Notes from class 4/16

Tape Lab

Given 2 pieces of tape on the table:
When you pull off one piece and pulled off the other piece, they were attracted to each other. They would also curl toward your finger. Positive or negative things also attract neutral things.

When top piece was removed and put toward another top piece- repelled.

Could you pull off a top and bottom piece and make them repel? - no because opposite charges attract, conservation of charge.

★ **OPPOSITES ATTRACT**- if one piece is charged positively and one piece is charged negatively, they will be attracted to each other.

★ **LIKE CHARGES REPEL**- if both pieces were bottom pieces or both were top pieces of tape, they will not want to be next to each other because they have the same charge.

Coulomb's Law

$$F = \frac{kq_1q_2}{r^2}$$

F= Electrical Force (measured in Newtons)

q = charge (measured in Coulombs)

r = radius (measured in meters)

k = Coulombs constant (a constant number $9x10^9$)

When you:	You get:
Double the distance-	1/4th the force
Triple the distance-	1/9th the force
Quadruple the distance-	1/16th the force
½ the distance –	4 times the force
1/3 the distance-	9 times the force
¼ the distance –	16 times the force

because the distance is squared in the formula.

Coulombs Law example:

A +2 c charge is placed 4 m from a +3 c charge. Calculate F_E.

$$F_E = \frac{kq_1q_2}{r^2} \quad \frac{(9x10^9)(+2c)(+3c)}{4^2} = \boxed{3.4 \times 10^9 N}$$

Example #2

A 5.4×10^{-8} C charge placed 6 m from an unknown charge, producing a -40 N force. Calculate the unknown charge.

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

$$-40_N = \frac{(9 \times 10^9)(5.4 \times 10^{-8} c)(q_2)}{6^2}$$

$$-40_N = \frac{486\ (q_2)}{36}$$

$$\begin{array}{r} -40 \\ \times 36 \\ \hline -1440 \end{array} = 486\ (q_2)$$

$$\frac{-1440}{486} = \frac{486}{486}\ (q_2)$$

$$\boxed{-2.96\ C = q_2}$$