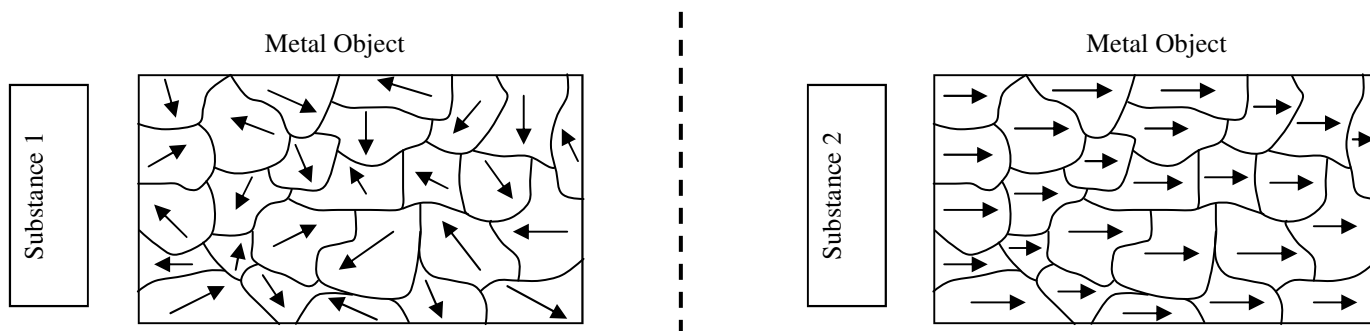


## 2009-10 PreAP Magnetism 3

You should first complete the regular physics homework: Magnetism 3.  
2 quizzes next time: over the lab and over the right hand rule.



- Substance 1 is placed next to a piece of metal. Then Substance 1 is removed and Substance 2 is placed next to Object 1. The microscopic view of Object 1 is shown for both situations and occurs immediately.
  - The small regions of the metal are known as what?
  - Which substance is magnetic: Substance 1 or Substance 2?
  - Justify your answer.
  - For the magnetic substance you chose in part B, above, label its North and South magnetic poles.
  - Is the metal object a soft or hard magnetic substance?
  - Why?
  - What type of metal is the metal object, most likely?
  - A non-ferrous material (one that cannot be magnetized) would look like which picture: left or right?

$F_{\text{magnetic}} = qvB$ , where  $q$  is a charge in coulombs,  $v$  is velocity of the charge in m/s, and  $B$  is the magnetic field in Teslas.  
This equation is valid only if the charge is moving perpendicular to the magnetic field.

- A  $5\mu\text{C}$  charge moving 180 m/s perpendicular to a magnetic field feels a 12 N force.
  - What is the magnetic field strength?

B. What will be the shape of the path of the charge in the magnetic field?

$F_{\text{magnetic}} = \mathbf{BI}\ell$  where  $B$  is a magnetic field not caused by the wire,  $I$  is the current in amps flowing thru the wire and " $\ell$ " is the length of a straight wire.

- A 1.5 T magnetic field is surrounding a 35 cm long wire that has 1.2 amperes running thru it. What is the force exerted on the wire?
- A 1.6 meter long wire carrying 6 A creates a 0.5 T magnetic field. What is the magnetic force on the wire?
- (Practice with cardinal directions...) The magnetic field of the earth points north. A proton is moving up from the ground (toward the sky). Give the direction of the magnetic force on the proton (use N, S, E or W).
- We know that a straight current carrying wire causes a circular magnetic field around it.
  - If you increase current in the wire, will the magnetic field increase or decrease?
  - If you move farther from the wire, will the magnetic field increase or decrease?  
"Proportional" or "directly proportional" means if one increases, the other increases (like weight and mass).  
"Inversely proportional" means if one increase, the other decreases (like more resistance means less current).
  - How is the magnetic field of a current carrying wire related to distance and current?