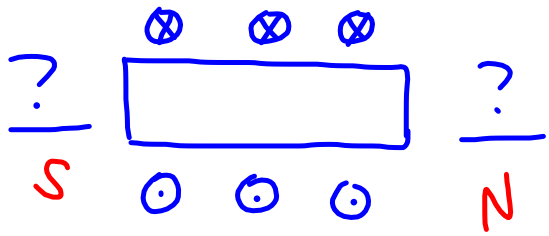


***Page 636 -637**

Factors affecting electromagnets

3 Applications

Practice
Page 638 #1-4


?
?
S
N