Name: KEY Period: ____

Electricity Test Review

Use this review as well as your notes, quizzes, and labs from this unit to help you prepare for your test.

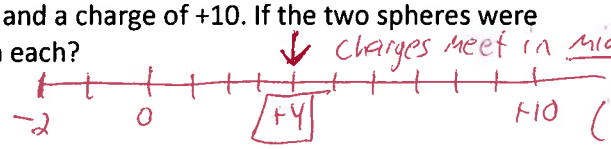
1. Opposite charges attract, and like charges repel. (Notes pg 1)
2. Marge rubs a rubber balloon on her dog's hair, causing the balloon to become negatively charged. (Notes pg 1)
   a. The balloon gained (gained/lost) electrons (electrons/protons).
   b. The dog's hair lost (gained/lost) electrons (electrons/protons).
3. According to Coulomb's Law, what would happen to the Force between two charges if the distance between them (r) increased? (Would it increase or decrease?) (Notes pg. 3)

   $F = \frac{k_c q_1 q_2}{r^2}$ it would decrease
4. In a series circuit, current (current/voltage) is constant, and in a parallel circuit, voltage (current/voltage) is constant. (Notes pg 7)
5. What is Ohm's Law? $V = IR$ (or $I = \frac{V}{R}$)
   a. What would happen to the current in a circuit if the voltage increased?

      It would increase.
   b. How would the current in a circuit be affected if the resistance increased?

      It would decrease.
6. An atom has 9 electrons and 7 protons. What is the net charge on the atom? (Notes pg 3)

   $(-9) + 7 = \boxed{-2}$
7. Two identical metal spheres are given a charge of -2 and a charge of +10. If the two spheres were brought together, what would the final charge be on each? (Notes pg 3)

   $\boxed{+4}$
8. A charge of 10 μC is placed in an electric field so that the force exerted on it is 9.5 Newtons. What is the magnitude of the strength of the electric field? (Notes pg 5)

   $10\,\mu C = 10 \times 10^{-6} C$

   $F = qE$

   $9.5 = (10 \times 10^{-6}) E \rightarrow E = \frac{9.5}{10 \times 10^{-6}}$

   $\boxed{E = 9.5 \times 10^{5}\ N/C}$ (or 950,000 N/C)
9. A light bulb has a resistance of 8Ω and is connected to a 12-Volt battery. How much current is running through the bulb? (Notes pg 7)

   $V = IR$

   $12 = I(8) \rightarrow I = \frac{12}{8}$

   $\boxed{I = 1.5\ Amps}$
10. A 1,500 μF capacitor is connected to a 12-Volt battery. How much charge is stored in the capacitor? (Notes pgs 8-9)

    $1500\,\mu F = 1500 \times 10^{-6} F$

    $C = \frac{Q}{V}$

    $1500 \times 10^{-6} = \frac{Q}{12} \rightarrow Q = (1500 \times 10^{-6})(12)$

    $\boxed{Q = 0.018\ Coulombs}$

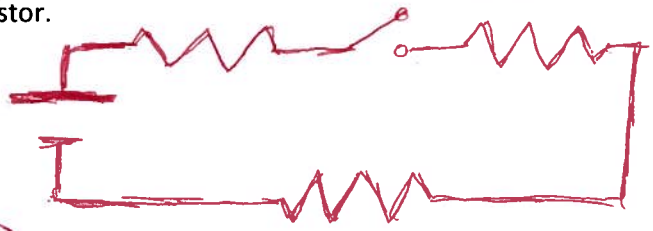
11. What is an electrical conductor and what is an insulator? Give one example of each. (Notes pg 2)

-Conductor - Allows electricity to flow through it easily. example: metal

-Insulator - Strongly resists the flow of electricity. example: rubber, glass, wood.

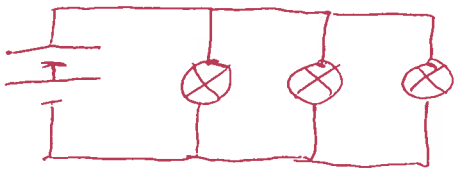
12. Sketch an example of a...

c. Series circuit with a power source and that has 3 resistors and 1 switch between the 1st and 2nd resistor.



(Notes pg 7)

d. ~~Parallel~~ circuit with 3 light bulbs and 2 batteries



13. A blender is connected to a 120 Volt circuit and experiences 2 Amperes of current flowing through it.

(Notes pg 7)

a. What is the ~~resistance~~ of the blender?

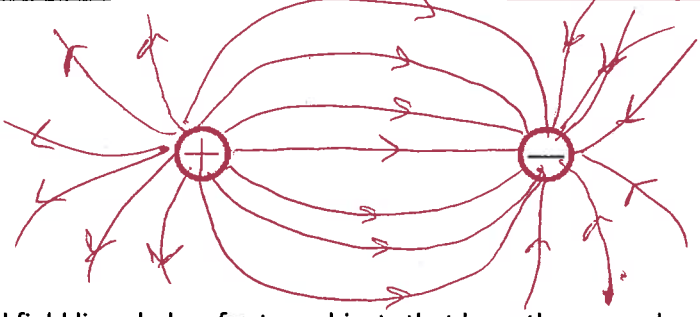
$V = IR$ → $R = \frac{120}{2}$

$120 = (2)R$ → $R = 60\,\Omega$

b. What is the *power* usage of the blender?

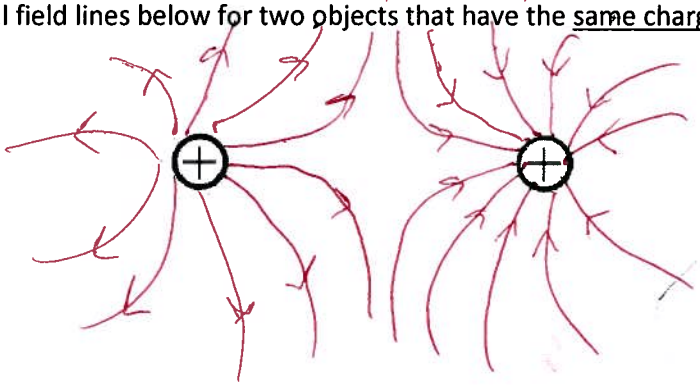
$P = IV = (2)(120) = 240$ Watts

14. Draw electric field lines below for two objects that have opposite charges.



(Notes pg 4)

15. Draw electrical field lines below for two objects that have the same charge.



(Notes pg 4)

16. What is charge polarization? Draw an example of charges being polarized on the sphere.

Charges on a neutral object separate. (Notes pg 2)

17. When pieces of string are attached to a Van de Graff generator and it is turned on, they stand on end, like in the picture to the right. Explain why this happens.

The string picks up the same charge as the Van de Graaf, and the like charges all repel

18. Sam has a charge of +9μC and is standing 0.5 meters from Alice who has a charge of -15μC.
    a. How much electrical force do they exert on one another?

$$F = \frac{k_c q_1 q_2}{r^2} = \frac{(9\times10^9)(9\times10^{-6})(15\times10^{-6})}{(0.5)^2} = 4.86\,N$$

    b. Is the force attractive or repulsive?

attractive (opposite charges)

19. A charge of -25μC exerts a force of 75 Newtons on a charge of +18μC. How far apart are the two charges? (Notes pg 3-4)

$$F = \frac{k_c q_1 q_2}{r^2} \rightarrow 75 = \frac{(9\times10^9)(25\times10^{-6})(18\times10^{-6})}{r^2}$$

$$75 = \frac{4.05}{r^2}$$

(multiply each side by r^2 to put it in the numerator)

$$75r^2 = 4.05$$

$$r^2 = \frac{4.05}{75}$$

$$r = \sqrt{\frac{4.05}{75}} \rightarrow r = 0.2$$

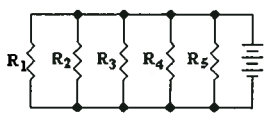
20. A 2Ω resistor, 6 Ω resistor, and a 12Ω resistor are all connected in a parallel circuit. What is the equivalent resistance of the circuit?

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$\frac{1}{R_p} = \frac{1}{2} + \frac{1}{6} + \frac{1}{12} \rightarrow \frac{1}{R_p} = \frac{3}{4} \rightarrow \frac{R_p}{1} = \frac{4}{3} \rightarrow R_p = 1.33\,\Omega$$

(flip the fraction to get R_p in numerator)

21. Complete the table of values for the circuit below



parallel

	V	I	R
Total	6 V	7.42 A	0.81 Ω
R_1	6 V	0.67 A	9 Ω
R_2	6 V	0.25 A	24 Ω
R_3	6 V	3 A	2 Ω
R_4	6 V	0.5 A	12 Ω
R_5	6 V	3 A	2 Ω

Electricity Formulas

$$F = k_c \frac{q_1 q_2}{r^2} \qquad V = IR \qquad R_S = R_1 + R_2 + R_3 + \cdots$$

$$k_c = 9.0\times10^9 \frac{Nm^2}{C^2} \qquad P = IV \qquad \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \cdots$$

$$F = qE \qquad C = \frac{Q}{V}$$