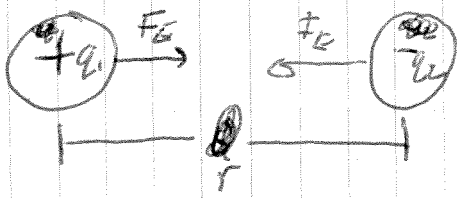
Day 3

Aim: Coulomb's Law

$F_E = \frac{K q_1 q_2}{r^2}$



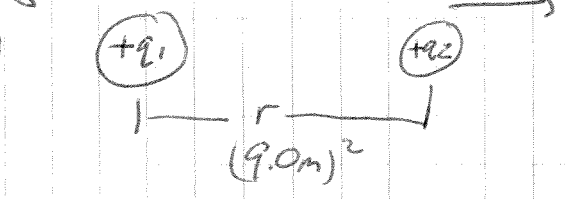
K = Electro-Static Constant
$= 8.99 \times 10^9 \frac{N \cdot m^2}{C^2}$

Similar to Newton's Law of Universal Gravitation

Ex 1: Calculate the magnitude of force between two positive charges $q_1 = 3 \times 10^{-6}$ C & $q_2 = 6.0 \times 10^{-5}$ C, seperated by a distance of 9 meters.

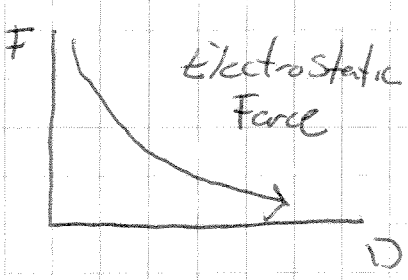
$$F_E = \frac{K q_1 q_2}{r^2} = \frac{\left(8.99 \times 10^9 \frac{N \cdot m^2}{C^2}\right)(3 \times 10^{-6} C)(6.0 \times 10^{-5} C)}{(9 m)^2}$$

$= 2.0 \times 10^{-2}$ N



Ex 2: Find the magnitude of electrostatic force between a charge of $+3.0 \times 10^{-5}$ C and a charge of -6.0×10^{-6} C seperated by 0.30 meters?

Ex 3



Name _____ Date _____

Commack High School
Regents Physics

Worksheet: Coulomb's Law & Electric Fields

1. Two positive charges of $6.0X10^{-6}$ C are separated by a 0.50 meters. What force exists between the charges?

$F_E = \frac{F q_1 q_2}{r^2}$ $F_E = 8.99\times10^9 \frac{N\cdot m^2}{C^2} \frac{(6\times10^{-6}C)(6\times10^{-6}C)}{(.5m)^2}$

$F_E = 1.3N$

2. A negative charge of $6.0X10^{-6}$ C exerts an attractive force of 64.8 N on a second charge 0.05 meters away. What is the magnitude of the second charge?

$64.8N = 8.99\times10^9 \frac{N\cdot m^2}{C^2} \frac{(6\times10^{-6})(x)}{(.05m)^2}$

$.162 = 53940x$

3.0×10^{-6} C

3. A positive test charge of $8.0X10^{-5}$C is placed in an electric field. It experiences a force of $4.0X10^{-3}$N. What is the intensity of the field at this point?

$E = \frac{F_e}{q}$ $E = \frac{8.0\times10^{-5}C}{(4.0\times10^{-3}N)} = .02\frac{N}{C}$ 50 $\frac{N}{C}$

4. A negative charge of $2.0X10^{-8}$C experiences a force of 0.06 N when in an electric field. What is the magnitude of the field intensity at the point where the charge is located?

$E = \frac{F_e}{q}$ $E = \frac{0.06N}{-2\times10^{-8}C}$ $-3.00\times10^6 \frac{N}{C}$