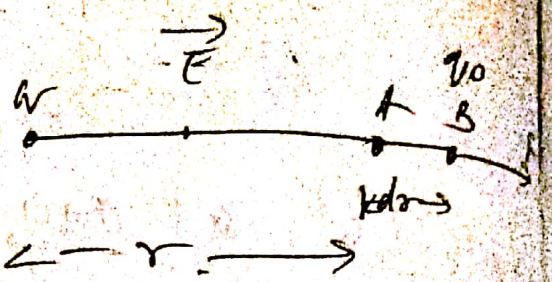
Relation between $\vec{E}$ and V

The force on q_0 is

$$F = q_0 \vec{E}$$



Work done in moving q_0 from B to A is

$$dW = F(-dr)$$

$$dW = -q_0 E\, dr$$

$$\frac{dW}{q_0} = -E\, dr$$

$$\frac{dW}{q_0} = dV$$

$$\therefore dV = -E\, dr$$

$$E = -\frac{dV}{dr}$$

EQUIPOTENTIAL SURFACE

Any surface over which the electric potential is same everywhere is called an equipotential surface.

PROPERTIES

* No work is done in moving a charge between any two points on an equipotential surface.

* The electric field and hence lines of force, are everywhere at right angles to the equipotential surface.

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In a family of equipotential surfaces the surface are close together where the electric field is strong and farther apart where the field is weaker.

$$d\alpha \propto \frac{1}{E}$$

* No two equipotential surfaces can intersect each other.

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