A-day: Due Thurs., May 3 (Assigned 5/1)
B-day. Due Fri., May 4 (Assigned 5/2)
(B-day: I'll be gone keep it until I get back)

Magnetism 6

Equation
$\text{emf} = -N\frac{\Delta(AB\cos\theta)}{\Delta t}$

Variable	Unit	Var Name	Notes
A	m^2	area	Area of a loop of wire.
θ	degrees	Theta	Angle between normal of loop and B
emf	volts	emf	Induced voltage in a loop due to B
N	none	# of loops	# of loops in a coil or transformer

1. Write the above information on your equation and variable list.
2. Assign variable to the following:

A) _____ = 12 volts
B) _____ = 4 kg
C) _____ = 18 J
D) _____ = 3 m^2
E) _____= 35 turns
F) _____= 76 kgm/s
G) _____= 9 seconds
H) _____= 60 T
I) ____ = 5 meters
J) ____ = 45 Ω
K) ____ = 15 watts
L) ____ = 10º

3. What is the equation for the area of a circle?

4. What is the equation for the area of a rectangle?

5. A 15 loop coil loop is positioned 15º away from a 2 T field. If each loop has a radius of 2 cm, how much emf is created in the loop if it is moved out of the field in 0.5 seconds?

6. From our previous homeworks (you can figure it out by drawing, if you need to).
   A) Two current carrying wires with the currents going the same direction repel or attract each other?
   B) Two current carrying wires with the currents going opposite directions repel or attract each other?

Let's see if I can make the RHR moving a wire or causing a current (induction) easier.

7. What always causes motion?

8. In the lab I put the large horseshoe magnet around a wire. Did the wire move before I turned the electricity on?

9. When I turned the electricity turned on and a current was flowing thru the wire the wire did what?

10. Why (what caused the above)?

11. When a wire is moved in a magnetic field, is it the magnetic field moving the wire?

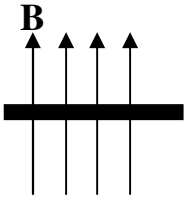
12. When a wire is moved into a magnetic field a current moves in the wire. What moves this current?

13. The palm of your hand in the right-hand rule is what?

OK (this the BIG OVERARCHING RULE) - ***Whatever is moved by the magnetic field is the palm.*** *The charges must be already moving (whether by there being a current in a wire already or by the wire being moved). Then the magnetic field pulls or pushes (exerts a force) on these moving forces.*

14. A wire is inside a magnetic field as shown on the right.
   A) If a current is put thru the wire by an external power source going to the right, which way does the wire move?

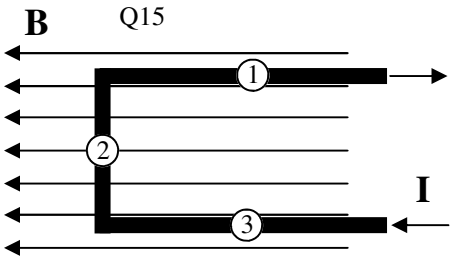
   B) If the wire is pushed into the page, which direction is the induced current in the wire?



Magnetism 6

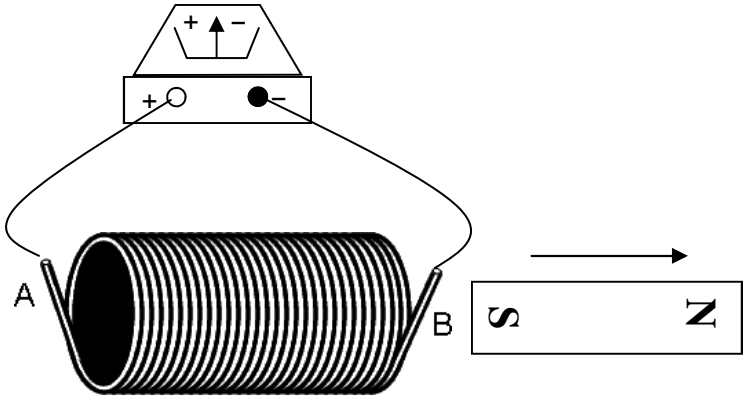
15. Is the current flowing up or down in segment 2 of the wire?
16. The current is due to an external power supply.
    A) What is the direction of the force on segment 1?
    B) What is the direction of the force on segment 2?
    C) What is the direction of the force on segment 3?

Q15

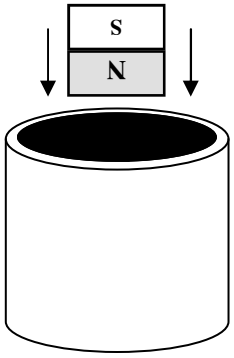


17. If the current shown is an induced current, which way would segment 2 have to be moved to create the current?

18. If the following magnet is moved into the solenoid,
    A) Which direction is North of the induced magnet?
    B) From which side of the solenoid will the positive current com out?
    C) Will the ammeter read + or – ?

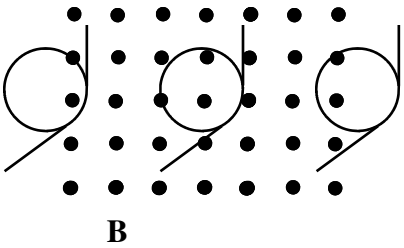


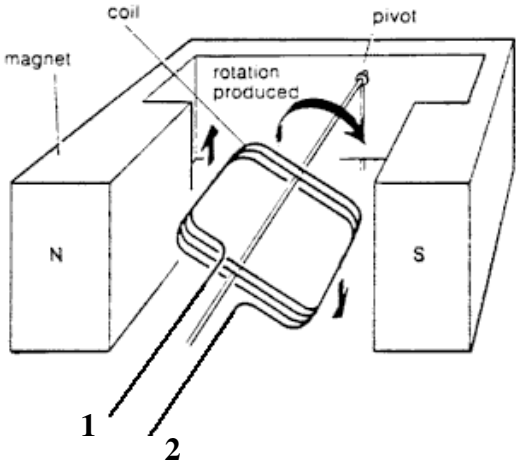
Q19



19. If the magnet is dropped thru the copper tube,
    A) label the ends of the tube as N and S;
    B) draw the direction of the induced current be flowing in the tube?

20. A wire coil is moved from left to right into and out of a constant magnetic field. *(I don't care if you use Lenz' Law or RHR.)*
    A) Find the direction of the current in the loop when it enters the field (left most position.)
    B) Find the direction of the current in the loop when it is completely in the field (center position.)
    C) Same for the right position.





21. The picture at the left shows a loop of wire being rotated clockwise in between the poles of a horseshoe magnet.
    A) Which direction does the magnetic field point?
    B) In which position is the induced emf the greatest: when it is horizontal or when it is vertical?
    C) If I am rotating the wire coil, is it a generator or a motor?
    D) How could you make it the other one?

    E) In the position it is in right now (with the left side of the coil moving up) which end of the wire will current come out: end 1 or end 2?