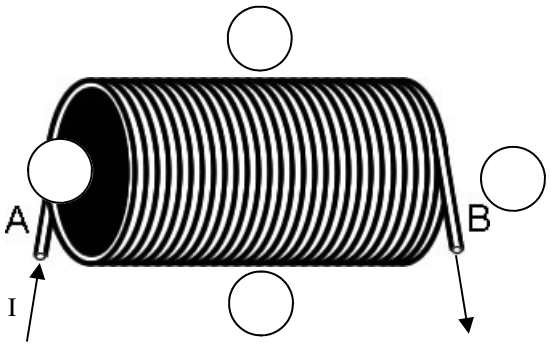
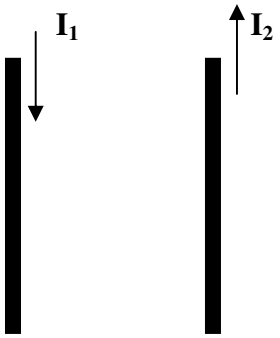
A-day: Due Tues., May 17
B-day: Due Wed, May 18

2011 Magnetism 3



1. Current goes into side A of the solenoid.
   A. Which side of the solenoid is its north pole?

   B. Draw the arrows for the compasses.



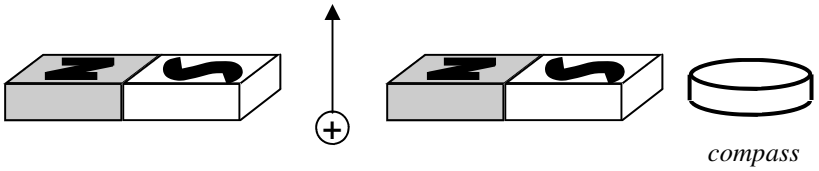
2. A. Draw B (the magnetic field) for wire 1 on the right side of wire 1
   B. Draw B for wire 2 on the left side of wire 2.

   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*):

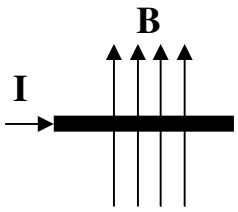
   A. ____The direction of a moving charge.
   B. ____The direction of the magnetic force.
   C. ____The direction of a moving proton.
   D. ____Points from a N pole to a S pole.
   E. ____Direction of the current in a wire.
   F. ____Direction a wire moves because of a magnetic



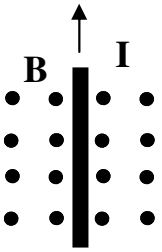
compass

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.

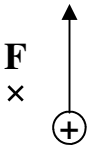
5. The direction of the magnetic field and current are shown. Which is the direction of the magnetic force on the wire?



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



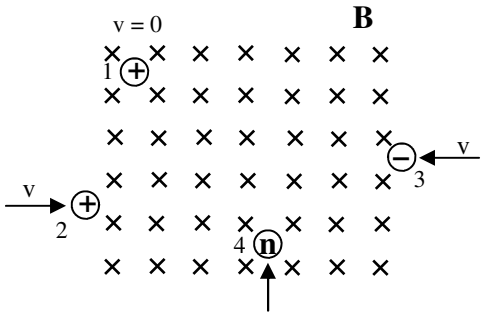
7. A proton moves as shown. Given the direction of the force, determine the direction of the magnetic field.



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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Practice with cardinal directions…

9. 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 using cardinal directions (N, S, E or W).

10. An electron is moving east at the equator. You know the direction of the earth's magnetic field. Determine the direction of the force on the electron and describe the path it will take. Make sure your description explains your orientation. (*Ex. If I am facing *** the path is ***.)*

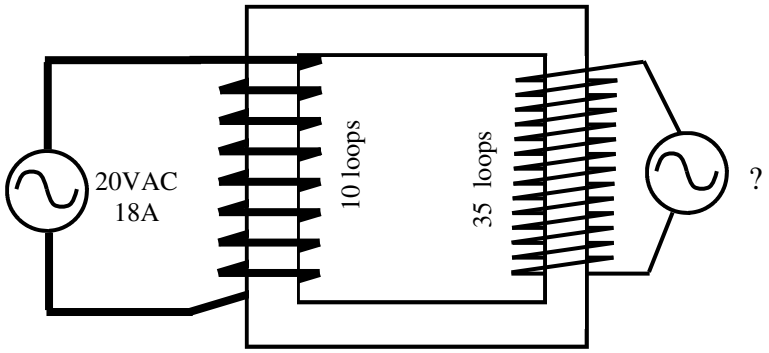
Using the "Transformer" notes. In the diagram below the curvy symbol in the circle stands for an alternating current source (like a battery for AC).

11. Left or Right side of the transformer at the right?

A. ____Most current?
B. ____Most voltage?
C. ____Most coils?
D. ___ Most power?
E. ___ Primary side?
F. ___ Secondary side?

G. Calculate the voltage on the right side (output).

H. Calculate the current on the right side.



12. What would happen if the transformer primary voltage source was DC?

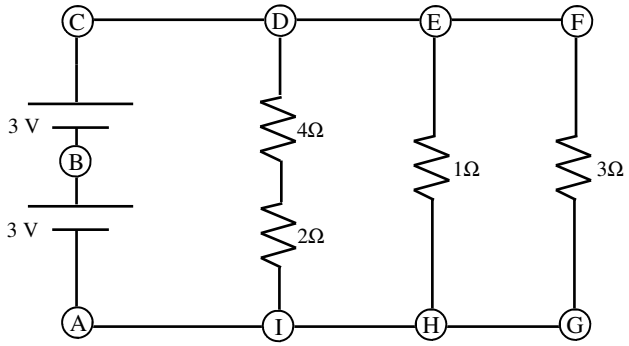
13. A. Calculate the total current flowing thru the batteries.

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?

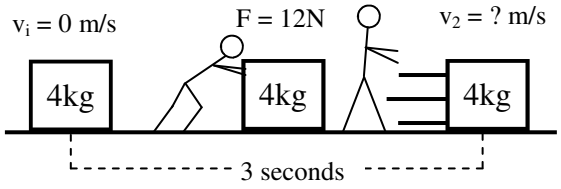
F. How much voltage is used by the 4Ω?



14. 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.

15. A 2 kg cube of iron is at 120ºC. It is placed into a bucket containing 5 kg of water at 50ºC.
A. Which substance's atoms have greater average kinetic energy: water or iron?
B. Which substance has more total internal energy: water or iron?
C. Heat will travel from:
D. They will eventually reach the same temperature, this is known as:
E. This temperature will be: I) above 120ºC; II) below 50ºC; III) between the two temperatures but closer to 120ºC; IV) between the two temperatures but closer to 50ºC;

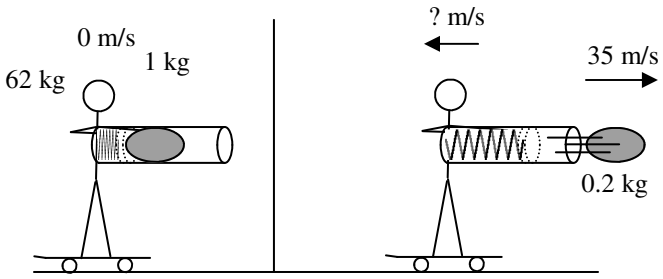


p_{before} = I = p_{after} =

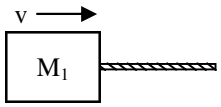
16. Slim Jim pushes on a 4 kg box for 3 seconds. Calculate the impulse Jim gave the box and its final velocity.

17. Slim Jim makes a football launcher.
    A. Calculate the final velocity of Jim.

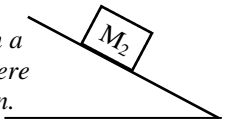
    B. Which has more momentum afterwards: Jim or the football?



Looking down on the object. There is friction.



Object on a ramp. There is friction.

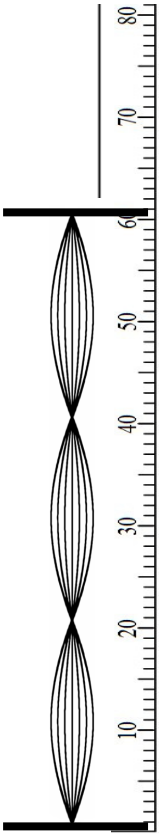


18. Draw the force diagrams for both of the above objects.

19. A 45 kg object is 18 m from a 150 kg object.
    A. Calculate the gravitational force between them.

    B. If the distance between them is doubled, how does the force change?

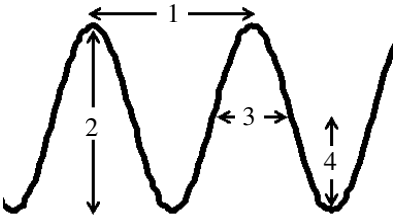
20. Two waves are pulsed on slinkies.



A. 

B. 

___ A transverse wave.
___ A longitudinal wave.
___ Like sound.
___ Like light.
___ Like earthquakes.
___ Amplitude affects its speed.



21. A wave passes a point as shown. Which number shows:
    A. Double the amplitude
    B. Amplitude
    C. Wavelength
    D. Half λ

22. How do you make the period of a pendulum faster (2 ways)?

23. If a spring mass system is moved to the moon: would it vibrate faster or slower?

24. The diagram at the left shows a standing wave on a string in front of a mater stick. The frequency of the standing wave is 100 Hz.
    A. Calculate the speed of the wave on the string.

    B. If the frequency increases, the wave speed will: the wavelength will:
    C. What would be the frequency of the sound we hear in the air?

    D. Would we be able to hear this sound?

Helps, Hints and Hallucinations for Magnetism 3:

1) Right side; 2A) out of page; 3A) T; 3B) P; 3C) T; 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)
9) west (fingers point north [obviously]; thumb point straight up toward sky; your palm faces west)
11G) 70 volts
13A) add up the individual currents. The current in the first branch = 6V/6Ω = 1A.
13F) use V = IR for each individual resistor. In thus example R = 4Ω.
16) I = Ft 18B) Ramp—remember that the force pulling it down the ramp IS NOT a force, itself, just a component.
19) see equation box at right.

Newton's Law of Universal Gravitation