

Chapter 24

Magnetic Fields

Magnet
Magnetic Poles
Compass

Magnetic Field - direction: direction of the force on the North pole of a compass.

Magnetic Field Lines - imaginary lines which show the direction of the magnetic field.

Magnetic Flux -number of lines passing through an imaginary surface.

Current:

(a) Electron flow (- to +)

(b) Conventional current flow (+ to -)

Electromagnetism:

Current in a wire sets up a magnetic field.

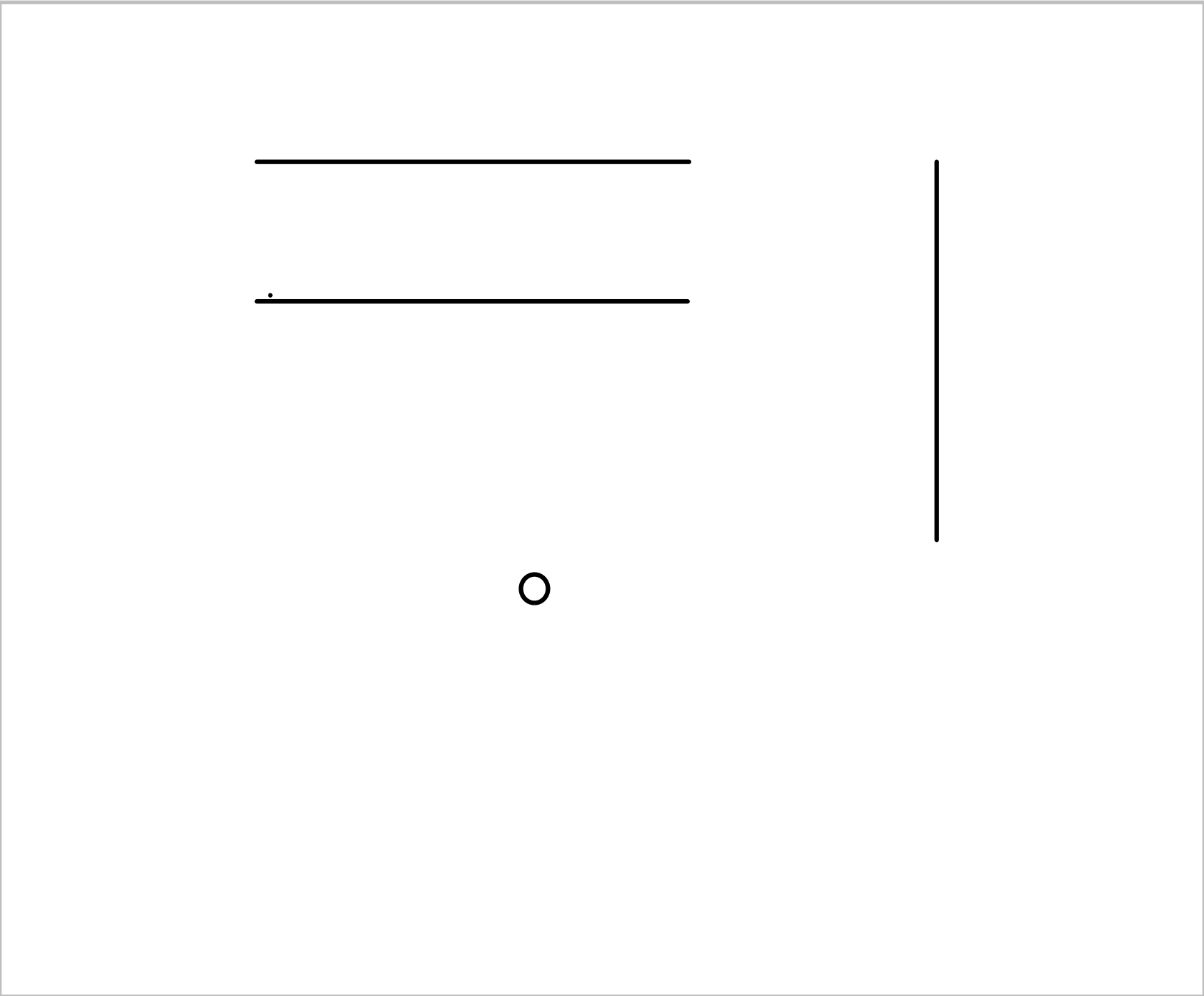
The direction of the field is given by the "first right hand rule"

Grasp the wire with the right hand.

1. The thumb of the **right** hand points in the direction of the conventional current.

2. The fingers curl in the direction of the magnetic field.

<http://www.walter-fendt.de/ph11e/mfwire.htm>



Solenoid: a coil of wire

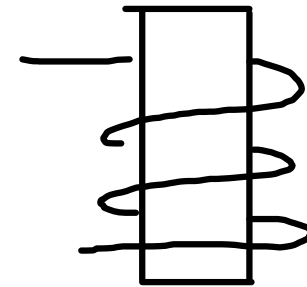
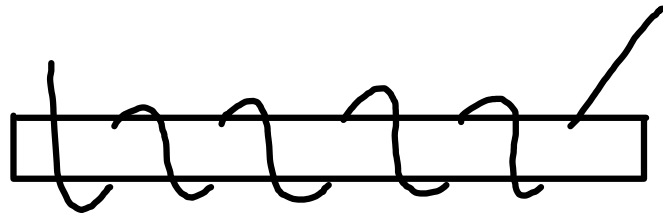
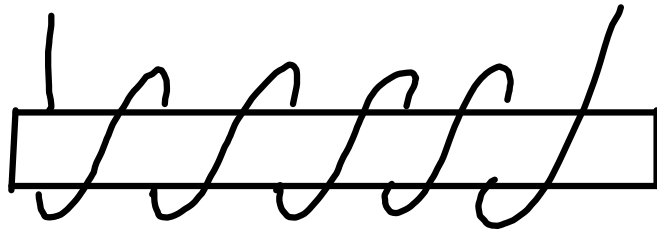
A current in a solenoid sets up a magnetic field inside the solenoid.

Second Right hand rule:

Grasp the wire with the right hand.

The fingers curl in the direction of **conventional current**. The thumb points in the direction of the magnetic field at the center of the coil.

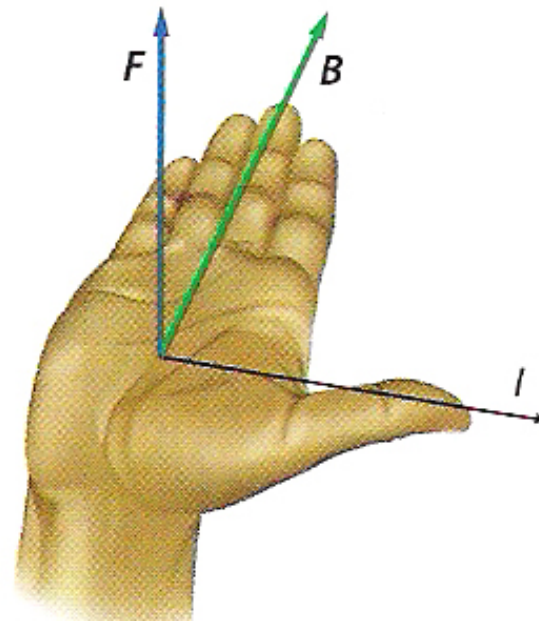
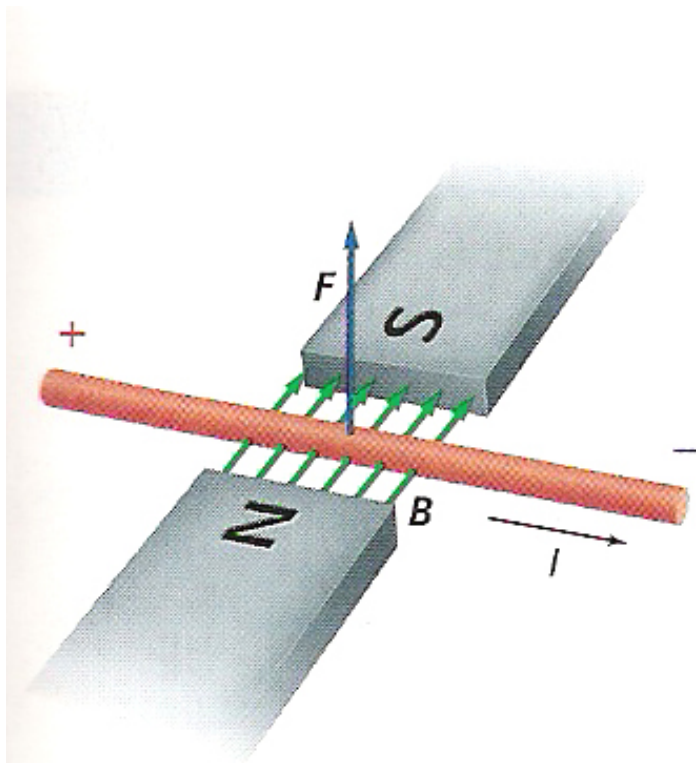
<http://micro.magnet.fsu.edu/electromag/java/compass/index.html>

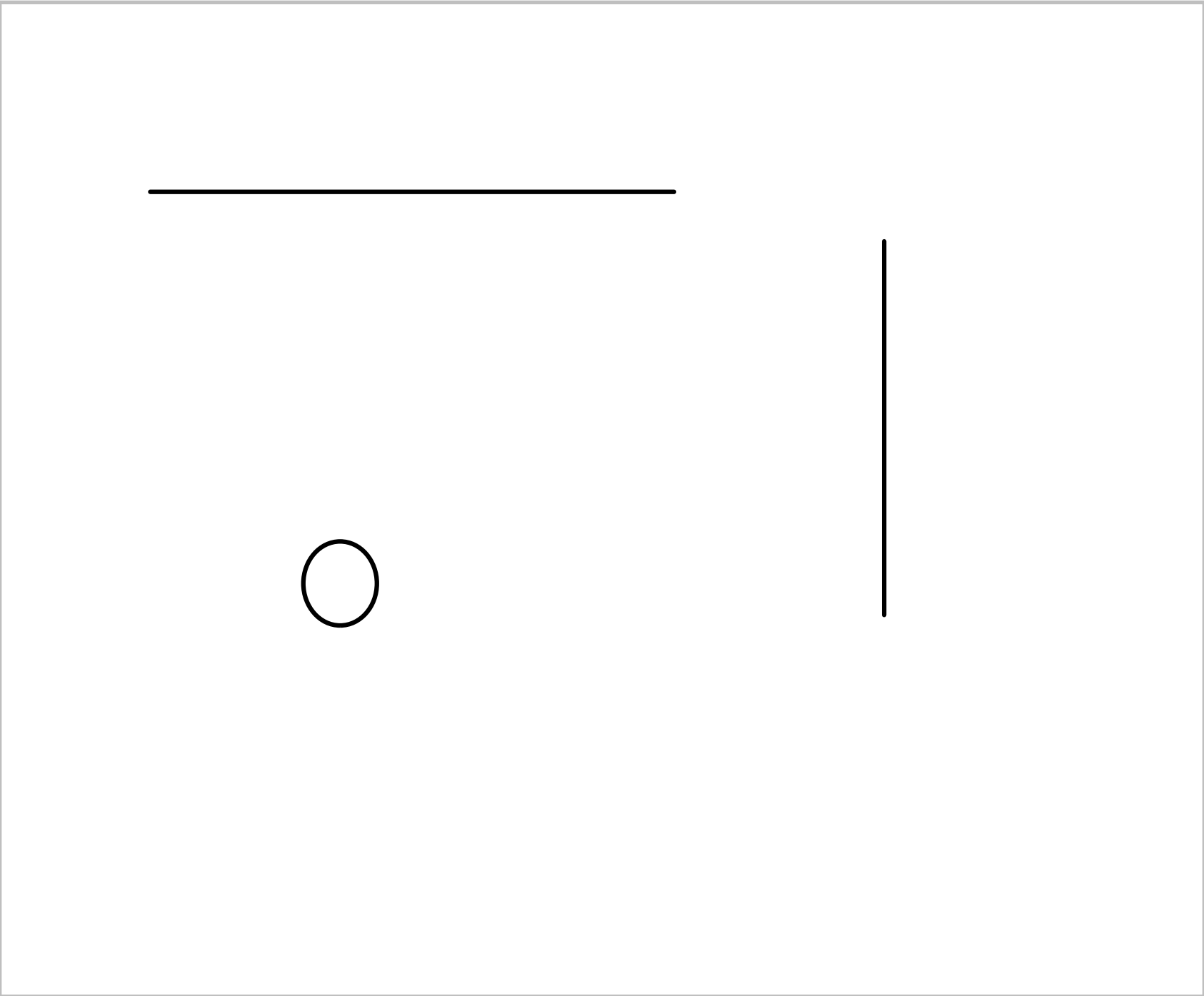


Forces on currents in an applied magnetic field:

Use the right hand open flat.

- 1. Thumb of the **right** hand points in the direction of the **conventional current**.**
- 2. The extended fingers point in the direction of the **APPLIED** magnetic field.**
- 3. The palm points in the direction of the force.**





Thought Questions:

- 1. How is it possible for a magnetic compass to give a false reading?**
- 2. Would a magnetic compass "work" on the moon?**
- 3. A student winds a wire around a nail as in the diagram. Which end of the nail (Head or point) would be the North Pole of the magnet?**

