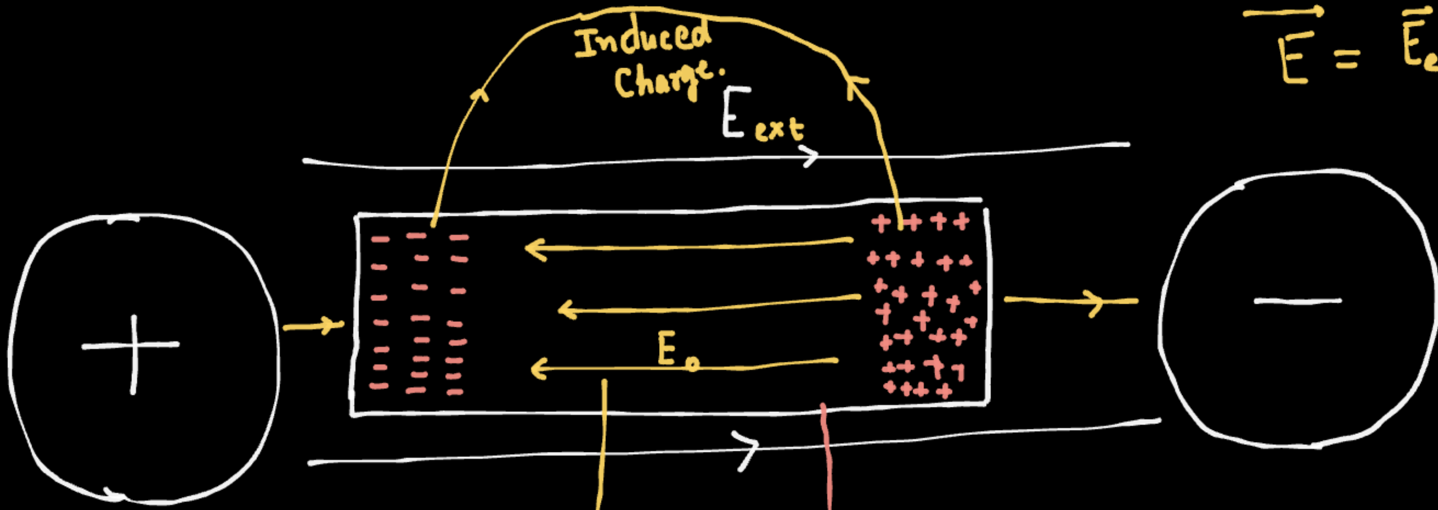
$$\vec{E} = \vec{E}_e - E_0$$



medium में polarization हो गए।

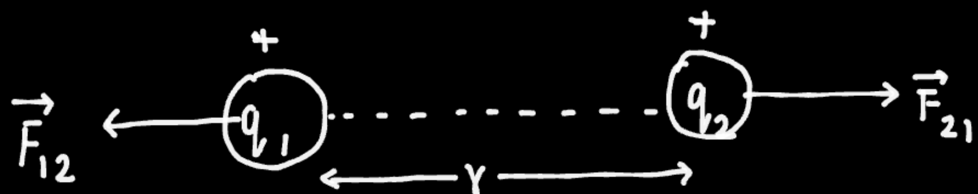
E_0 — induced $\vec{E}$

$$\Longrightarrow \vec{E} = \lim_{q_0 \to 0} \frac{\vec{F}}{q_0}$$

⋆ COULAMB'S LAW :

→ Electric force (Electrostatic force) b/w two stationary point Charge.

$|F_{12}| = |F_{21}|$



$\vec{F}_{12} = -\vec{F}_{21}$

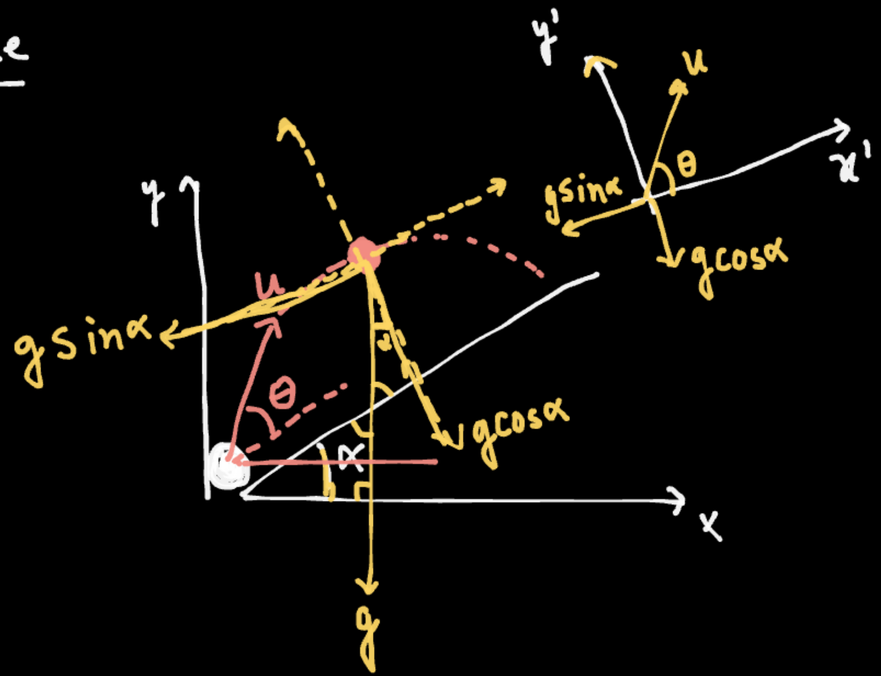
→ Coulomb's experiment stated

$$\left\{ \begin{array}{l} F_e \propto \frac{1}{r^2} \text{ \{inv. square law\}} \longrightarrow \text{(i)} \\ F_e \propto q_1 q_2 \longrightarrow \text{(ii)} \end{array} \right.$$

→ F act's along line joining two charges (this force is also Called Central Force)

The projectile on a inclined plane.

i) Motion Up the plane



x'- dirn

$u_{x'} = u\cos\theta$

$a_{x'} = -g\sin\alpha$

$S_x = u_x t + \frac{1}{2} a_x t^2$

$R = u\cos\theta \times \frac{2u\sin\theta}{g\cos\alpha} - \frac{1}{2} g\sin\alpha \cdot \frac{4u^2\sin^2\theta}{g^2\cos^2\alpha}$

$$\boxed{R = \frac{u^2\sin 2\theta - 2u^2\tan\alpha\sin^2\theta}{g\cos\alpha}}$$

y'- dirn :

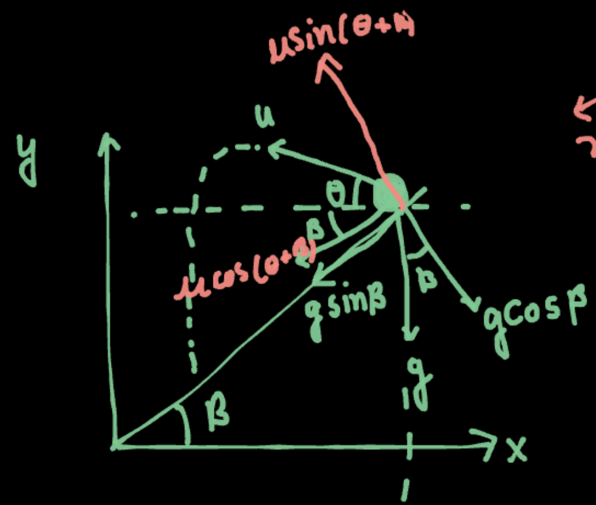
$u_y = u\sin\theta$, $a_y = -g\cos\alpha$,

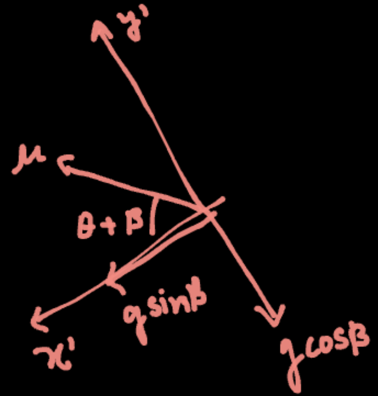
$V_y = u_y + a_y t$

$0 = u\sin\theta - g\cos\alpha t$

$$\boxed{T = \frac{2u\sin\theta}{g\cos\alpha}}$$

Motion down the incline





x' dirn

$u_x = -u\cos(\theta+\beta)$

$a_x = -g\sin\beta$

$s = ut + \frac{1}{2}a_x t^2$

$$R = \frac{u^2}{g}\left[\frac{\sin(2\theta+\beta)+\sin\beta}{1-\sin^2\beta}\right]$$

y' dirn :

$u_y = u\sin(\theta+\beta)$ $\qquad$ $a_y = -g\cos\beta$

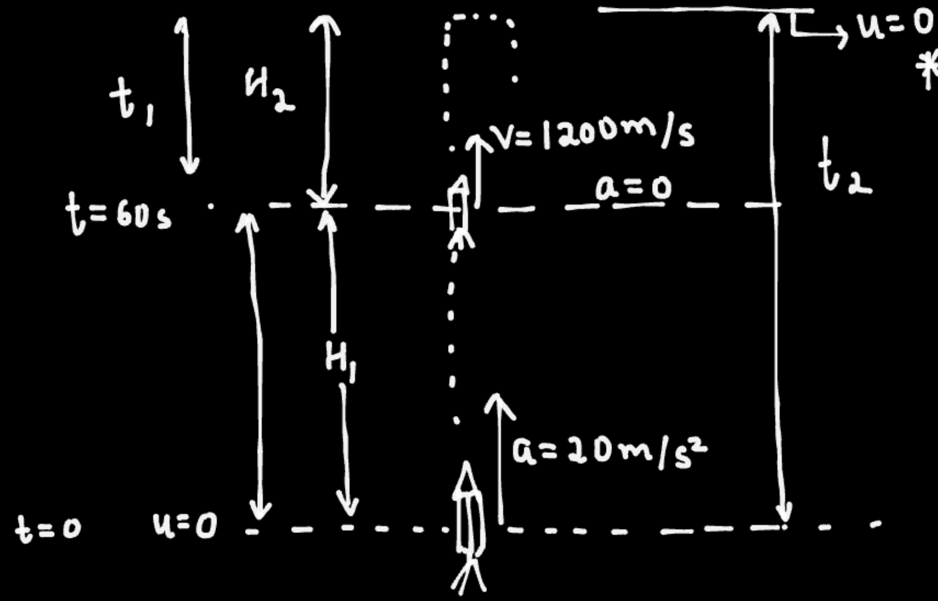
$v_y = u_y + a_y t$

$0 = u\sin(\theta+\beta) - g\cos\beta\, t$

$$T = \frac{2u\sin(\theta+\beta)}{g\cos\beta}$$

* * * * *

8)



$$H_1 = \cancel{ut}^{\,0} + \frac{1}{2}at^2$$

$$H_1 = \frac{1}{\cancel{2}} \times \cancel{20}^{\,10} \times 3600$$

$$H_1 = 36000\,m$$

*

$$V_{(60)} = u + at$$

$$V = 20(60) = 1200\ m/s$$

$$t_1 = \frac{u}{g} = 2min$$

$$H_2 = \frac{u^2}{2g} = \frac{1200 \times \cancel{1200}^{\,60}}{\cancel{2} \times \cancel{10}}$$

$$H_2 = 72000m$$

$$\underline{H_{max} = 108\,km} \;\; \text{———} (a)$$

$$H = \frac{1}{2}gt_2^2$$

$$\sqrt{\frac{2 \times 10800\cancel{0}}{1\cancel{0}}} = t_2$$

$$\sqrt{21600} = t_2$$

$$146.96s = t_2$$

$$T = t + t_1 + t_2$$

$$T = 60 + 120 + 146.96$$

$$\boxed{T = 326.96s}$$

*

$$\vec{A} = a_1\hat{i} + b_1\hat{j} + c_1\hat{k}$$
$$\vec{B} = a_2\hat{i} + b_2\hat{j} + c_2 k$$

$$\vec{C} = \vec{A}\times\vec{B}$$

$$\vec{C} = \begin{array}{c} \begin{array}{ccc} + & - & + \end{array} \\ \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix} \end{array}$$

$$\vec{C} = \hat{i}(b_1c_2 - b_2c_1) - \hat{j}(a_1c_2 - a_2c_1) + \hat{k}(a_1b_2 - a_2b_1)$$

$$A = \begin{vmatrix} a_1 & a_2 \\ b_1 & b_2 \end{vmatrix}$$

$$A = a_1b_2 - ba_2$$

A_{11} A_{12} A_{13}

$$A = \begin{vmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \\ c_1 & c_2 & c_3 \end{vmatrix} \rightarrow \text{first decide.}$$

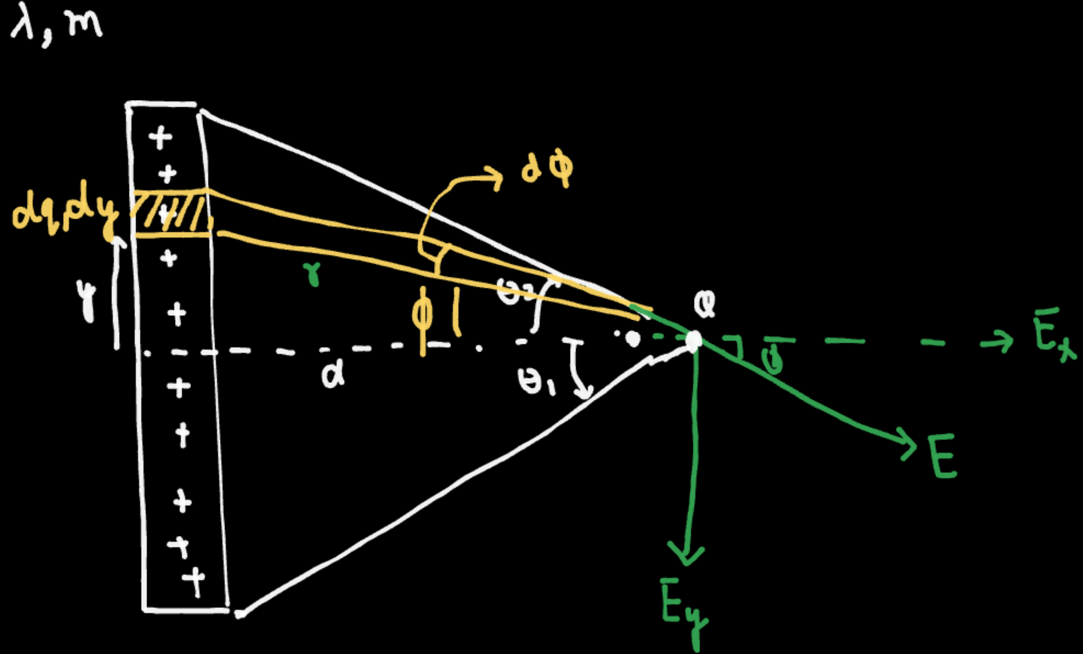
2

A_{21}

A_{31}

$$|A| = +a_1(b_2c_3 - c_2b_3) - a_2(b_1c_3 - c_1b_3) + a_3(b_1c_2 - c_1b_2)$$

det(A)



$$E = \frac{K\,dq}{\gamma^2}$$

$$\int dE = \int \frac{K\,dq}{\gamma^2} \cos\phi$$

$$\lambda = \frac{dq}{dy}, \quad dq = \lambda\,dy$$

$$\int dE = \int \frac{K\lambda\,dy}{\gamma^2} \cos\phi$$

$$E_x = \int \frac{K\lambda\,dy}{\gamma^2} \cos\phi$$

$$\rightarrow E_x = \int \frac{K\lambda\, d\cancel{\sec^2\phi}\, d\phi\, \cos\phi}{d^2\, \cancel{\sec^2\phi}}$$

$$E_x = \frac{K\lambda}{d} \int_{-\theta_1}^{\theta_2} \cos\phi\, d\phi$$

$$E_x = \frac{K\lambda}{d} \left[\sin\phi\right]_{-\theta_1}^{\theta_2}$$

$$\cos\phi = \frac{d}{\gamma}$$

$$\gamma = \frac{d}{\cos\phi}$$

$$\tan\phi = \frac{y}{d}$$

$$y = d\tan\phi$$

$$dy = d\sec^2\phi\, d\phi$$

$$\boxed{E_x = \frac{K\lambda}{d}\left[\sin\theta_2 + \sin\theta_1\right]}$$