EQUIPOTENTIAL SURFACE :

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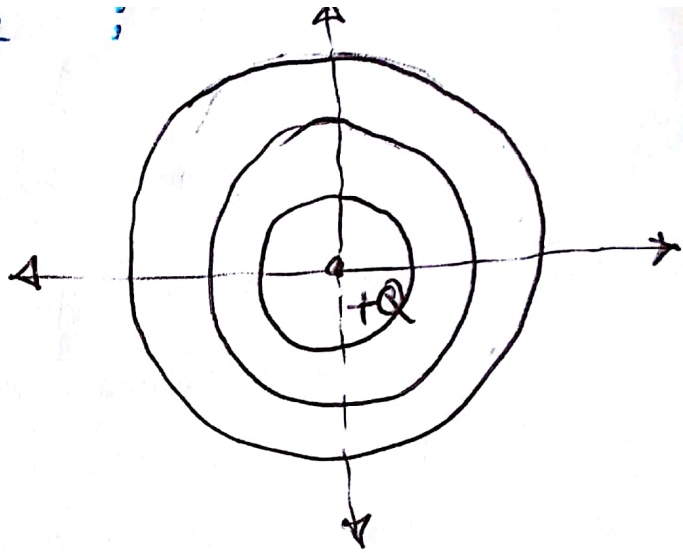
- Surface over which Potential is same everywhere.

- It's a graphical way to represent the potential distribution.

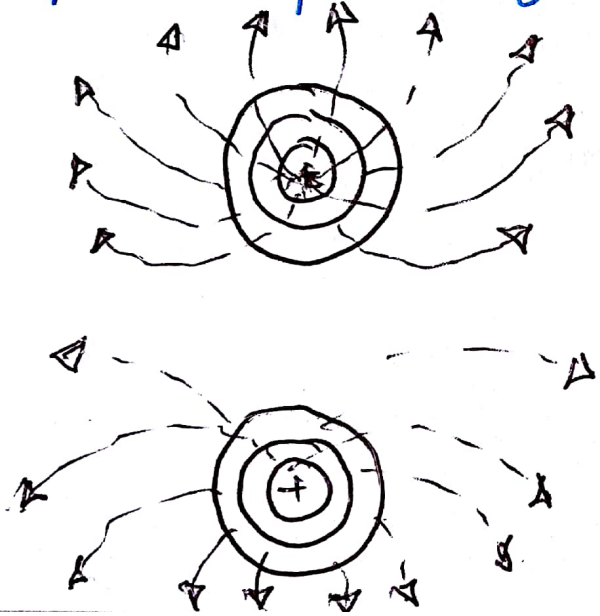
- Depends on 2 values
  - The value of charge distribution.
  - Medium is isotropic or anisotropic.

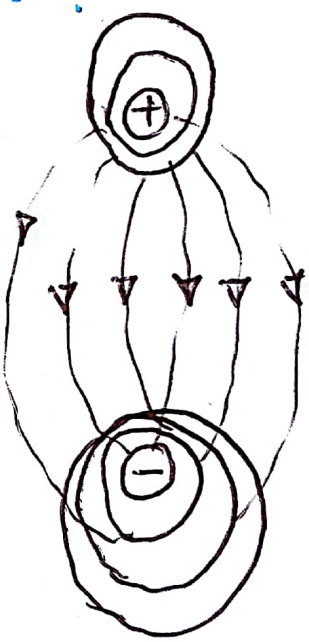
For a point charge :

Equipotential surface would be a sphere.



For a pair of point charges :





Lines of force are always ⊥r to equipotential surface :

Considering P_1 and P_2 having V_1 and V_2 potential on surface, which is equipotential

$$V_1 = V_2 \Rightarrow V_1 - V_2 = 0.$$

Hence, there should be no component of electric force along the displacement.

So, lines of force are ⊥r to equipotential surface.

In case of Spherical equipotential surface its along the radius originating from centre.

V V

Plane Equipotential surface for a uniform field :

$$E = -\frac{dV}{dl}.$$

So $dl \propto \frac{1}{E}$

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- In strong electric field, equipotential surface are closely spaced.
- In weak electric field, equipotential surface are more and more spaced apart.
- In uniform electric field, equipotential surface are || to each other and equally spaced.
- Surface of charged conductor is always an equipotential surface whatever the shape may be.