The Charge Force

PH 111

1. Charge is conserved
2. Charge is quantized

2 Types of Charge - positive and negative
The force between like charges is always repulsive
The force between opposite charges is always attractive

q, Q represent amount of charge
SI unit for charge is Coulumb (C) - $\mu C, nC, pC, fC$
$Q = Ne$ ← Integer (no decimal)
↑ fundamental unit of charge $1.602 \times 10^{-19} C$

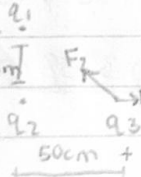
3 Types of materials related to charge force
Conductor - the charges can move freely throughout the material
Insulator (dielectric) - the charges are not free to move freely throughout the material
Semiconductor - the ability of charges to move is switchable

Charge Reservoir
Ground

3 Methods to electrify an object
Friction - rubbing two surfaces together transfers charge from one object to another
Conduction - the transfer of charge by direct physical contact
Induction - the appearance of charge due to the proximity of charge

Coulumb's Law

$\vec{F}_Q = k(q_1 q_2 / r_{12}^2)\,\hat{r}_{12}$ $\quad k = 8.99 \times 10^9 \approx 9 \times 10^9$



$\vec{F}_Q = k\frac{|q_1||q_2|}{r_{12}^2}$

$F_1 = k^{(2\times10^{-6})(3\times10^{-6})}/_{0.5^2}$ in N

$F_2 = k^{10^{-6}(3\times10^{-6})}/_{0.2^2}$ in N