21.1 The Force on a Current in a Magnetic Field
   - Force on Single Charged Particle:
   - Force on a stream of charged particles with same speed:
     - Application: Stereo speakers

21.2 Magnetic Fields Produced By Currents
21.2.1 A Long, Straight Wire
   - Direction?
   - Magnitude

Example 1: Bring back two parallel wires with opposite current of ~ 2 amps, wires about 1 m long and about 5 mm apart.
   A) What is the direction and what is the magnitude of the magnetic field due to the right hand wire (current going up) at the position of the left hand wire?
   B) What is the force (direction and magnitude) the right hand wire exerts on the left hand wire?

21.2.2 Loop of Wire
   - Qualitatively
21.2.3 A Solenoid
   - Qualitatively

Chapter 22 Electromagnetic Induction
22.1 Induced EMF and Induced Current
   - Current Induction in the Swing
   - Demo: Current swing – swing it up toward the magnet
   - Demo: Electric Guitar String
     - Supply Current in presence of Field – Induce Motion
     - Supply Mechanical motion in presence of Field – Induce Current
   - Induced EMF
     - Demo: LED & Battery vs. Generator
     - 1) Electric Field Driving Charge
     - 2) Magnetic Field Driving Charge

Demo: Repeat Generator & Diode

Example 2: Say I took my 0.01 m long wire swing, and put it in the presence of a uniform 3 Tesla magnetic field. With what speed would I have to move it to get up the 1.7 Volt Emf needed to light a diode?

   - Motional Emf / Magnetic Drag Force.
   - Demo: Drag force on copper fin through magnet

22.3 Magnetic Flux
   - Flux:
     - Units:
   - Conceptualizing flux:
     - Conceptualizing B Field Lines
Ch 21
26. A 45-m length of wire is stretched horizontally between two vertical posts. The wire carries a current of 75 A and experiences a magnetic force of 0.15 N. Find the magnitude of the Earth’s magnetic field at the location of the wire, assuming that the field makes an angle of 60.0° with respect to the wire.

46. A long, straight wire carries a current of 48 A. The magnetic field produced by this current at a certain point is $8.0 \times 10^{-5} \text{T}$. How far is the point from the wire?

Ch 22
4. In 1996, NASA performed an experiment called the Tethered Satellite experiment. In this experiment a $2.0 \times 10^4$-m length of wire was let out by the space shuttle *Atlantis* to generate a motional emf. The shuttle had an orbital speed of $7.6 \times 10^3 \text{m/s}$, and the magnitude of the Earth’s magnetic field at the location of the wire was $5.1 \times 10^{-5} \text{T}$. If the wire had moved perpendicular to the Earth’s magnetic field, what would have been the motional emf generated between the ends of the wire?