Electrostatics Review Handout

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-Electrostatics (or Static Electricity) is the study of stationary electric charges.

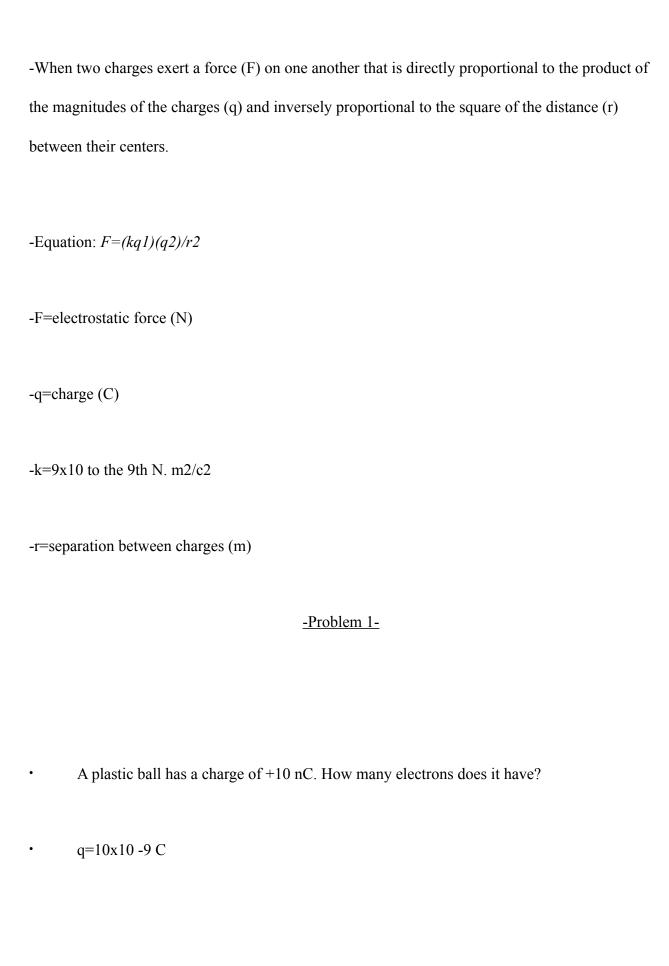
-Electrically Charged Objects-

- -Like charges will repel each other (positive repels positive; negative repels negative).
- -Unlike charges will attract each other (positive attracts negative charge).
- -Both negative and positive charges will attract neutrally charged objects.
- -Charge has everything to do with the balance of protons and electrons in an atom (more electrons=negative; more protons=positive; equal amounts=neutral).
- -Charge is conserved, meaning that neutral objects have no net charge (if two neutral objects touch/get rubbed together, one object gets a net negative charge, and the other gets a net positive charge, attracting the two objects).
- -Usually natural materials (your hair) tend to lose electrons, synthetic materials (like plastic) tend to gain electrons, and some materials (like wood) tend to stay neutral.

-Basic Electrostatics Vocabulary-

- -Conductor- Material that electric charges can easily flow through.
- -Insulator- Material that electric charges **DO NOT** easily flow through.
- -<u>Electroscope</u>- Device used to indicate existence of a charge.
- -There is also an electrostatic generator used to accumulate or create an electric charge; aka the Van de Graaff Generator.

-Coulomb's Law-



1 electron=1.6x10 -19 C $(1 \text{ electron}/1.6x10 - 19 \text{ C})(10x10 - 9 \text{ C}) = 6.25x10 \ 10 \text{ electrons}$ -Problem 2-What is the magnitude and direction of the force on a charge of +4 nC that is 5cm from a charge of +50 nC q1 = +4x10 - 9 Cq2=+50x10 - 9 Cr = .05 m $F=(kq1)(q2)/r2=9x10\ 9(4x10\ -9)(50x10\ -9)/(0.05)\ 2=7.2x10\ -4\ N$, which is repulsive (away from each other) -Problem 3-Consider two charged objects. One carries a charge of 18 uC. When the two are separated by a distance of 0.9m, there is a force of 2.7 N between them. What is the charge on the second object?

q1=18x10 - 6 C

- r=0.9m
- F=2.7 N
- F=(kq1)(q2)/r2
- Fr2=(kq1)(q2)
- q2=Fr2/kq1=2.7(0.9)2/9x10 9(18x10 -6)=1.35x10 -5 C-Problem 4-

-Problem 4-

-Be creative, make up your own problem, and solve it. This will help you to be better at solving Coulomb's Law equations.