Two Kinds of electric Charge:

Positive charge Proton

Negative charge electron

No charge Neutron

Funtarental Electric Charge

$e = 1.60 \times 10^{-19}$ Coulombs

Coulombs is SI base unit for charge (C)

Electrostatic attraction & repulsion

++ repel

-- repel

+- attract

Conductors - Materials where Charges can move freely

Insulators - Materials where Charges can not move freely

Coulomb's Law

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

$$\left(\begin{matrix}\text{Electric}\\ \text{force}\end{matrix}\right) = \frac{\left(\begin{matrix}\text{Coulomb's}\\ \text{Constant}\end{matrix}\right)(\text{Charge 1})(\text{Charge 2})}{(\text{distance between Charges})^2}$$

Coulomb's constant $k = 8.99 \times 10^9 \frac{N \cdot m^2}{C^2}$

ex) Electric force between a $+0.2\,C$ charge & a $-0.4\,C$ charge that are $2.0\,m$ apart

$$F = \frac{k q_1 q_2}{r^2} = \frac{\left(8.99 \times 10^9 \frac{N m^2}{C^2}\right)(+0.2\,C)(-0.4\,C)}{(2.0\,m)^2} = -1.8 \times 10^8\,N$$

attraction

Classwork 5-11

1. What is the electric force between a proton & electron that are $1.0 \times 10^{-10}\,m$ apart.

proton charge $= +1.60 \times 10^{-19}\,C$

electron charge $= -1.60 \times 10^{-19}\,C$

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

$$F_e = \frac{\left(8.99 \times 10^9 \frac{N m^2}{C^2}\right)(+1.6 \times 10^{-19}\,C)(-1.6 \times 10^{-19}\,C)}{(1.0 \times 10^{-10}\,m)^2}$$