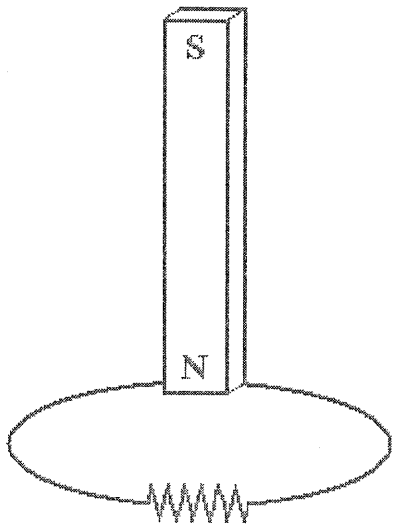
PHYS – 1120 Discussion #13, Chapter 20 and Chapter 19 Review
Applying Lenz' Law

Consider the bar magnet shown in the figure below. It is falling through the loop of wire with a constant velocity and with the north pole entering first.



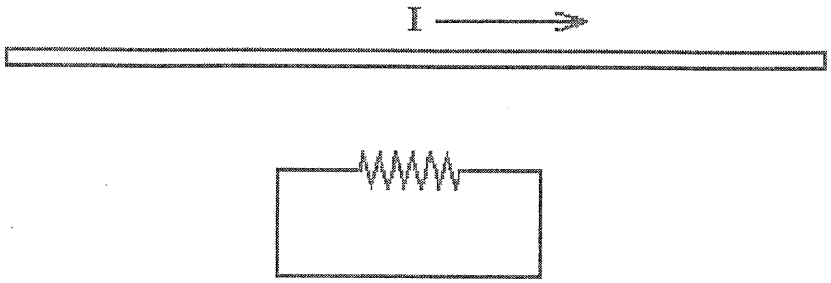
1. The current moving through the resistor will be best described as _____.

a.	from right to left	e.	both a and c
b.	from left to right	f.	both a and d
c.	in a clockwise fashion	g.	both b and c
d.	in a counterclockwise fashion	h.	both b and d
		i.	zero

2. After the magnet passes through the loop of wire and is moving away, the current moving through the resistor will be best described as _____.

a.	from right to left	e.	both a and c
b.	from left to right	f.	both a and d
c.	in a clockwise fashion	g.	both b and c
d.	in a counterclockwise fashion	h.	both b and d
		i.	zero

Consider the figure below.



3. As the current in the long straight wire in the figure above is rapidly increasing from zero to a steady-state value, the current moving through the resistor will be best described as _____.

a. from right to left
b. from left to right
c. in a clockwise fashion
d. in a counterclockwise fashion
e. both a and c
f. both a and d
g. both b and c
h. both b and d
i. zero

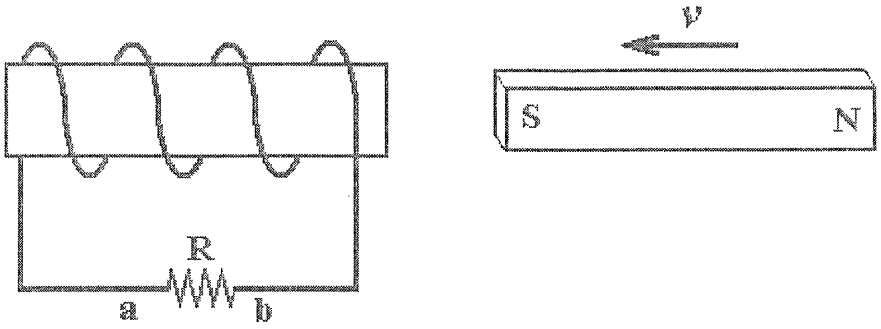
4. If the current in the long straight wire in the figure above is held constant, the current moving through the resistor will be best described as _____.

a. from right to left
b. from left to right
c. in a clockwise fashion
d. in a counterclockwise fashion
e. both a and c
f. both a and d
g. both b and c
h. both b and d
i. zero

5. If the current in the long straight wire in the figure above is held constant while the wire is moved upward away from the loop containing the resistor, the current moving through the resistor will be best described as _____.

a. from right to left
b. from left to right
c. in a clockwise fashion
d. in a counterclockwise fashion
e. both a and c
f. both a and d
g. both b and c
h. both b and d
i. zero

Consider the figure below.



6. As the magnet moves to the left as shown in the figure above, the current moving through the resistor will be best described as _____.

a. from right to left
b. from left to right
c. zero

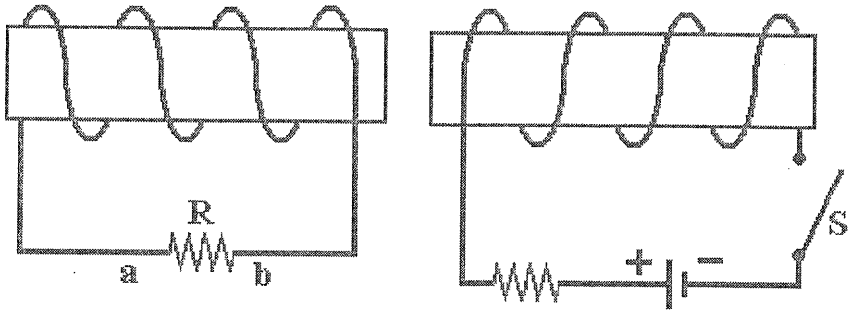
7. As the magnet moves to the left as shown in the figure above, the potential difference $V_b - V_a$ will be best described as _____.

a. Positive
b. Negative
c. zero

8. If the magnet is held stationary just to the right of the solenoid, the current moving through the resistor will be best described as _____.

a. from right to left
b. from left to right
c. zero

Consider the figure below.



9. When the switch, S, is closed in the figure above, the current moving through the resistor, R, will be best described as _____.

a. from right to left
b. from left to right
c. zero

10. When the switch, S, is closed in the figure above, the potential difference $V_b - V_a$ will be best described as _____.

a. Positive
b. Negative
c. zero

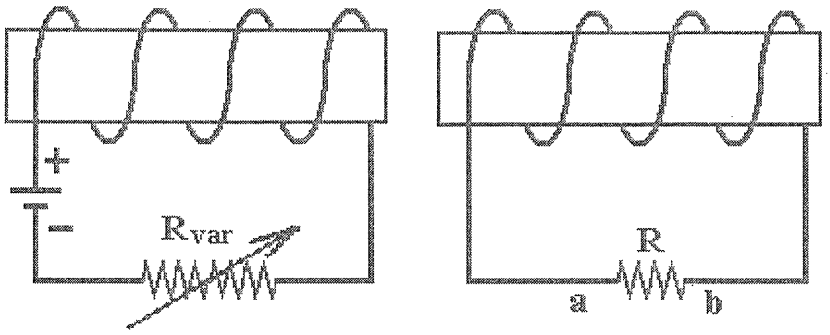
11. If the switch, S, remains closed for a long time in the figure above, the current moving through the resistor, R, will be best described as _____.

a. from right to left
b. from left to right
c. zero

12. If the switch, S, remains closed for a long time in the figure above and the left solenoid is moved to the left, the current moving through the resistor, R, will be best described as _____.

a. from right to left
b. from left to right
c. zero

Consider the figure below. Two solenoids are aligned along their mutual axes (referred to as being "coaxial") and are fairly close to each other without touching. The left solenoid has a variable resistor (R_{var}) which allows the resistance in the circuit to be changed easily and smoothly.



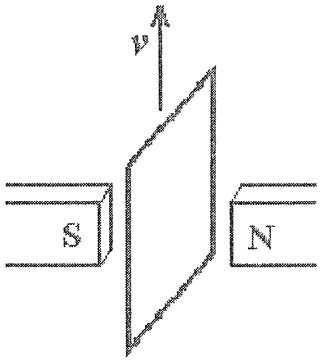
13. While the resistance of the variable resistor in the left-hand circuit is increased at a constant rate, the induced current through the resistor R will _____.

a. flow from a to b

b. flow from b to a

c. be zero because the rate of change of the resistance R_{var} is constant

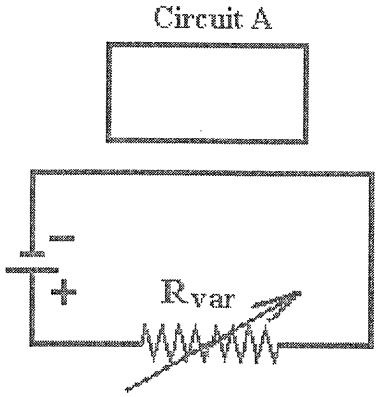
Consider the figure below. A square loop of wire is pulled upward out of the space between the poles of a magnet.



14. As this is done, the current induced in this loop, as viewed from the N pole of the magnet, will be directed _____.

a. clockwise b. counterclockwise c. zero

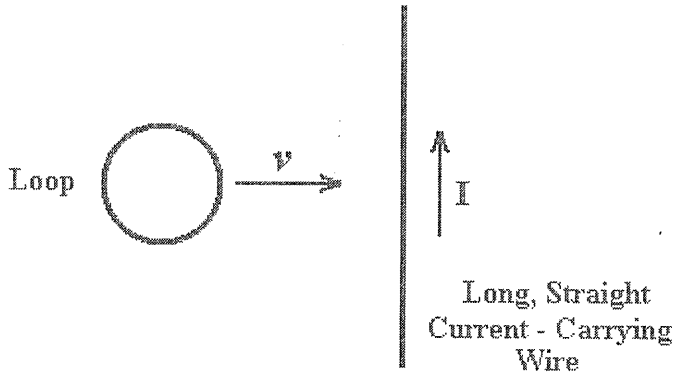
Consider the figure below. The lower circuit has a variable resistor (R_{var}) which allows the resistance in the circuit to be changed easily and smoothly.



15. While the resistance of the variable resistor in the lower circuit is decreased at a constant rate, the induced current through Circuit A will be directed _____.

a. clockwise b. counterclockwise c. zero

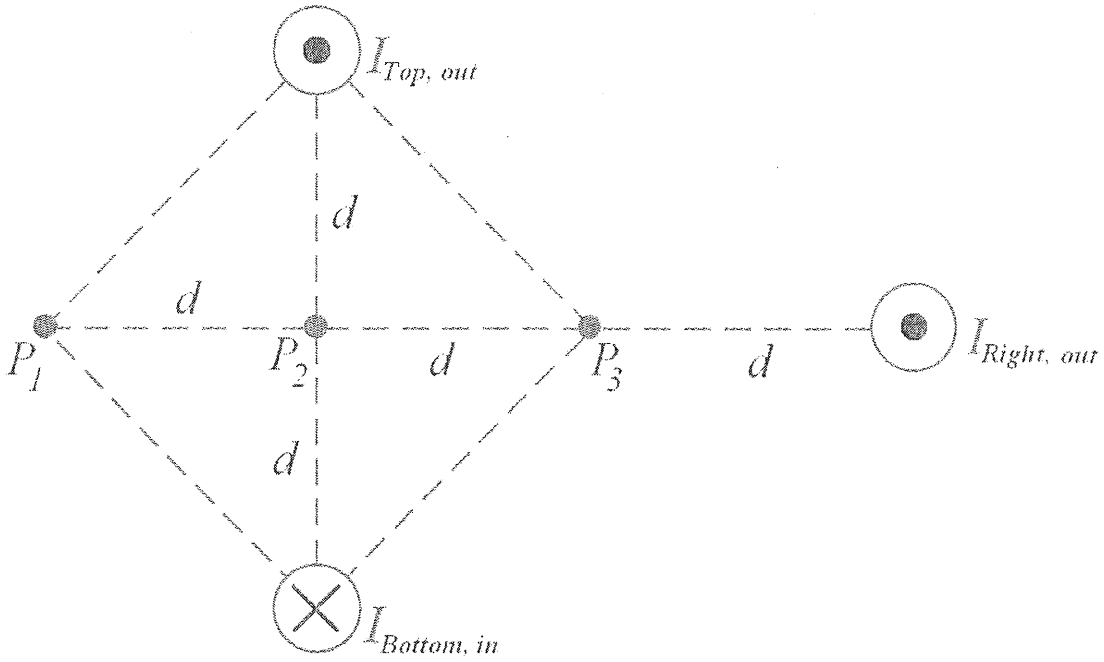
Consider the figure below. A metal loop moves in the plane of the page at constant velocity toward a long wire carrying a steady current, I.



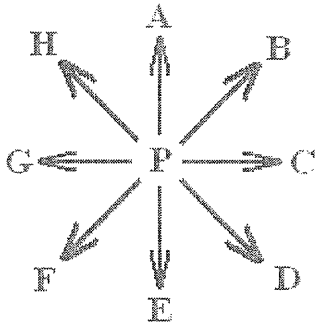
16. The current induced in the metal loop is directed _____.

a. clockwise b. counterclockwise c. zero

17. Three long, parallel conductors carry currents of equal magnitude. The end-view of each wire along with points P_1, P_2 and P_3 are shown in the figure below. Currents I_{Top} and I_{Right} are directed out of the page (+ z direction). Current I_{Bottom} is directed into the page (– z direction). All distances indicated by d are the same.

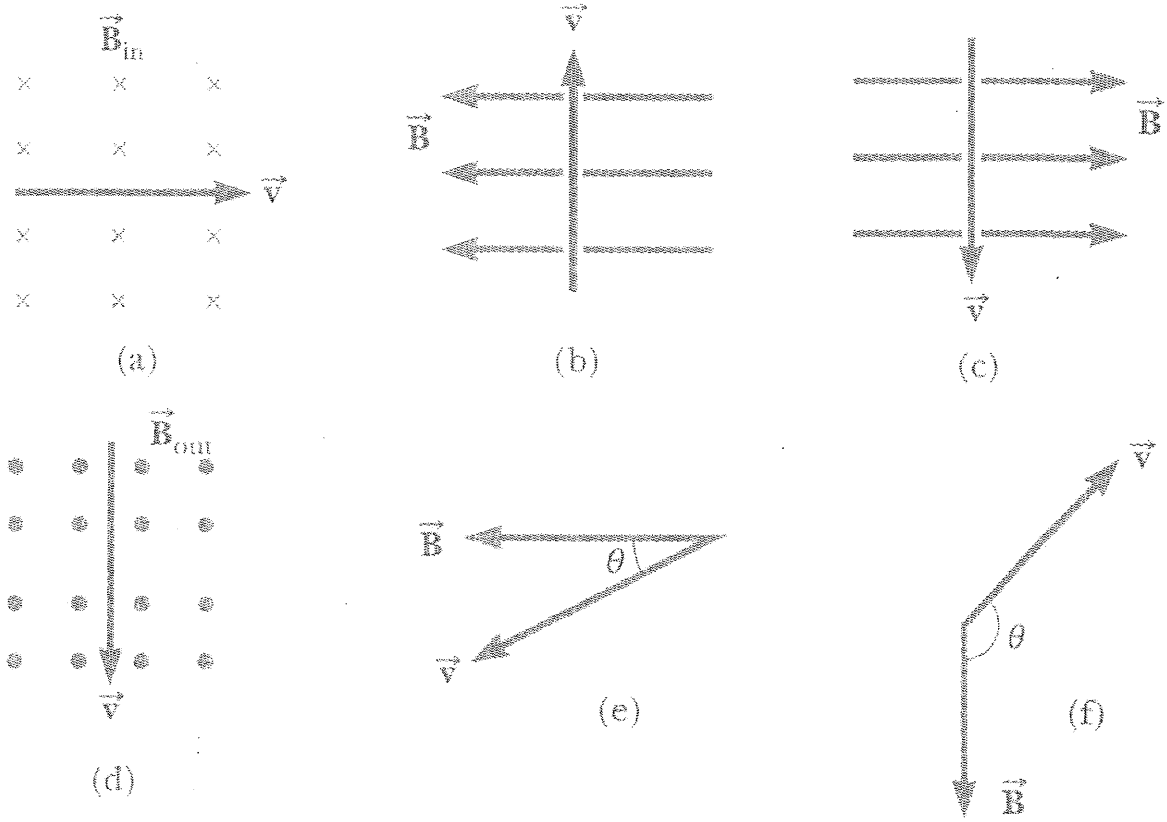


Use the figure below to select the correct letter to indicate the direction of the magnetic field created by each wire at each point. Enter the correct letter in the table below the figure.



Wire current → / Point	I_{Top}	I_{Bottom}	I_{Right}
P_1	_____	_____	_____
P_2	_____	_____	_____
P_3	_____	_____	_____

18. Find the direction of the force on an electron moving with the velocity shown through uniform magnetic fields in the directions indicated. Give your answers for the direction of the force as follows: + x (to the right), – x (to the left), + y (up), – y (down), + z (out of page) or – z (into page).



(a) _____ (b) _____ (c) _____

(d) _____ (e) _____ (f) _____

PHYS – 1120 Discussion Chapter 20 and Chapter 19 Review Solutions

Completion of all 18 problems in this handout constitutes a 10-Point problem. For credit, be able to explain how you applied Lenz' Law or the Right-Hand Rule in your solution strategies to your discussion instructor.