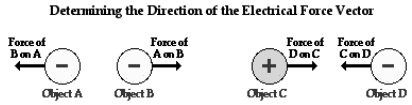

Book - Ch. 32.2 – 32.3

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

- Coulomb's Law describes the force that is present between two charged objects.
- The direction of that force depends on the charges (same or opposite).




## The Law of Conservation of Charge

- The net charge of an isolated system remains constant.

* Charge can be created and destroyed, but only in positive-negative pairs.

- Both electrons and protons have the same amount of charge, 1.60 x $10^{-19}$ C, except for the + or -.

Table of elementary particle masses and charges:

| particle | mass | charge | |
|---|---|---|---|
| electron | 9.11 x $10^{-31}$ kg | -1.60 x $10^{-19}$ C | (-e) |
| proton | 1.672 x $10^{-27}$ kg | +1.60 x $10^{-19}$ C | (+e) |
| neutron | 1.674 x $10^{-27}$ kg | 0 | |

Break

Activity – Compare Electrical and Gravitational Forces

***What's a Coulomb?***

- Unit of electric charge. (C)
- Charge on 1 electron or 1 proton (equal and opposite) is noted as *e*:

  $e = 1.602 \times 10^{-19}$ *Coulombs*

- How many electrons or protons in 1 C?

Coulomb's Law Equation:

- F = electric force
- k = Coulomb's constant
- $q_1$ = charge one
- $q_2$ = charge two
- r = distance

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

$$k = 9x10^9 \frac{Nm^2}{C^2}$$

**Example 1**

- Object A has a positive charge of $6.0 \times 10^{-6}$ C.
- Object B, carrying a positive charge of $3.0 \times 10^{-6}$ C, is 0.030 m away.
- Calculate the force.

## Example 2

A given electrical force is equal to 100 N.

(a) If the point charge is reduced by a half, what will the new force be?

(b) For the given 100 N force, the distance is reduced by a half. What is the new force?