

Laboratory Application Assignment

This lab application assignment is optional due to the fact that your laboratory may not have the items listed under "Equipment." If you do have the items listed, then you will be able to experimentally determine the pattern of magnetic field lines extending outward from the poles of a bar magnet.

Equipment: Obtain the following items from your instructor.

- Digital camera
- Compass
- Two bar magnets (If the pole ends are marked N and S cover them.)
- Iron filings
- Thin cardboard or sheet of glass ($8\frac{1}{2} \times 11$ in.)

Magnetic Field Pattern

Examine the compass assigned to you. How can you tell which end of the compass needle is the north (N) pole? _____

Describe how the compass can be used to determine the pole polarities of the two unmarked bar magnets you have in your possession. _____

Using the technique you described above, experimentally determine the pole polarities on each of the two bar magnets assigned to you.

Remove the coverings on each end of the bar magnets, and see if your technique was correct. Was it? _____

Place a thin piece of cardboard or thin sheet of glass over one of the bar magnets assigned to you. Sprinkle iron filings on the cardboard or glass directly above the bar magnet. Gently tap the cardboard or glass until you see a recognizable pattern. This is the pattern of a cross section of the lines of force surrounding the magnet. Take a picture of this pattern with a digital camera. Identify the position of the magnetic poles, and indicate the direction of the lines of force.

Now place both bar magnets (in line) under the cardboard or glass so that the N pole of one is adjacent to and about 1 in. away from the S pole of the other. Lightly sprinkle iron filings on the cardboard or glass directly above both bar magnets. Gently tap the cardboard or glass until you see a recognizable pattern. This is the pattern of a cross section of the lines of force surrounding both magnets. Take a picture of this pattern with a digital camera. Identify the position of the magnetic poles, and indicate the direction of the lines of force.

Turn one of the two bar magnets completely around (180 degrees) so that the N pole of one magnet is adjacent to and about 1 in. away from the N pole of the other. Be sure the magnets are still in line. Lightly sprinkle iron filings on the cardboard or glass directly above both bar magnets. Gently tap the cardboard or glass until you see a recognizable pattern. This is the pattern of a cross section of the lines of force surrounding both magnets. Take a picture of this pattern with a digital camera. Identify the position of the magnetic poles, and indicate the direction of the lines of force.