Key

Electrostatics and Circuits Review 17-18 **Name:** _____

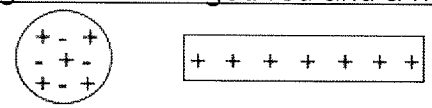
Book Problems:

Pg 578 #3, 7, 14 (keys online)

APlus Physics.com Problems: 3,4,5,7,11

Review Problems: (this is not all inclusive: this is a general reflection of the assessment)

Use the diagram of a charged rod and a neutral sphere to answer questions 1-3:



1. When the rod is brought near (not touching) the sphere, how will the charges appear?

a. 

b. 

c. 

d. 

c. → rod polarizes ball

2. If the sphere is free to move when the rod is brought close (not touching), what happens?
   a. The sphere stays still.
   b. The sphere moves toward the rod. → opposite charges attract
   c. The sphere moves away from the rod.
   d. The sphere circles the rod in a constant circular pattern.

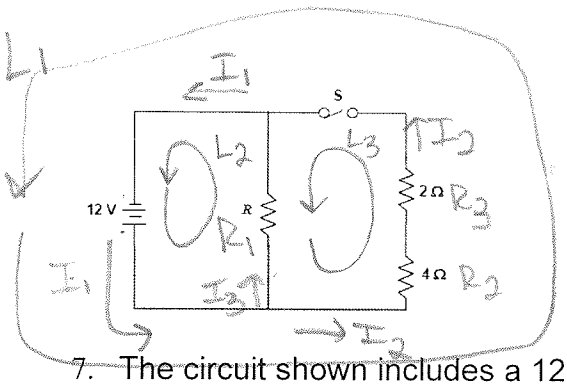
3. After the rod touches the sphere, what will the sphere do?
   a. Stay still.
   b. Move toward the rod.
   c. Move away from the rod. → conduction has occurred, so both rods now have same charge, and repel
   d. Create a variable electric field.

4. A neutral metal sphere is touched by a negatively charged rod. After touching, the charge of the sphere is _____ and the charge of the rod is _____.
   a. positive, negative
   b. negative, positive
   c. negative, neutral
   d. negative, negative

5. Which statement best explains why pieces of paper are attracted to a charged rubber rod?
   a. Paper is naturally a positive material.
   b. The charged particles in the paper become polarized.
   c. The paper acquires a positive charge by induction.
   d. The paper gains a negative charge by conduction.

6. The magnitude of the force of attraction between two point charges is F. If the magnitude of each point charge is doubled, and the distance between the charges is doubled, what is the new magnitude of the force of attraction between the point charges?
   a. F/2
   b. F
   c. 2F
   d. 4F

$\vec{F}_e = k\frac{q_1 q_2}{r^2}$ $\vec{F}_e = k\frac{2q_1 2q_2}{2r^2}$



$I_1 = I_2 + I_3$; $I_1 = 3.0\,amps$

$L_1\ \Delta V = 0V = V_{batt} - V_{R_2} - V_{R_3}$

$L_2\ \Delta V = 0V = V_{batt} - V_{R_1}$

$L_3\ \Delta V = V_{R_1} - V_{R_2} - V_{R_3}$

7. The circuit shown includes a 12 V battery, a resistor of unknown resistance R, an open switch, a 2 Ω resistor and a 4 Ω resistor. The switch is then closed so that a total current of 3.0 A flows in the circuit.

   a. Determine the current passing through the unknown resistor.

   *need to solve I_2 first ($I_1 = I_2 + I_3$; $I_1 = 3.0\,amps$)

   $L_1\ \Delta V = 0V = V_{batt} - V_{R_2} - V_{R_3} = 12V - I_2 2\Omega - I_2 4\Omega$

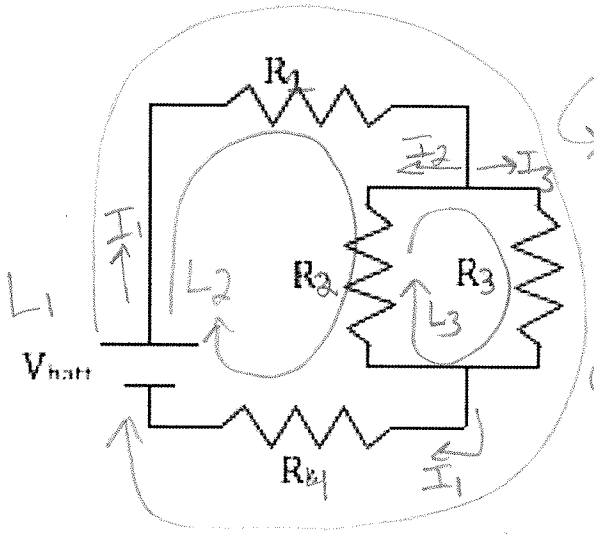
   $I_2 = 2\,amps$

   $\hookrightarrow I_3 = I_1 - I_2 = 3.0\,amps - 2.0\,amps = 1.0\,amps$

   b. Determine the value of the unknown resistor R.

   $L_2\ \Delta V = 0V = 12V - I_3 R_1 = 12V - (1.0\,amps) R_1 = 2.0\,\Omega$

8. For the circuit below, determine the Kirchhoff loop equations for all loops.



$L_1\ \Delta V = 0V = V_{batt} - V_{R_1} - V_{R_3} - V_{R_4}$

$\hookrightarrow 0V = V_{batt} - I_1 R_1 - I_3 R_3 - I_1 R_4$

$L_2\ \Delta V = 0V = V_{batt} - V_{R_1} - V_{R_2} - V_{R_4}$

$\hookrightarrow 0V = V_{batt} - I_1 R_1 - I_2 R_2 - I_1 R_4$

$L_3\ \Delta V = 0V = V_{R_2} - V_{R_3}$

$\hookrightarrow \Delta V = 0V = I_2 R_2 - I_3 R_3$