Magnetic Fields

1. Describe what happens if a bar magnet is cut into three equal lengths.

   Each piece becomes a new magnet with a north and south pole.
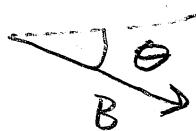
2. Explain what is meant by the

   (a) angle of declination.

   The angle between the magnetic north pole and the geographic north pole.

   (b) angle of inclination.

   The angle between the horizontal plane and the magnetic field vector.
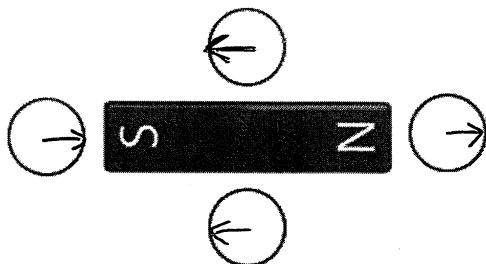
3. Briefly explain domain theory.
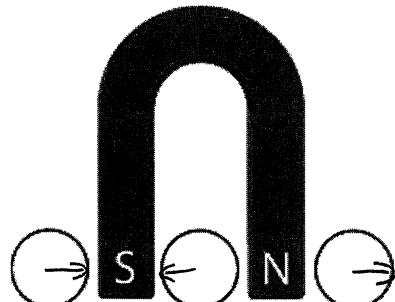
   Regions within a ferro magnetic material that act as small bar magnets. They are normally randomly oriented. In the presence of a magnetic field, they align themselves parallel to the field.

4. In the diagrams below, each circle represents a compass. Indicate the direction of the needle in each compass.

   (a)   (b)

5. You have two pieces of metal that look identical to each other. One is a bar magnet and the other is unmagnetized.

   (a) Describe how you could determine which one is the magnet using a compass.
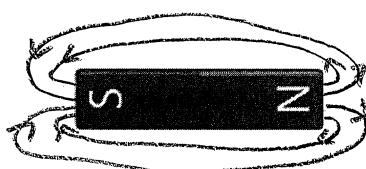
   Place the compass near each end of the pieces of metal. The compass will point in opposite directions at each ends of the magnet, whereas either pole will be attracted to the metal.

   (b) Could you determine which one is the magnet just by manipulating the two pieces of metal? Explain.
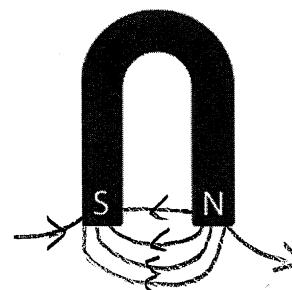
   No. Both poles of the magnet will equally attract the unmagnetized metal. There is no way of telling which bar exerted the force on the other bar.

6. Sketch the magnetic field around each of the following objects.

   (a)

   (b)

   (c)

   (d)