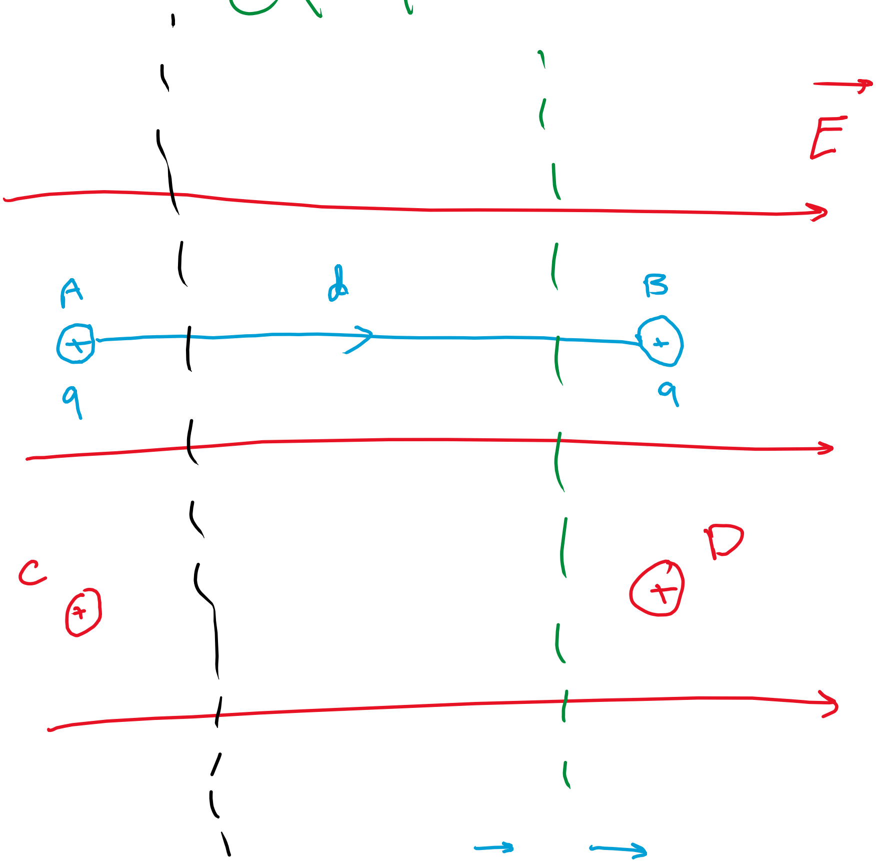
equipotential surfaces



$$\vec{F}_e = q\vec{E}$$

$$\vec{a} = \frac{q\vec{E}}{m}$$

$$W = \vec{F}\cdot\vec{d}$$

$$W = -\Delta U = -[U_B - U_A]$$

$$W = -\Delta U = \vec{F}\cdot\vec{d} = q\vec{E}\cdot\vec{d}$$

$$\frac{W}{q} = \vec{E}\cdot\vec{d} = \underbrace{-\Delta V}_{\text{potential difference}} = -[V_B - V_A]$$

$$\boxed{\Delta V = -\frac{W}{q} = \frac{\Delta U}{q} = -\vec{E}\cdot\vec{d}}$$

1) potential energy decreases as a positive charge moves in the same direction as $\vec{E}$ $\Rightarrow$ ΔU is negative

W is positive

2) The potential decreases along the $\vec{E}$ ($\vec{E}$ points in the direction of decreasing V.

ΔV is negative

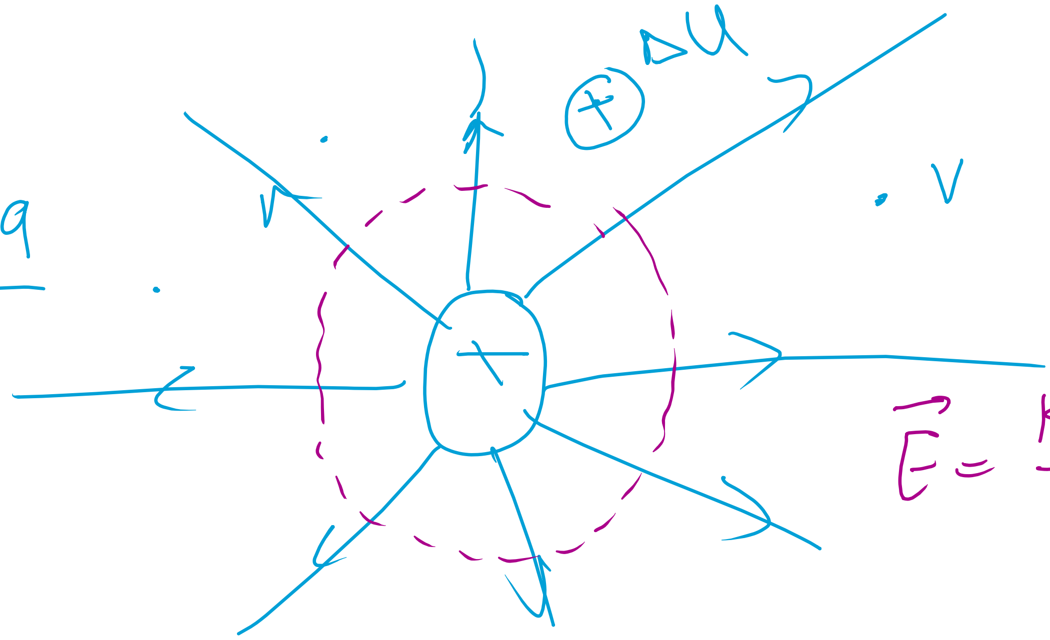
$W \Rightarrow J \qquad \Delta U = J$

$\Delta V \Rightarrow 1\,V = 1\,J/C$

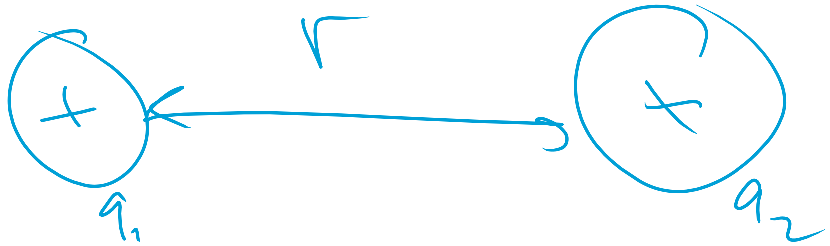
ΔU potential energy

ΔV potential

$$V = \frac{k_e q}{r}$$

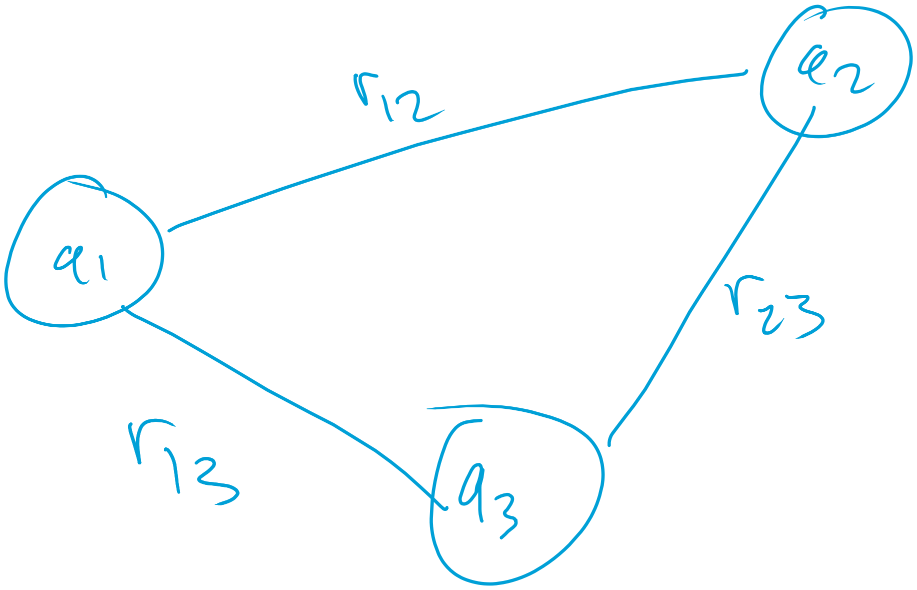


$$\vec{E} = \frac{k_e q}{r^2}$$



Potential Energy:

$$U = \frac{K q_1 q_2}{r}$$



$$U = ke\left[\frac{q_1 q_2}{r_{12}} + \frac{q_1 q_3}{r_{13}} + \frac{q_2 q_3}{r_{23}}\right]$$

$$\Delta V = -\vec{E} \cdot \vec{d} = \underbrace{-Ed}_{\downarrow}$$

E is uniform & d is parallel to $\vec{E}$

$$\Delta V = -\int_A^B \vec{E} \cdot d\vec{s}$$

$$\vec{E}_x = \frac{-\partial V}{\partial x} \; ; \; \vec{E}_y = \frac{-\partial V}{\partial y} \; ; \; \vec{E}_z = \frac{\partial V}{\partial z}$$