

Electric charges & forces

- to understand it we need to start with
[q] = electric charge (fundamental property of
[Q] matter) & electric forces

1. Frictional forces, such as rubbing **add** or **remove** a charge from an object.

2. There are 2 kinds of charges - positive
- negative
3. 2 like charges exert repulsive forces on each other.



2 opposite charges attract each other

4. The force between 2 charges is long-range force.



It increases as the quantity of the charge increases
 & decreases as the distance between objects increases

$$F_{\text{electric}} \propto k \frac{qQ}{r^x} \quad x = ?$$

5. There are 2 types of classes of materials:

- conductors - charge moves easily
- insulators - does not move easily

both can be charged

Charged object has $N_p > N_e$ (N number
positively charged p protons +
e electrons -)

$N_e > N_p$
negatively charged

Objects acquire positive charge by
losing electrons!

ionization - process of removing an electron
from cloud

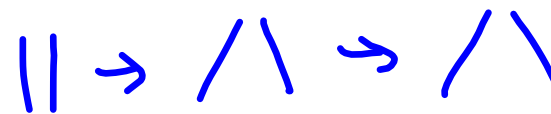
Law of conservation of charge - charge
can be transferred, but total amount of
charge remains constant.

Grounding - any object that is physically connected to the earth through a conductor is said to be grounded

- we ground to prevent a build up of any charge on the objects

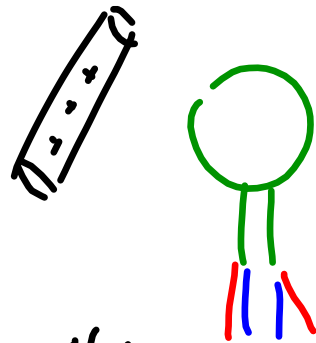
- earth is a giant conductor

Charging an electroscope



Charge polarization

- slight separation of positive & negative charges in a neutral object



the leaves separated a bit,
went back after we
moved the rod

close
by
no touching



Charging by Induction

