## Homework Questions for Investigation #12

1. Did all of the metals you tested stick to a magnet? If not, which metals did and which did not?

2. Do magnetic forces appear to penetrate through materials that themselves are not magnetic? Provide an example of how you know?

3. What test(s) could you perform in order to tell the difference between an actual magnet and an object that is merely made of a magnetic material?

4. Suppose you have two iron bars that appear to be identical, except that one is a bar magnet and the other is not. How would you be able to tell them apart if you had no other materials to help you? A sketch might be helpful here. (**Hint:** Where are the poles of a typical bar magnet?)

5. What is the basic difference between a generator and a motor?

6. Why can it be said that you constructed a simple *electric motor* in **Part V**?

7. Why can it be said that you constructed a simple *electric generator* in **Part V**?

- 8. List at least three changes that you could make in **Part V** that would cause a greater deflection of the galvanometer needle.
  - 1)
  - 2)
  - 3)
- 9. What complications did you encounter in the construct of your hands-free motor in **Part VI**? Based on your DC motor operation, and that of other groups in lab, would you make any changes to your design variables (thickness, coil diameter, number of turns)? If so, what might they be and why?

- 10. Use all of your observations from today's investigation along with information gleaned from your text in order to explain the operation DC motor you constructed in **Part VI**. Use a separate sheet and attach to your lab packet upon submission. Your explanation must include the following:
  - a) What is the purpose of the battery?
  - b) What is the purpose of the permanent disk magnet?
  - c) Why does the coil start to spin?
  - d) Why is it necessary to remove the varnish coating only halfway around of one of the coil ends?
  - e) What keeps the coil spinning while the current is cut off by the varnish coating?
  - f) What would happen if the polarity of the battery was reversed?
  - g) What would happen if the disk magnet was flipped over?
  - h) What would happen if both the battery polarity AND the disk magnet were reversed?