Electrostatics

Understanding Coulomb's Law: $F = \frac{Kq_1q_2}{d^2}$ $K = 9.0\times10^9 \frac{Nm^2}{C^2}$

Name_____

Part one the effect of charge

Calculate the forces below and determine whether it is an attraction or repulsion

	q_1	q_2	d (m)	Force (N)	Attraction or repulsion
A	+ .03 C	+ .02 C	116 m	401 N	~~Attractive~~ Repulsive
B	+ .06 C	+ .02 C	116 m	802 N	~~Attractive~~ Repulsive
C	+ .03 C	+ .01 C	116 m	200 N	Repulsive ~~Attractive~~
D	- .03 C	+ .02 C	116 m	-401 N	Attractive ~~Repulsive~~
E	- .06 C	- .02 C	116 m	+802 N	~~Attract~~ Repulsive

1. When using coulomb's Law to calculate a force , a positive force represents a(n) Repulsive and a negative force represents a(n) Attractive

2. Using Ex A as a comparison, find an example in which one of the charges has been doubled. Ex B. What happens to the force when one charge is doubled? It doubles

3. Using Ex A as a comparison, find an example in which on or the forces has been halved. EX C. What happens to the charge when the force is halved? It is halved

4. Using Ex A as a comparison, Predict what the force will be if:
   a) Both charges are doubled. F= 1600 N
   b) Both charges are halved. F= 100 N
   c) One charge is tripled. F= 1200 N
   d) Both charges were tripled. F= 3600 N
   e) One charge is tripled and the other halved. F= 400 (3/2) = 600 N

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Part two the effect of distance

Calculate the forces below and determine whether it is an attraction or repulsion

	q_1	q_2	d (m)	Force (N)	Attraction or repulsion
A	+ .03 C	+ .02 C	116 m	401 N	Repulsive
B	+ .03 C	+ .02 C	232 m	100 N	Repulsive
C	+ .03 C	+ .02 C	58 m	1600 N	Repulsive
D	+ .03 C	+ .02 C	29 m	6420 N	Repulsive

1. Using Ex A as a comparison, find what happens to the force when the distance is doubled?

   "B" Force = $\frac{1}{4}$ X

2. Using Ex A as a comparison, find what happens to the force when the distance is halved?

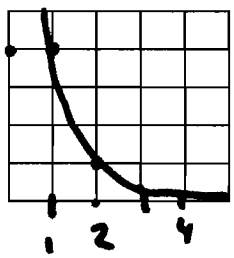
   C Force = 4 X

3. Using Ex A as a comparison, find what happens to the force when the distance is quartered?

   D Force = 16X

4. Force and distance are an inverse square relationship. Describe in you own words what this means and draw a graph of what it would look like

   As distance Increases, Force is Inversly Proportional to the Square of the distance



5. Using Ex A as a comparison, Predict what the force will be if:

   a) d were tripled. F= $401(\frac{1}{9}) = 45$ N

   b) d were decreased to 1/3. F= $401(9) = 3610$ N

   c) One charge was doubled and d was halved $\frac{(401)2}{(\frac{1}{2})^2} = 3208$ N