Chapter 5 Questions   **Name:** _____

Electrical Charges

1. Opposite charges *attract* / *repel* each other. (circle one) *[attract circled]*
2. Like charges *attract* / *repel* each other. (circle one) *[repel circled]*
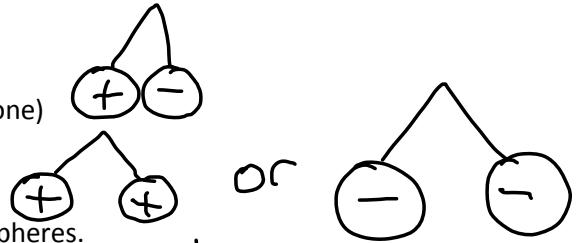
3. The following experiment is set up using charged spheres.

[handwritten diagrams: spheres with + and – signs, labeled OPP attract, like repel, opp attract; spheres A B, B C, C D with + – – – – + below]

[handwritten top right: (+ –) over (+ +) or (– –)]
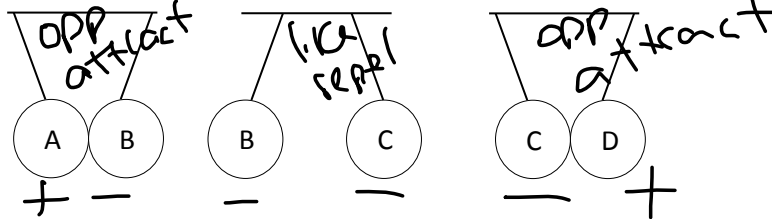
   Spheres A and D are then set up side by side, as well as spheres B & D. Which diagram below correctly shows what would happen?

   A) *[diagram: A D together, B D apart]*   C) *[diagram: A D apart, B D apart]*

   B) *[circled]* *[diagram: A D apart, B D together]*   D) *[diagram: A D together, B D together]*
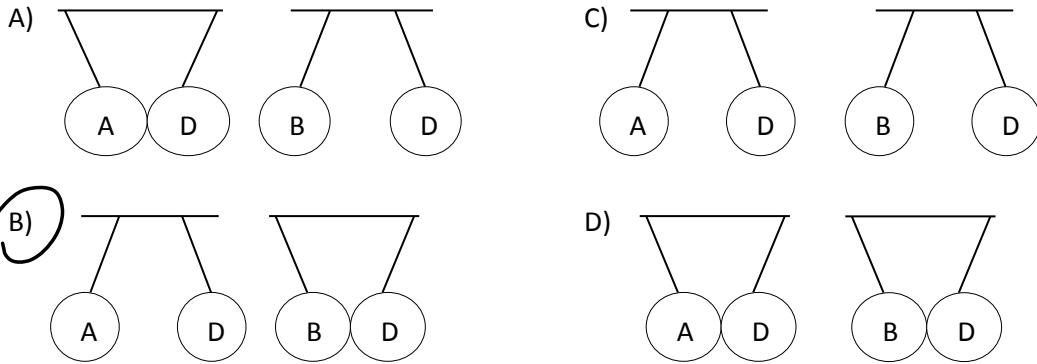
4. If A is positively charged, what is the charge of C? __positive__

[handwritten diagrams: + A, + B, + B, C +]
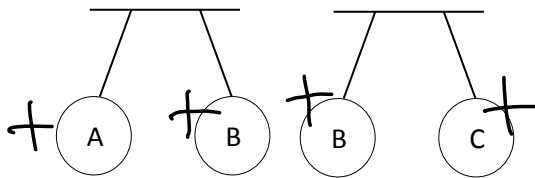
5. Based on the electrostatic series, (found on the next page) if silk is rubbed on a glass rod - which one is gaining electrons? *Silk would gain electrons, and get a negative charge*

6. What would happen if you used a cotton cloth to wipe your glass window clean?
   A) The glass window would become negatively charged
   B) *[circled]* The cotton cloth would become negatively charged
   C) The cotton cloth would become positively charged
   D) The glass window & cotton cloth would stay neutrally charged

Electrostatic Series	
TENDENCY	SUBSTANCE
Acquire a Negative Charge	Rubber
	Ebonite Polyethylene (Plastic) Cotton Silk Wool Glass Acetate
Acquire a Positive Charge	Fur

Memorize units! (handwritten)

Ohm's Law, Electrical Power & Energy Consumed Questions

1. What units are used for the following variables?

   I – Current Intensity __amps (A)__

   V – Potential Difference __volts (v)__

   R – Resistance __ohms (Ω)__

   P – Electrical Power __watts__ or __kilowatts__

   E – Electrical Energy __joules__ or __w/h__ or __kw/h__

   T – time __secs__ (when E is __joules__) or __hours__ (when E is in __w/h__) __or kw/h__

2. A 6kW appliance is turned on for 20 minutes, how much energy (in watt-hour) did it use?

$$P = 6kW \xrightarrow{\times 1000} 6000 \, w$$
$$t = 20 \, mins \xrightarrow{\div 60} 0.33 \, h$$
$$E = ? \, w/h$$

$$E = P \cdot t$$
$$= 6000 \, w \cdot 0.33 \, h$$
$$= 1980 \, w/h$$

3. A circuit consists of a 21 V battery connected across a single resistor. If the current in the circuit is 3 A, calculate the size of the resistor (calculate the resistance).

$$V = 21 \, v$$
$$I = 3 \, A$$
$$R = ? \, \Omega$$

$$R = \frac{V}{I} \qquad R = \frac{21v}{3A} \qquad R = 7 \, \Omega$$

4. A 20-volt relay has a coil resistance of 200 ohms. How much current does it draw?

$$V = 20 \, v$$
$$R = 200 \, \Omega \qquad I = ? \, A$$

$$I = \frac{V}{R} \qquad I = \frac{20v}{200\Omega} \qquad I = 0.1 \, A$$

5. A 500W appliance is turned on for 180 minutes. How much energy in watt-hour was used by the appliance?

$P = 500w$
$t = 180\,mins \xrightarrow{\div 60} 3\,h$
$E = ?\,w/h$

$E = P \cdot t$
$= 500w \cdot 3h$
$= 1500\,w/h$

6. A transformer is connected to 120 volts. Find the current if the resistance is 480-ohms

$V = 120v$
$R = 480\,\Omega$
$I = ?\,A$

$I = \dfrac{V}{R}$

$I = \dfrac{120v}{480\,\Omega}$

$I = 0.25A$

7. The price of electricity in Quebec is approximately $0.07 per kW·h. A student turns on a 60 watt light bulb for 7 hours every day for 30 days. What will be the monthly electric bill for the light bulb?

$P = 60w \xrightarrow{\div 1000} 0.06\,kW$
$t = 7h$
for 30 days $\} 210\,h$

$E = P \cdot t$
$= 0.06\,kW \cdot 210h$
$= 12.6\,kW/h$

Cost
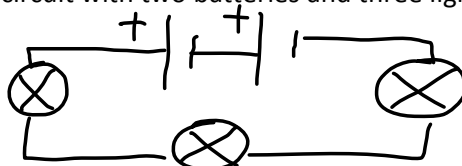$12.6\,kW/h$
$\times\ 0.07$
$\$0.88$

Circuits

1. What are the three elements a circuit needs for it to work?

o Power supply (battery)   o Resistance (light bulb, resistor)   o Wires
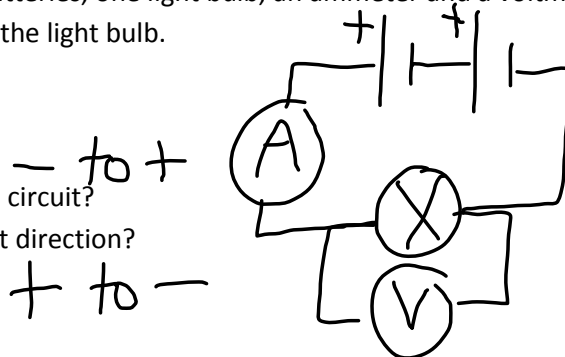
2. Draw a series circuit with two batteries and three light bulbs.

3. Draw a parallel circuit with one battery and three light bulbs.

4. Draw a circuit that includes two batteries, one light bulb, an ammeter and a voltmeter finding the potential difference of the light bulb.


5. Which way do electrons travel in a circuit?

− to +

6. Which way is conventional current direction?

+ to −

7. State whether the motor will work in the circuit below in the following situations:

a) Switch A is on, Switch B is off, the motor is __working__

b) Switch A is on, Switch B is on, the motor is __working__

c) Switch A is off, Switch B is off, the motor is __not working__

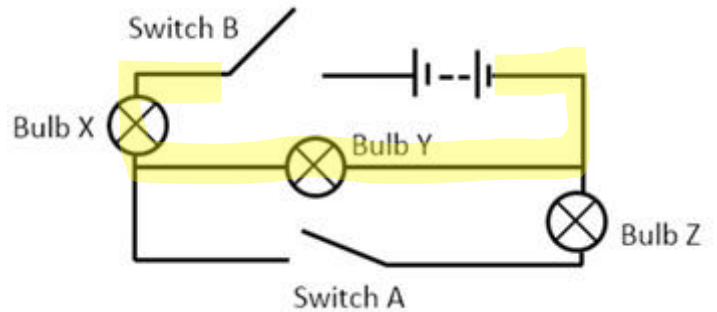d) Switch A is off, Switch B is on, the motor is __not working__

switch A   switch B

(M) motor
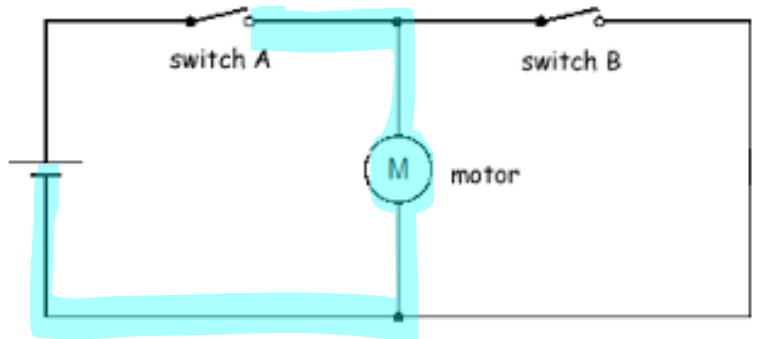
8. Which bulbs will turn on if switch A is closed and switch B is open?

__None !__

9. Which bulbs will turn on if switch A is open and switch B is closed?

__Bulb Y & X__

Switch B

Bulb X

Bulb Y

Bulb Z

Switch A

Magnets

1. Like poles *attract/repel* each other & Opposite poles *attract/repel* each other.
2. Each magnet has __2__ poles, a __north__ pole and a __south__ pole.
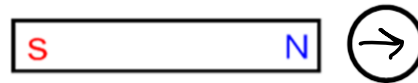3. Draw the magnetic field lines of the following:

a) [N]   b) [N]   [N]
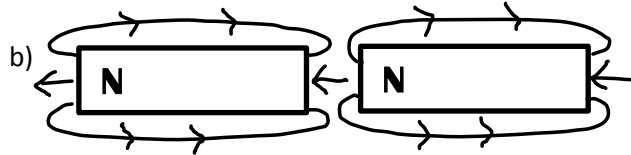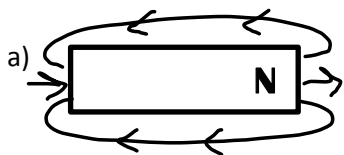
4. Where would the compass' be pointing if placed in the following locations near the magnets?
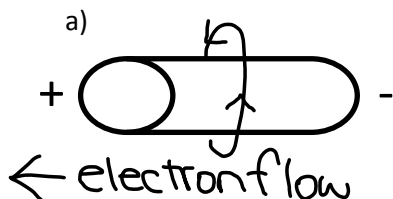
a) [N   S] (→)

b) [S   N] (→)
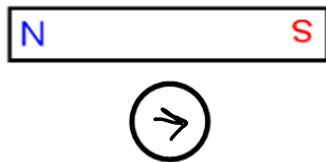
5. Which way is the current flowing on the following?

a) + (○) - ← electron flow

b) + electron flow