* Electric field lines:

→ Electric field lines are imaginary lines which give virtual idea of electric field.

→ Electric field lines never cross each other

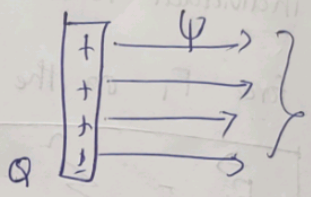
→ It can never be a clo

* Electric flux (ψ):-

→ It is the total number of electric lines of force emanat from a charge.

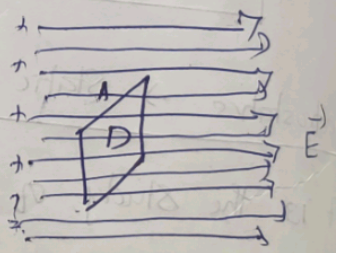
→ If 'Q' is the charge of body, then the electric flux produce from that is given as.

$$\psi = Q$$



* Electric flux Density : (D)

→ It is defined as the amount of flux passing through unit surface area perpendicular to the direction of the flux.



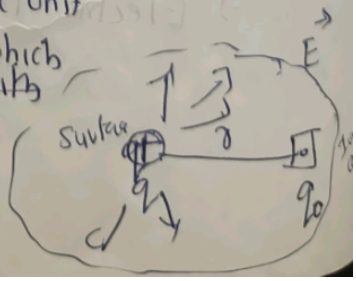
$$D = \frac{\psi}{A} \quad \text{Coulomb/m}^2$$

$\psi \rightarrow \frac{Q}{A} \rightarrow$ coulo

*. Electric field Intensity :. (E)

→ It is the measure of the strength of an electric field at any point.

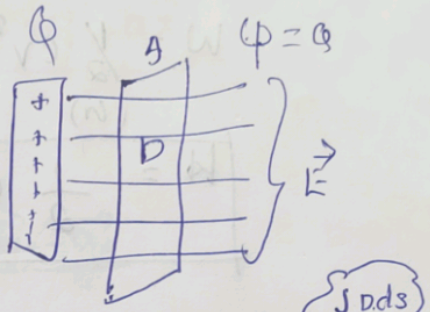
→ It is defined as the electric force per unit charge experienced by the charge which is placed in the electric field.



$$E = \frac{F}{q_0}$$ (Newtons per coulomb. (or) volt/m

$$E = \frac{q}{4\pi\varepsilon_0 r^2}$$

Relation between Ψ, D & E :-

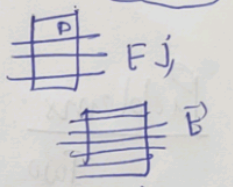


Flux density : $D = \frac{\Psi}{A} \Rightarrow$

$$\Psi = \int D \cdot ds$$

$$\Rightarrow D.A$$

$\int D.ds$



$D \propto E$

$$D = \varepsilon E$$

Dielectric constant

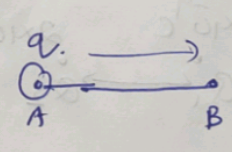
$\varepsilon = \varepsilon_0 \varepsilon_r$ material

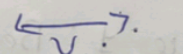
$\varepsilon_0 = 8.854 \times 10^{-12}$ F/m

$D \propto \vec{E}$

Electric Potential :- (V)

It is the amount of work required to move a unit of charge from one point to another.





$V \uparrow \; q \uparrow$

$r \downarrow \; r \uparrow$

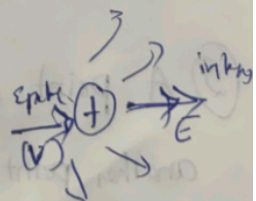
$$V \propto \frac{q}{r}$$

$$V = \frac{q}{4\pi\varepsilon r}$$ volts

$4\pi\varepsilon r \rightarrow$ proportionality constant.

Relation between (V) & (E)

$$E = -\nabla V \qquad V = -\int E \cdot dl$$



Electric field is the gradient of voltage.

voltage is the integral of electric field

(−) sign indicates that the direction of E is opposite to V