

## Chapter 27 – Magnetic Field and Magnetic Forces

- Magnetism
- Magnetic Field
- Magnetic Field Lines and Magnetic Flux
- Motion of Charged Particles in a Magnetic Field
- Applications of Motion of Charged Particles
- Magnetic Force on a Current-Carrying Conductor
- Force and Torque on a Current Loop

1) A moving charge or collection of moving charges (e.g. electric current) produces a magnetic field. (Chap. 28).

2) A second current or charge responds to the magnetic field and experiences a magnetic force. (Chap. 27).

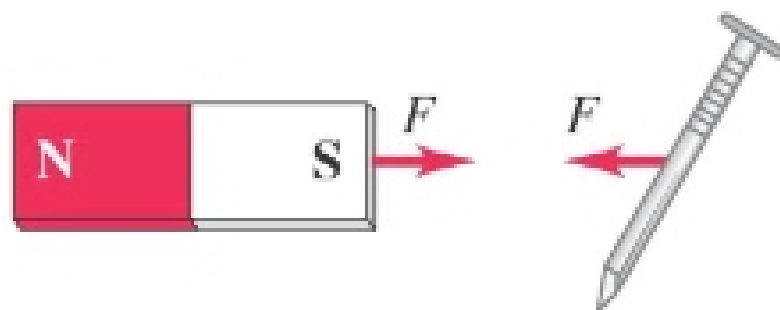
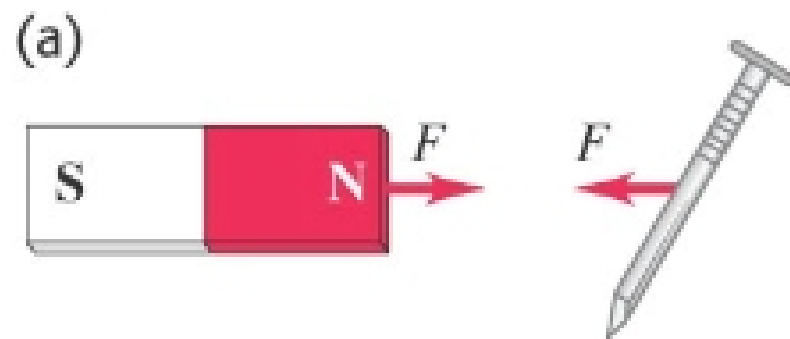
## 1. Magnetism

**Permanent magnets:** exert forces on each other as well as on unmagnetized Fe pieces.

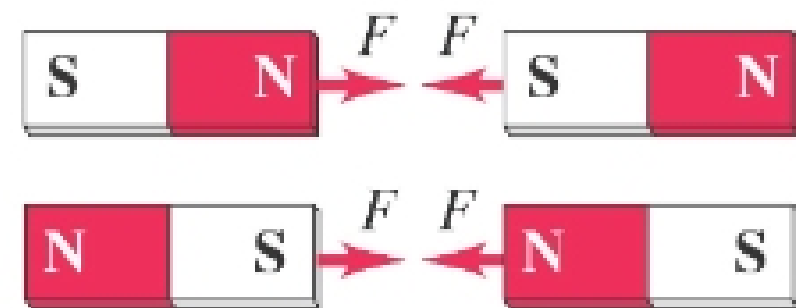
- The needle of a compass is a piece of magnetized Fe.
- If a bar-shaped permanent magnet is free to rotate, one end points north (north pole of magnet).
- An object that contains Fe is not by itself magnetized, it can be attracted by either the north or south pole of permanent magnet.
- A bar magnet sets up a magnetic field in the space around it and a second body responds to that field. A compass needle tends to align with the magnetic field at the needle's position.

# 1. Magnetism

- Magnets exert forces on each other just like charges. You can draw magnetic field lines just like you drew electric field lines.
- Magnetic north and south pole's behavior is not unlike electric charges. For magnets, like poles repel and opposite poles attract.
- A permanent magnet will attract a metal like iron with either the north or south pole.



(a) Opposite poles attract.



(b) Like poles repel.

