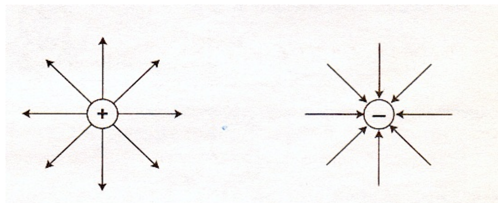
ELECTRIC FIELDS (ELECTROSTATICS)

UNIT 2- SECTION 1
PHYSICS 3204

- An electric field is a region in space that affects charge, and causes the electric force on a test charge placed inside the electric field. Electric field are graphically represented by lines of force



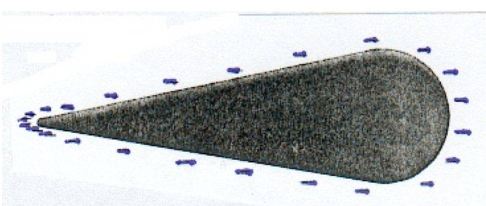
- 2 methods to charge an object 1) conduction 2) Induction

- The materials towards the top of the "Electrostatic Series" have a poor attraction for electrons.

- Understand the charge on an electroscope (and instrument used to detect the presence of a net charge on an object).

- The charge on an electron or proton is e = 1,602 x 10^{19} C.

- Know how charge is distributed on objects,



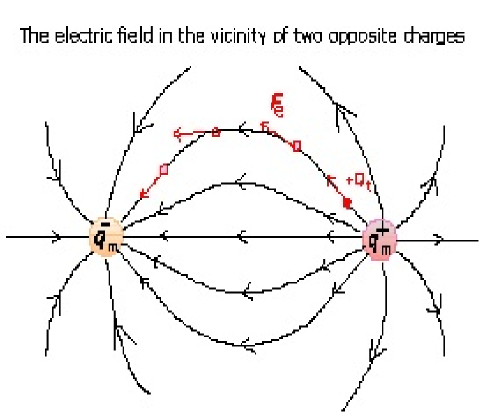
This picture suggests that electrical discharge is more likely to occur from places of high curvature (i.e., pointy places).

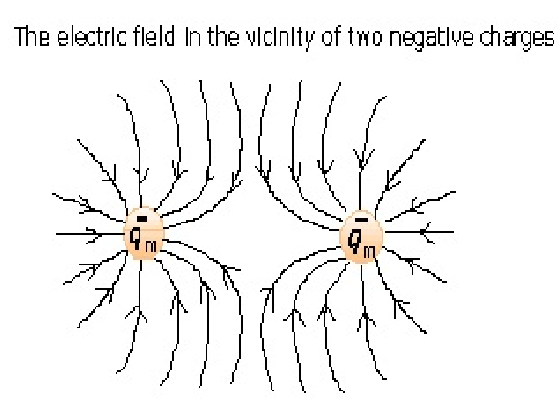
- Determining Charge

q = Ne

- q is the charge (coulombs)
- N = is the number of elections in excess or deficit
- e is the charge on the electrons 1.602 x 10-19 C/e

- Common Electric Field Configurations





- Look over the Laws for Electric Field Lines

- Below are a list of formulae that can be used in electrostatics:

Coulomb's Law (The electrical force between two objects) positive = repulsive force negative = attractive force	$F_e = \frac{kQ_1Q_2}{d^2}$ **(unit: N)** k = 9.0 x 10^9 N•m^2/c^2 (Coulomb's constant)
Electric Field Strength ($\bar{E}$) Sign indicates direction of the field	$\bar{E} = \frac{F_e}{q}$ **(unit: (N/C)** or $\bar{E} = \frac{kq_m}{r^2}$ (for the main point charge)
Electric Potential Energy (E_e): The work done to move a charge in an electric field	$E_e = \frac{kq_mq_t}{r}$ **(unit: J)**
Electric Potential (V) The potential energy per unit charge	$V = \frac{E_e}{q}$ **(unit: J/C or Volts)** or $V = \frac{kq}{r}$
Potential Difference (ΔV) The change in electric potential	$\Delta V = \frac{\Delta E_e}{q}$ (Unit: Volts)
For a Parallel Plate Electric Field Strength	$E = \frac{v}{d}$ (Unit: N/C)

electron-volt (eV)?

1eV = 1.602 x 10^{-19} J