

Final Exam Electrostatics Review

Chapters 32, 33

Equations:

$$F_e = \frac{kq_1q_2}{d^2} \qquad E = \frac{F}{q} \qquad E = \frac{kQ}{d^2} \qquad V = \frac{PE_e}{q}$$

Constants: $k = 9 \times 10^9 \text{ Nm}^2/\text{C}^2$ $e = +/- 1.6 \times 10^{-19} \text{ C}$

Concepts:

1. A positively charged object has
 - a. Gained protons.
 - b. Lost protons.
 - c. Gained electrons.
 - d. Lost electrons.

2. Negatively charged objects will attract
 - a. Only positively charged objects.
 - b. Only negatively charged objects.
 - c. Positively or negatively charged objects.
 - d. Positively or neutral objects.

3. A Styrofoam plate is rubbed with fur and acquires a negative charge. This is an example of
 - a. Charging by contact.
 - b. Charging by induction.
 - c. Charging by friction.
 - d. Ohm's Law

4. A positively charged glass rod is placed close to, but not touching an electroscope. The bottom of the electroscope is
 - a. Positive
 - b. Negative
 - c. Neutral

5. _____ Law states that the force between any two charged objects is proportional to the product of the charges and inversely proportional to the square of the distance between them.
 - a. Ohm's
 - b. Newton's 3rd
 - c. Conservation of energy
 - d. Coulomb's

6. Electric field lines radiate outward from ___ charges.
 - a. Positive
 - b. Negative
 - c. Both positive and negative

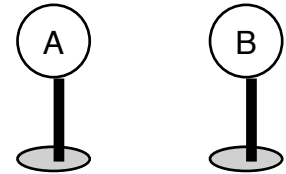
7. The metal sphere of the Van de Graaff generator is charged. The electric field inside of the metal sphere
 - a. is very large.
 - b. is zero.
 - c. points outward.
 - d. points inward.

8. Electric potential energy divided by charge is called ___ and is measured in ____.

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- a. force, newtons
 b. electric field, Newtons/Coulomb
 c. electric energy, joules
 d. electric potential, volts
9. Assuming that you started off with two neutral insulators, and you charged them by rubbing them together, what is true about the charges on the two objects? What particles move and why?
10. Imagine you have two identical metal spheres on insulating stands, labeled A and B. For each of the questions below, you are given what the charges are on each sphere – tell what will happen to the charges if you touch them together.

- a. $A = +4$ & $B = 0$ $A = \underline{\hspace{1cm}}$ & $B = \underline{\hspace{1cm}}$
 b. $A = 0$ & $B = -6$ $A = \underline{\hspace{1cm}}$ & $B = \underline{\hspace{1cm}}$
 c. $A = +5$ & $B = +5$ $A = \underline{\hspace{1cm}}$ & $B = \underline{\hspace{1cm}}$
 d. $A = +2$ & $B = -2$ $A = \underline{\hspace{1cm}}$ & $B = \underline{\hspace{1cm}}$
 e. $A = +4$ & $B = -2$ $A = \underline{\hspace{1cm}}$ & $B = \underline{\hspace{1cm}}$



Problems:

1.
 - a. Calculate the force between two $3 \mu\text{C}$ charges that are 0.5 m apart.
 - b. How many electrons are missing in a charge of $3 \mu\text{C}$
2.
 - a. Sketch the electric field that surrounds a $+1\text{C}$ charge.
 - b. What is the strength and direction of the electric field 1 m to the right of the charge.
 - c. If a 0.002 C test charge was placed 1 m to the right of the -1 C charge what would be the force on the test charge?
 - d. What is the direction of the force on the test charge?
3. It takes 6 J of work to move a charge of 2 C from point A to point B. What is the electric potential between these points?
4. A charge of $45 \mu\text{C}$ has $9 \times 10^{-4} \text{ J}$ of potential energy. What is the electric potential where the charge is?
5. A 3 C charge is at a spot with a potential difference of 120 V. How much potential energy does it have?

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