Today: **Ch 21** Magnetic Force and Field 1st ½
Friday: **Ch 21** Magnetic Force and Field 2nd ½ **HW 15**

Chapter 21 The Magnetic Force and Magnetic Field

Introduction

- **Charge and Electric Interaction:**
- **Moving Charge and the Magnetic Interaction:**
- **Current Wire – Current Wire interaction**
  - **Anti-Parallel**
  - **Parallel**
- **Current Wire – Current Wire Loop interaction**
- **Current Wire – Magnet Interaction**
- **Magnet – Magnet Interaction**

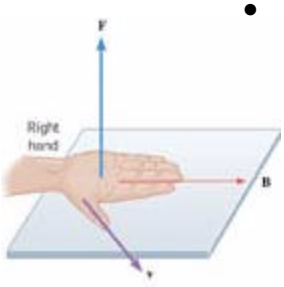
- **Plan for today and tomorrow**

21.1 Magnetic Fields

- **Magnets**
  - **Magnetic Field**
    - **B**
  - **Magnetic Field of Cow Magnet**
  - **Magnetic Field of the Earth**

21.2 The Force on a Charge moving in a Magnetic Field

- **Demo: Horse-Shoe Magnet**
-
- ***Handy* rule.**
  - ***Direction of magnetic force***



Equation 21.1

- ***Magnitude (and sign) of magnetic force***
  - **In words,**
    - **Field**
    - **Charge**
    - **Velocity**
      - **Perpendicular speed**

Example 1 A charge of 12 μC, traveling with a speed of 9.0×10^{6} m/s at 120° to the magnetic field experiences a magnetic force of 8.7×10^{-3} N. A) What is the magnitude of the field? B)If the field and speed are oriented as shown, what is the direction of the force?

Example 2: Say another charge, q2 = 5.00μC, travels at an angle of 40.0° with respect to the same magnetic field and experiences a 1.90×10^{-3} N Force. Determine the speed of q2.

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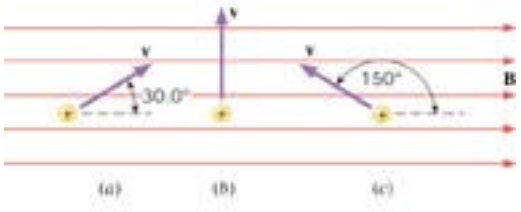
2. A particle with a charge of 8.4μC and a speed of 45 m/s enters a uniform magnetic field whose magnitude is 0.30 T. For each of the cases n the drawing, find the magnitude and direction of the magnetic force on the particle.



5. At a certain location, the horizontal component of the earth's magnetic field is 2.5×10^{-5} T, due north. A proton moves eastward with just the right speed, so the magnetic force on it balances its weight. Find the speed of the proton.