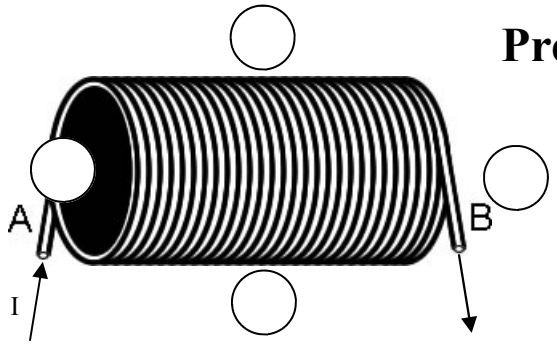
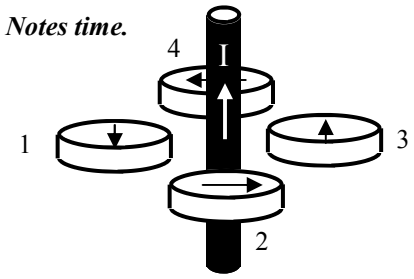
PreAP Magnetism 3

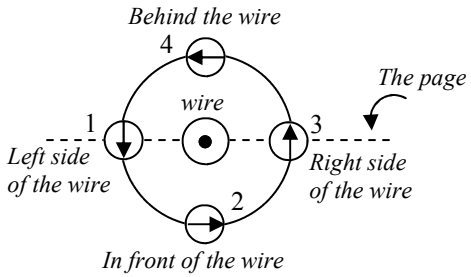


1. Current goes into side A of the solenoid. (Again, think of water flowing thru tubes. Your right fingers are the water.)
   A. Which side of the solenoid is its north pole?

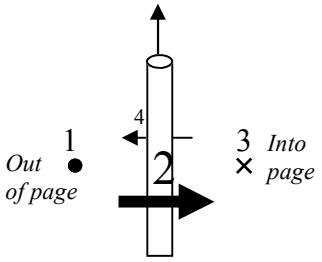
   B. Draw the arrows for the compasses.



In the lab we saw compasses prove that current in a wire creates a circular magnetic field (B). In this case the current is up (notice the "I" on the wire). Put your right thumb up and your fingers curl in the direction of the compasses.



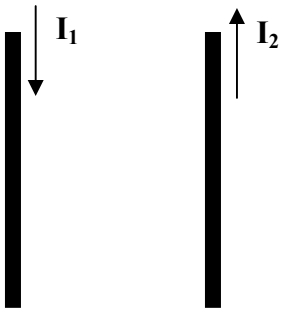
Here is the same wire viewed from above. The dot in the wire means the current is toward you. Notice B is counterclockwise (CCW) around the wire. Also, the dashed line represents "the page" for the next diagram (at the right), which is a 2D drawing on this piece of paper.



Front view, again. On the left side of the wire (point 1) the mag field, B, is out of the page (imagine a pin pushed "through" the page). On right of wire (point 3), B is into page. In front of the wire (point 2) B is to the right, etc.

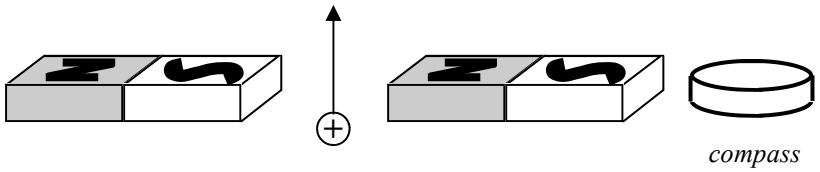
2. A. * Draw B (the magnetic field) for wire 1 on the right side of wire 1 (between the wires, but closer to wire 1).
   B. Draw B for wire 2 on the left side of wire 2 (between the wires, but closer to wire 2).
   C. In between the two wires are the two magnetic fields going the same direction or opposite directions?

   D. Will the wires be attracted or repelled by each other?



3. Fingers, Thumb, or Palm? (*Using "Magnetic Force" notes for the Right Hand Rule*):

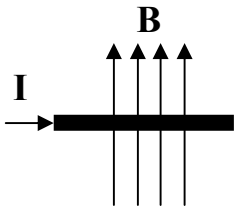
   A. ___ * The direction of a moving charge.
   B. ___ * The direction of the magnetic force.
   C. ___ The direction of a moving proton.
   D. ___ Points from a N pole to a S pole.
   E. ___ Direction of the current in a wire.
   F. ___ Direction a wire moves because of a magnetic field.



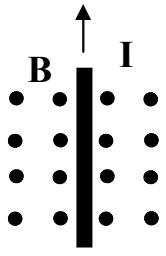
compass

4. A proton is moving between two bar magnets.
   A. * Draw the direction of the magnetic field between the magnets (label it "B").
   B. * Find the direction of the force on the proton.
   C. Fill in the compass.

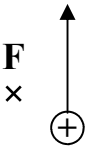
5. * The direction of the magnetic field and current are shown. Which is the direction of the magnetic force on the wire?



6. * Find the direction of the magnetic force on the wire.



7. A proton moves as shown. Given the direction of the force, determine the direction of the magnetic field.

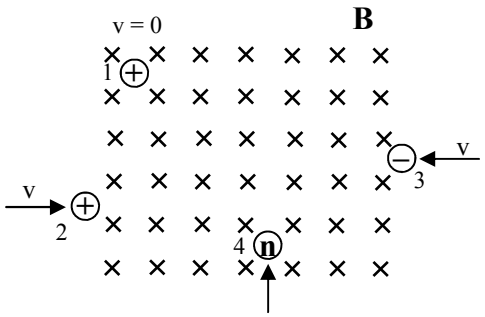


Magnetism 3—p2

8. Four subatomic particles are in a magnetic field. The arrows show the direction of their initial velocities when they enter the field. The charge of each object is also given.

   A. The proton at the top left (object 1) is at rest, what is the direction of the magnetic force (F_B)?

   B. Draw the path that the moving proton (object 2) at the bottom left will follow.



   C. Draw the path that the electron (object 3) will follow.

   D. What is the change of speed of the electron?

   E. What is the direction of the magnetic force on the neutron (object 4) labeled "n"?

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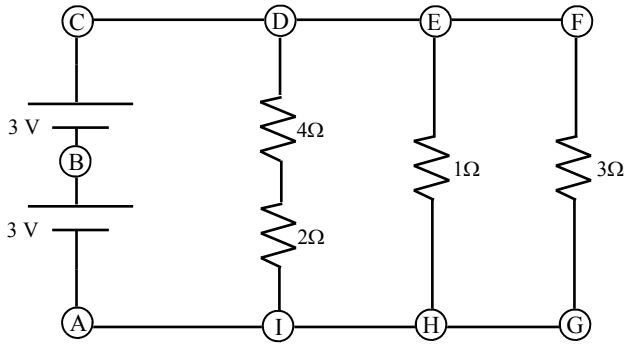
9. A. Calculate the total current flowing thru the batteries.

   C. Calculate the power dissipated by the entire circuit.

   D. If the resistors were actually light bulbs, which one would be the brightest and why?

   E. If the 2Ω resistor was replaced by a 5Ω resistor,
      i. how would the current thru the batteries change?
      ii. how would the current thru the 3Ω change?

   F. How much voltage is used by the 4Ω?



10. Conduction (Cd), Convection (Cv), Radiation (R):

   A. ___ Between a pot and the stove.
   B. ___ Between the pot and the water.
   C. ___ Moves heat throughout the water.
   D. ___ You lift the pot and put your hand next to (but not touching) the side of the pot. You can feel the heat because of this.

1) Right side; 2A) out of page; 3A) T; 3B) P; 4A) N to S, so left 4B) out of page.

5) out of page (fingers point toward top of page; thumb points to R);
6) Right (fingers are out of page; thumb is to top of page)
9A) add up the individual currents. The current in the first branch = 6V/6Ω = 1A.
9F) use V = IR for each individual resistor. In this example R = 4Ω.