Physics of Imagineering **In-class assignment #2**
September 19, 2011 **Magnetism**

Goals

1. To understand the basics of magnetism.
2. To experiment with magnetic materials
3. To understand some of the visual "tricks" used at Disneyland.

Equipment:

Notebook (draw diagrams directly inside), unmarked magnet, stickers, compass, ruler, aluminum foil, paper clips, etc.

Questions:

1. Based on the video, draw a picture of what you expect the magnetic field of a bar magnet to look like.
2. How can you determine which end is the North Pole of your bar magnet?
3. Once the poles are marked, make several measurements of the magnetic field near the magnet. Draw the directions on a diagram. Does it match what you drew for #1? Explain.
4. Work with a partner to determine how two magnets interact. Describe the interactions.
5. Using other items, determine how magnets interact with other pieces of matter. Try aluminum, paper, tape, paper clips, etc.
    a. Do magnetic interactions appear to pass through matter? How far? Does it depend on the magnet (or number of magnets)?
6. Place the compass to the right of your bar magnet, oriented in such a way as to make the compass deflect 70° to the east. Measure the distance from the magnet to the compass.
7. Use vectors and the fact that the Earth's magnetic field is approximately 10 μT ($\mu = 10^{-6}$) to calculate the magnitude of the field due the bar magnet.
8. Move the compass away to twice the distance, measure the new deflection angle and calculate the field at this location. Repeat at different distances.

Rides

- California Screamin'