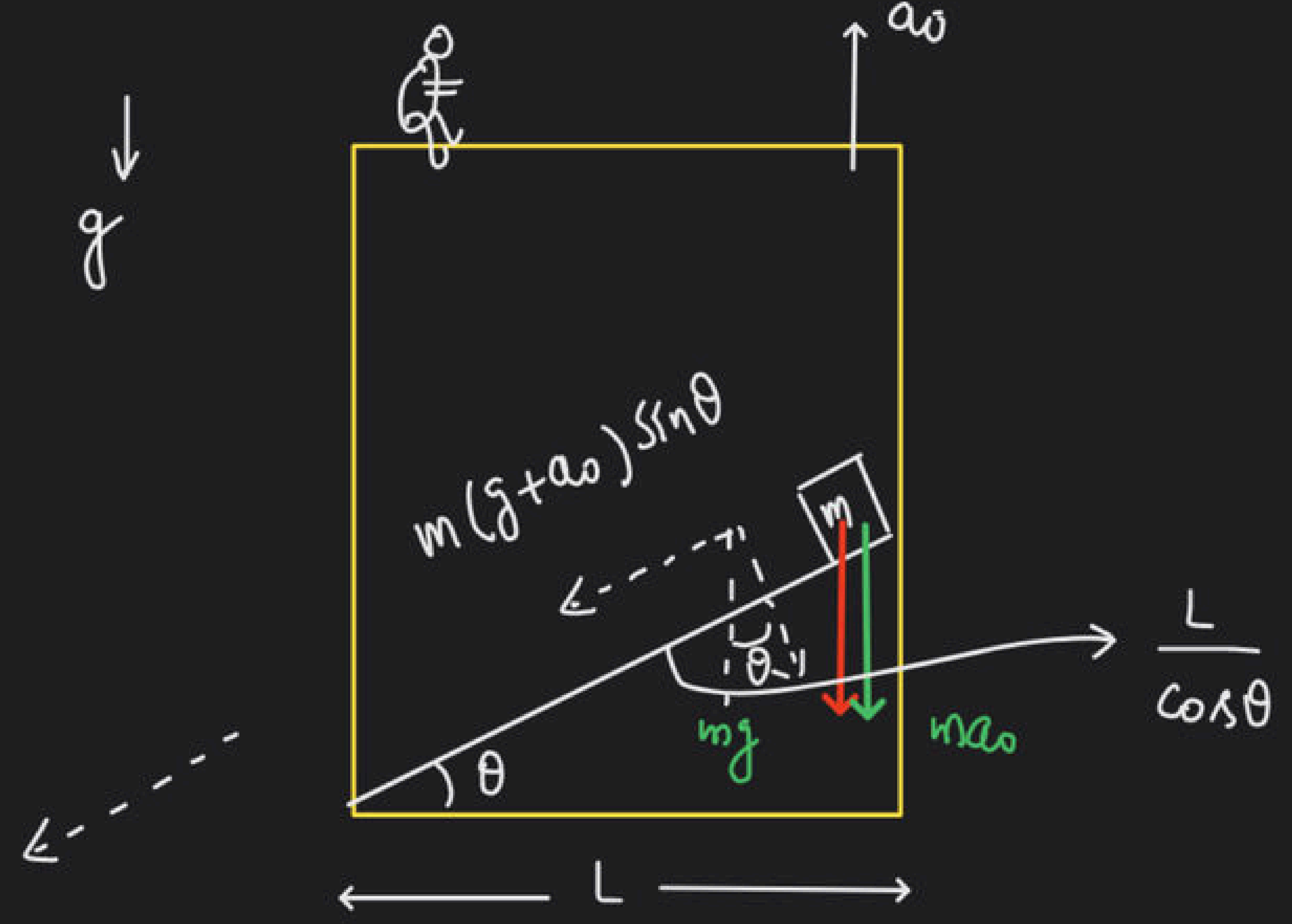
Friction - II

Focus: Advance Course on Laws of Motion for JEE 2023

Nitin Sachan • Lesson 14 • Aug 30, 2022

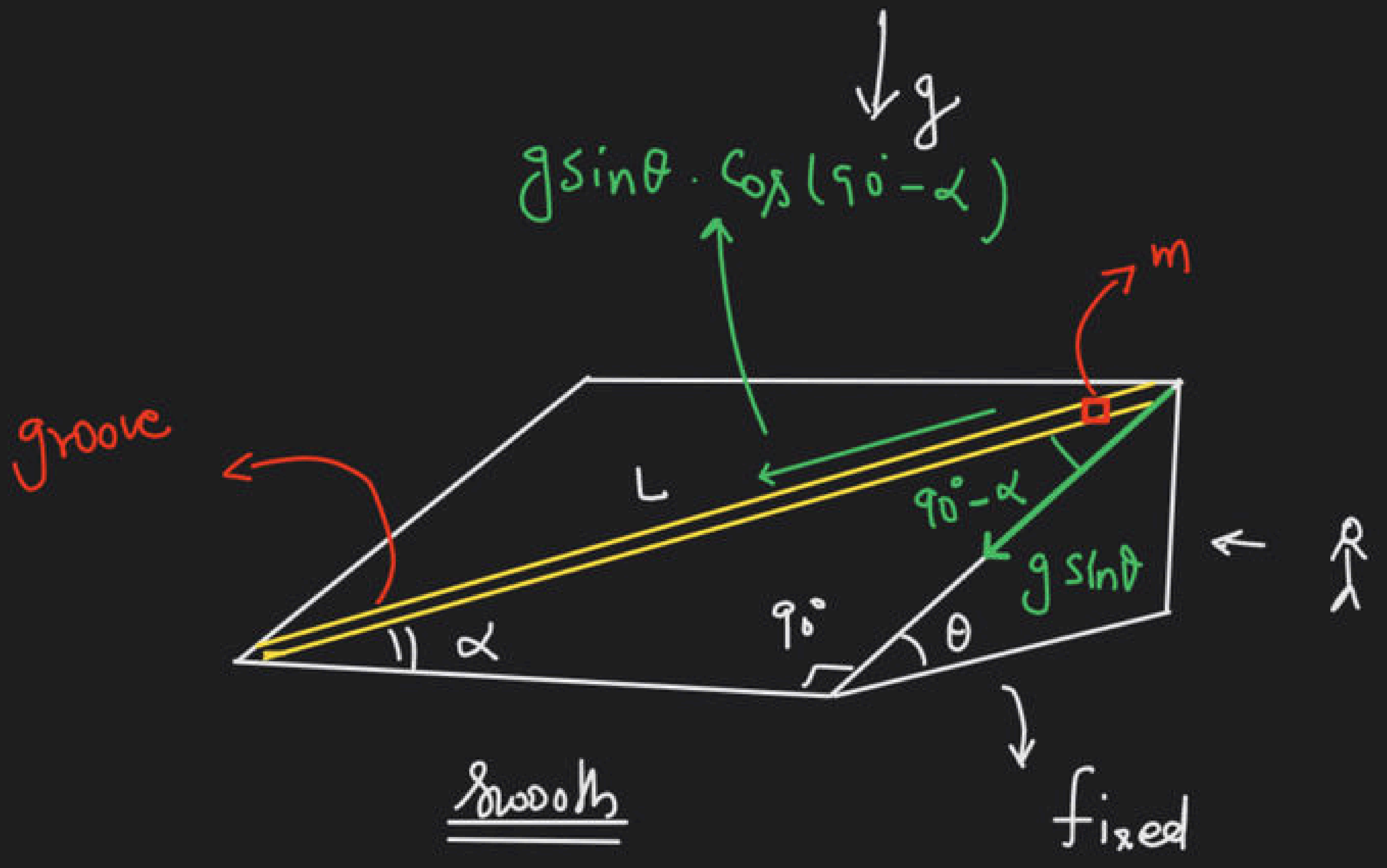


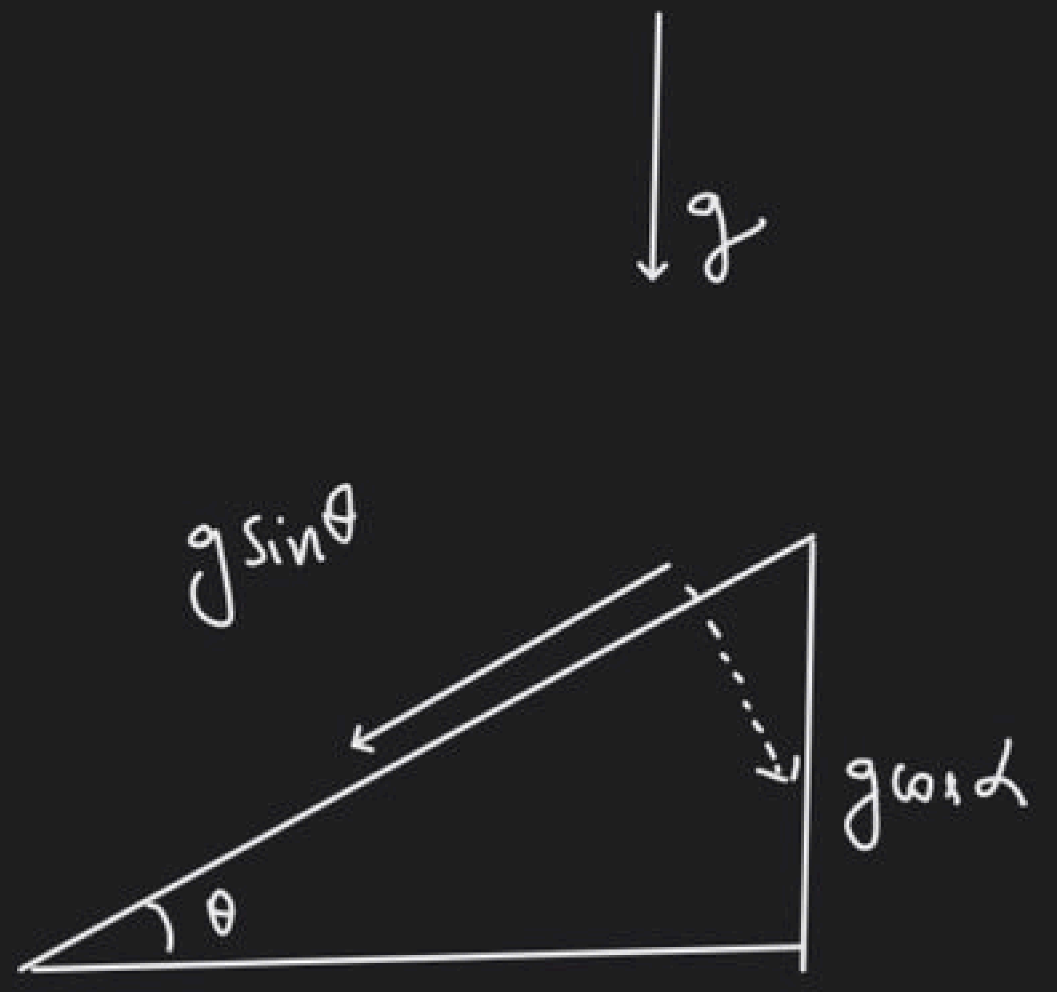
$$a_r = (g+a_0)\sin\theta$$

$$m(g+a_0)$$

$$\frac{L}{\cos\theta} = \frac{1}{2}\cdot(g+a_0)\sin\theta\cdot t^2$$

$$\boxed{t = \sqrt{\frac{4L}{(g+a_0)\sin 2\theta}}}$$





$$L = \frac{1}{2} \cdot a \cdot t^2 \Rightarrow \frac{1}{2} \cdot g\sin\theta \cdot \sin\alpha \cdot t^2$$

$$\boxed{t = \sqrt{\frac{2l}{g\sin\theta \cdot \sin\alpha}}}$$

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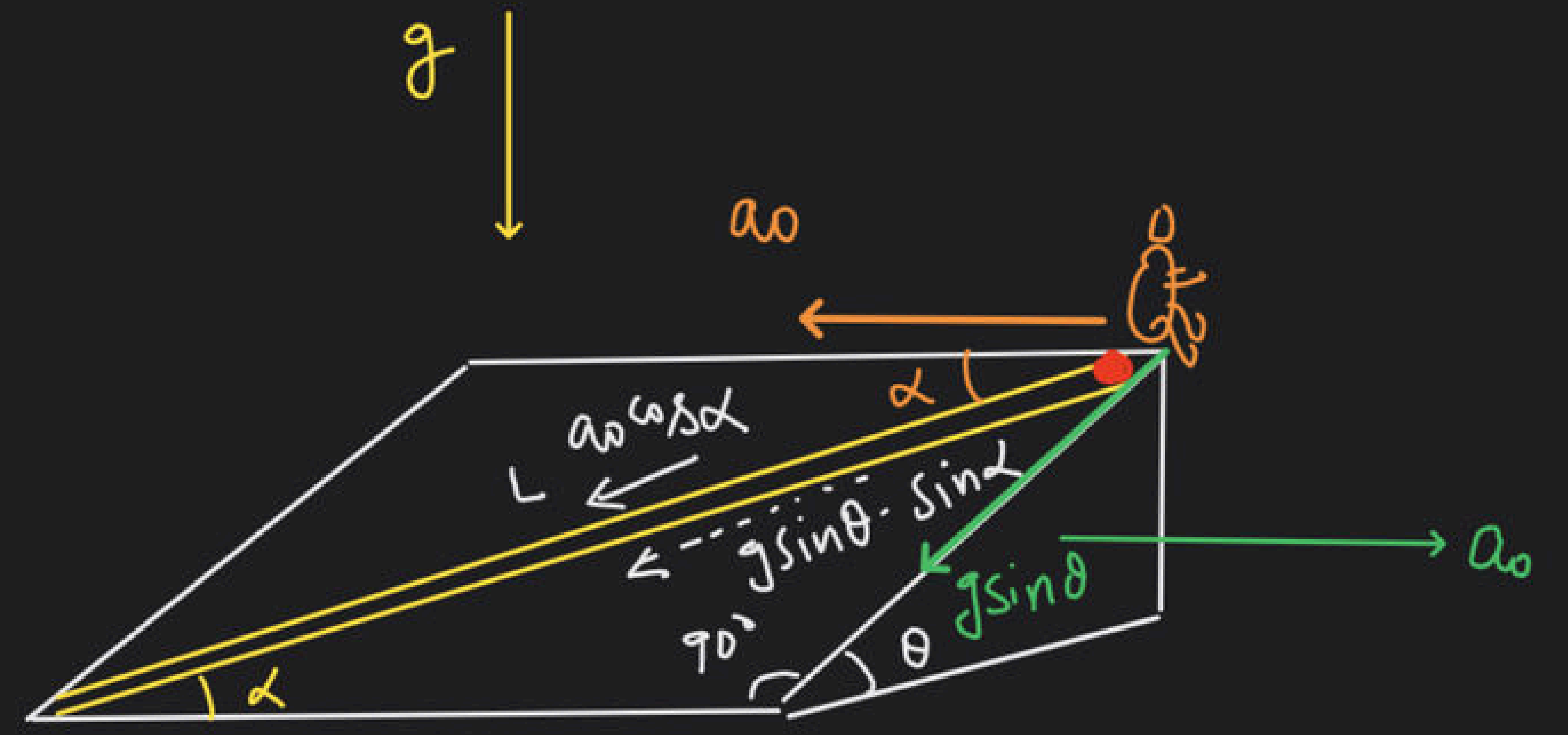

a_r along the groove

$$\boxed{a_r = g\sin\theta \cdot \sin\alpha + a_0 \cos\alpha}$$

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$$\boxed{L = \frac{1}{2}\left[a_0 \cos\alpha + g\sin\theta \cdot \sin\alpha\right] \cdot t^2}$$

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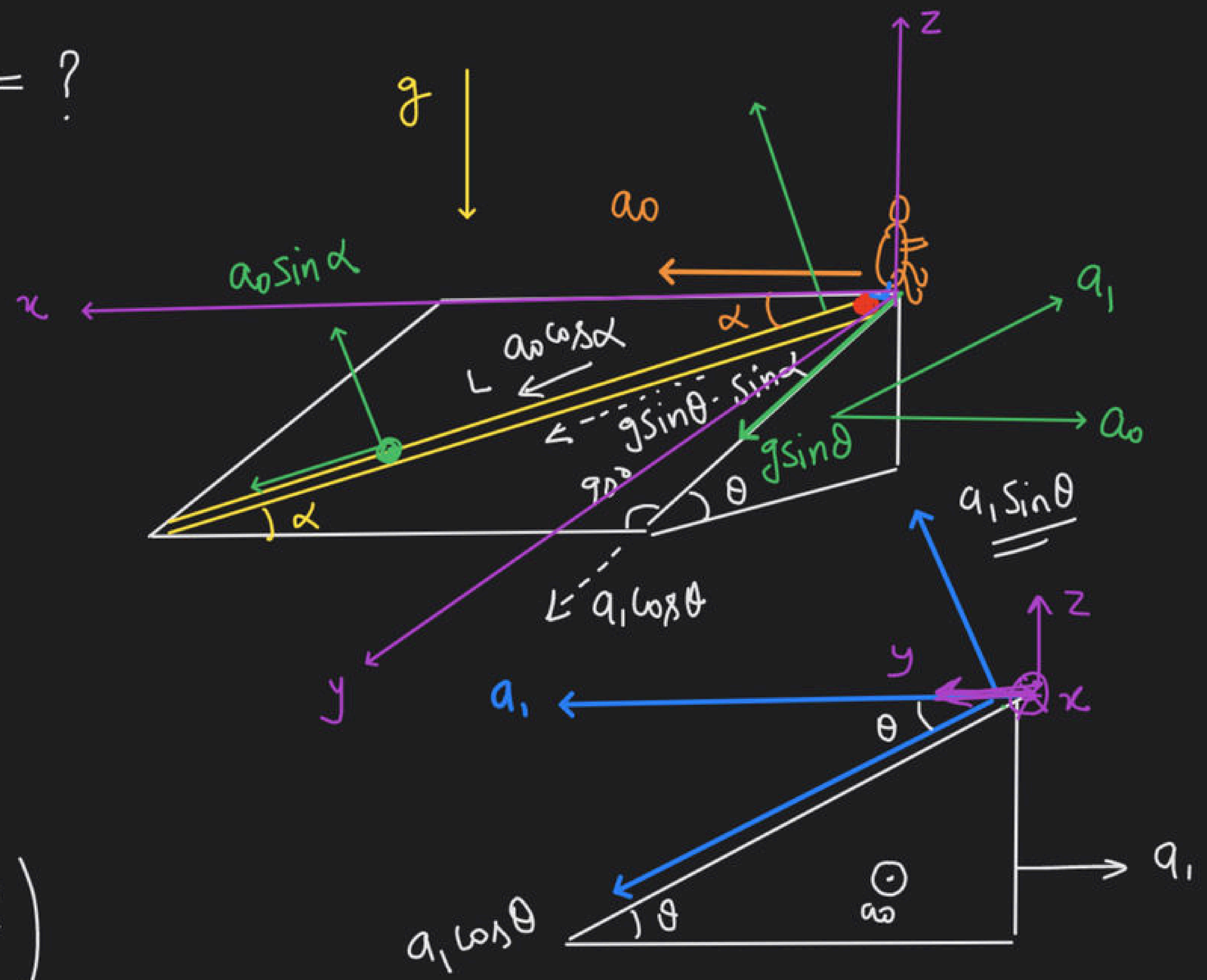
Normal from the groove = ?

$t = ?$

Original

$$\boxed{\text{find } \vec{N} = \quad H.C.}$$



a_y

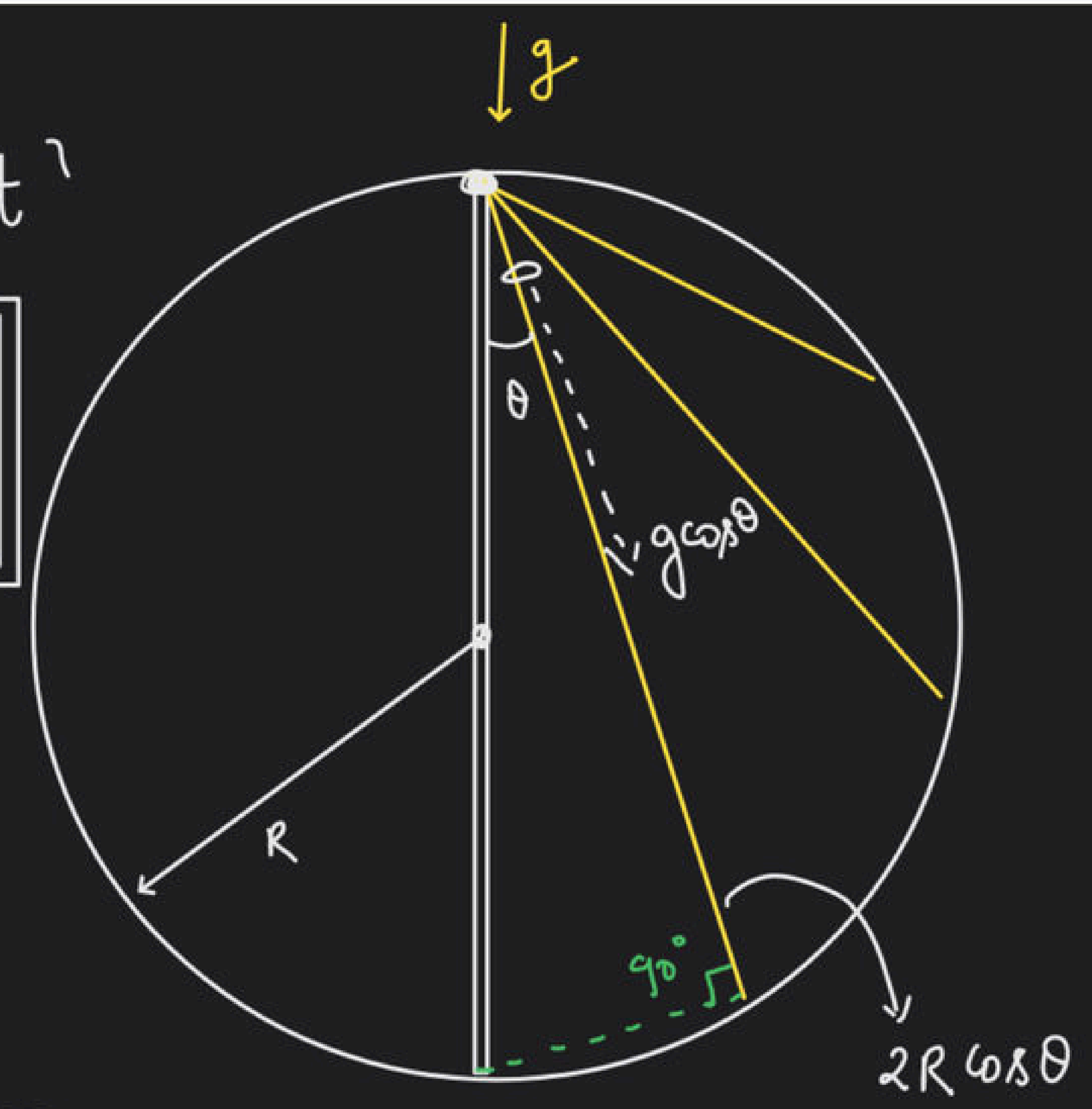
$$\left(a_0\cos\alpha + g\sin\theta \cdot \sin\alpha + a_1\cos\theta \cdot \sin\alpha\right)$$

$$L = \frac{1}{2}\left(a_0\cos\alpha + g\sin\theta \cdot \sin\alpha + a_1\cos\theta \cdot \sin\alpha\right) \cdot t^2$$

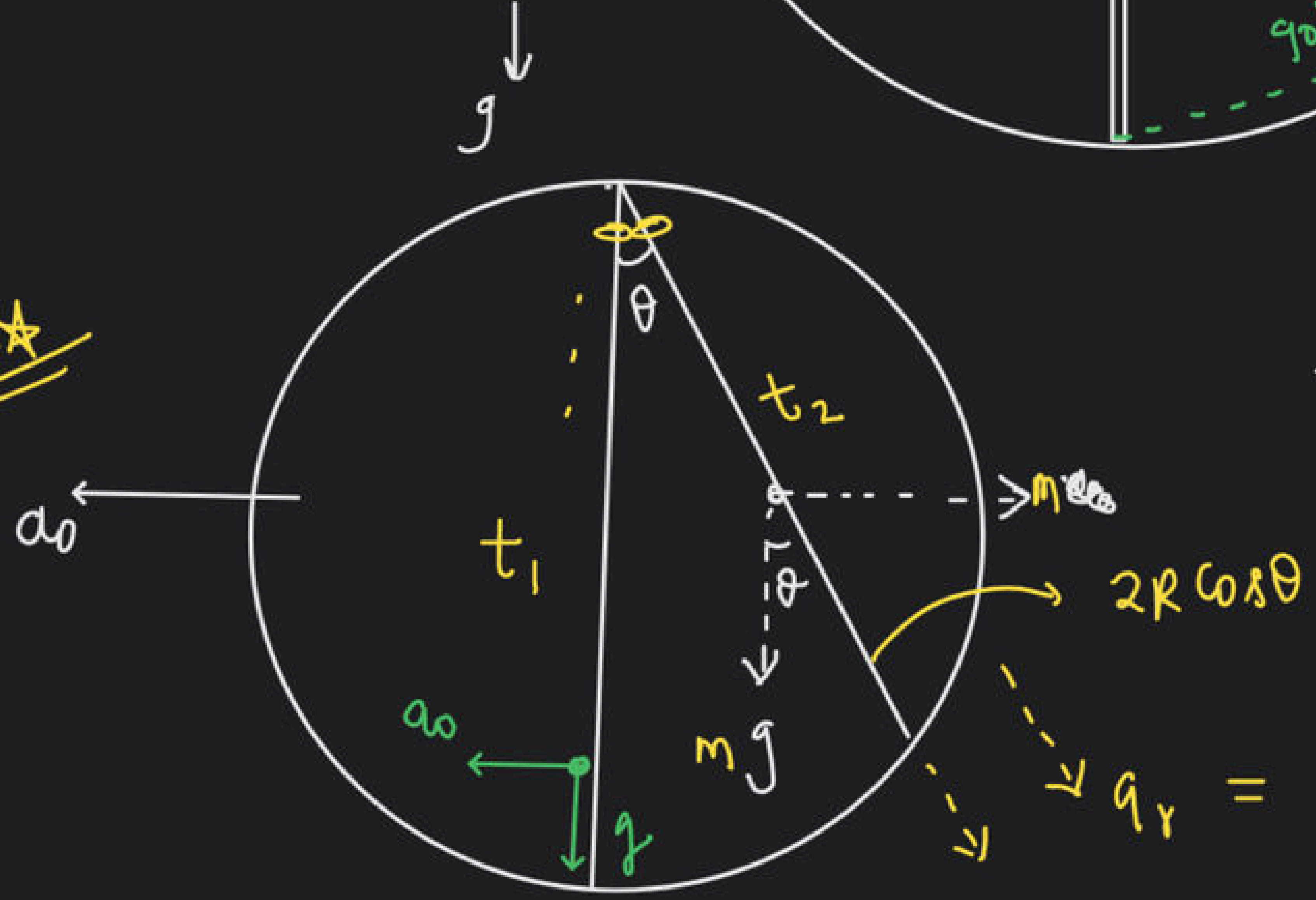
$$\boxed{t = \sqrt{\frac{2L}{a_0\cos\alpha + g\sin\theta \cdot \sin\alpha + a_1\cos\theta \cdot \sin\alpha}}}$$

$$2R\cos\theta = \frac{1}{2}\cdot g\cos\theta\cdot t^2$$

$$\boxed{t = 2\sqrt{\frac{R}{g}}}$$



$$\boxed{\frac{t_1}{t_2} = \sqrt{\frac{g\cos\theta + a_0\sin\theta}{g\cos\theta}} = \sqrt{1+\frac{a_0}{g}\tan\theta}}$$



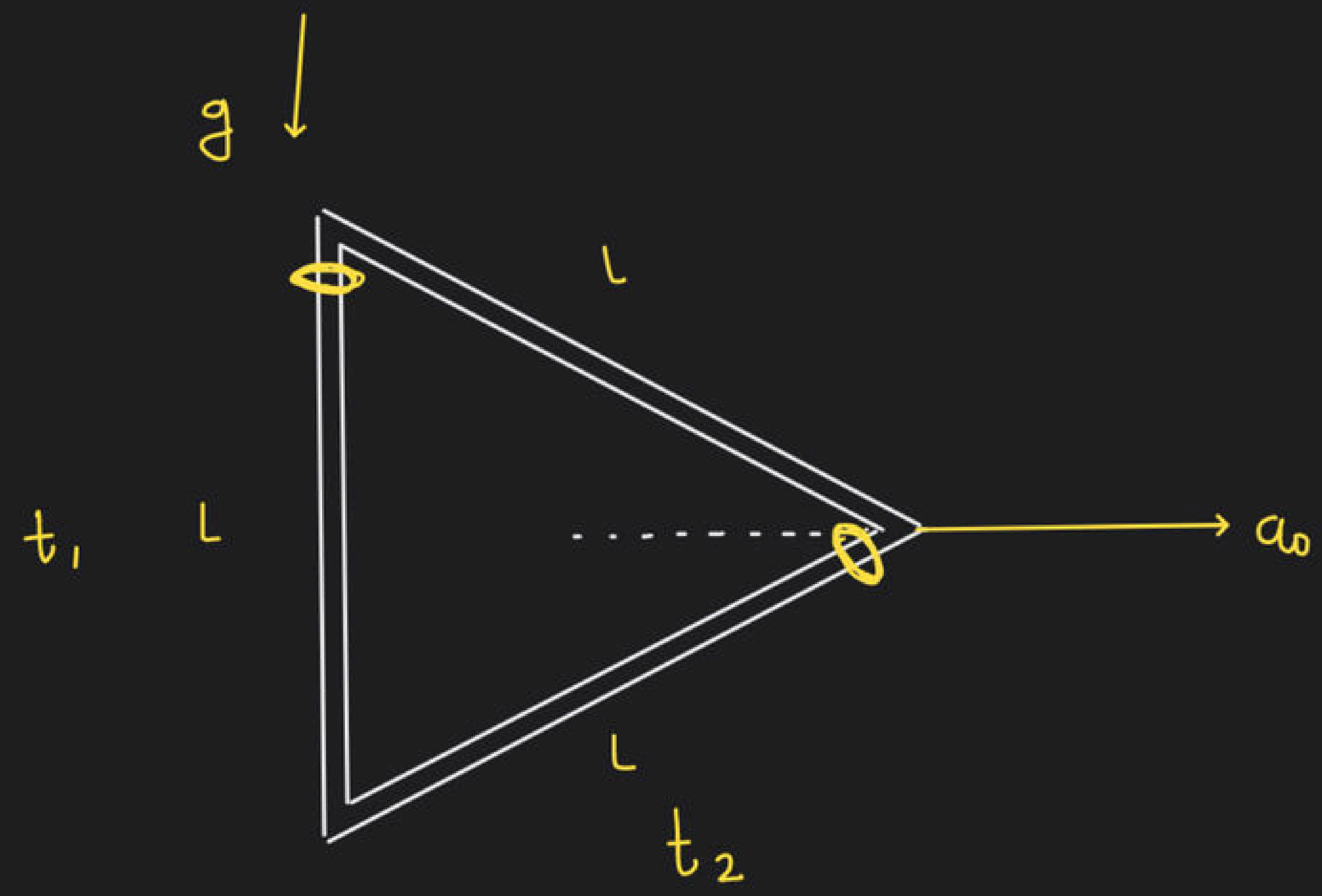
$$t_1 = \sqrt{\frac{2\cdot 2R}{g}}$$

$$a_r = g\cos\theta + a_0\sin\theta$$

$$2R\cos\theta = \frac{1}{2}\left(g\cos\theta + a_0\sin\theta\right)t_2^2$$

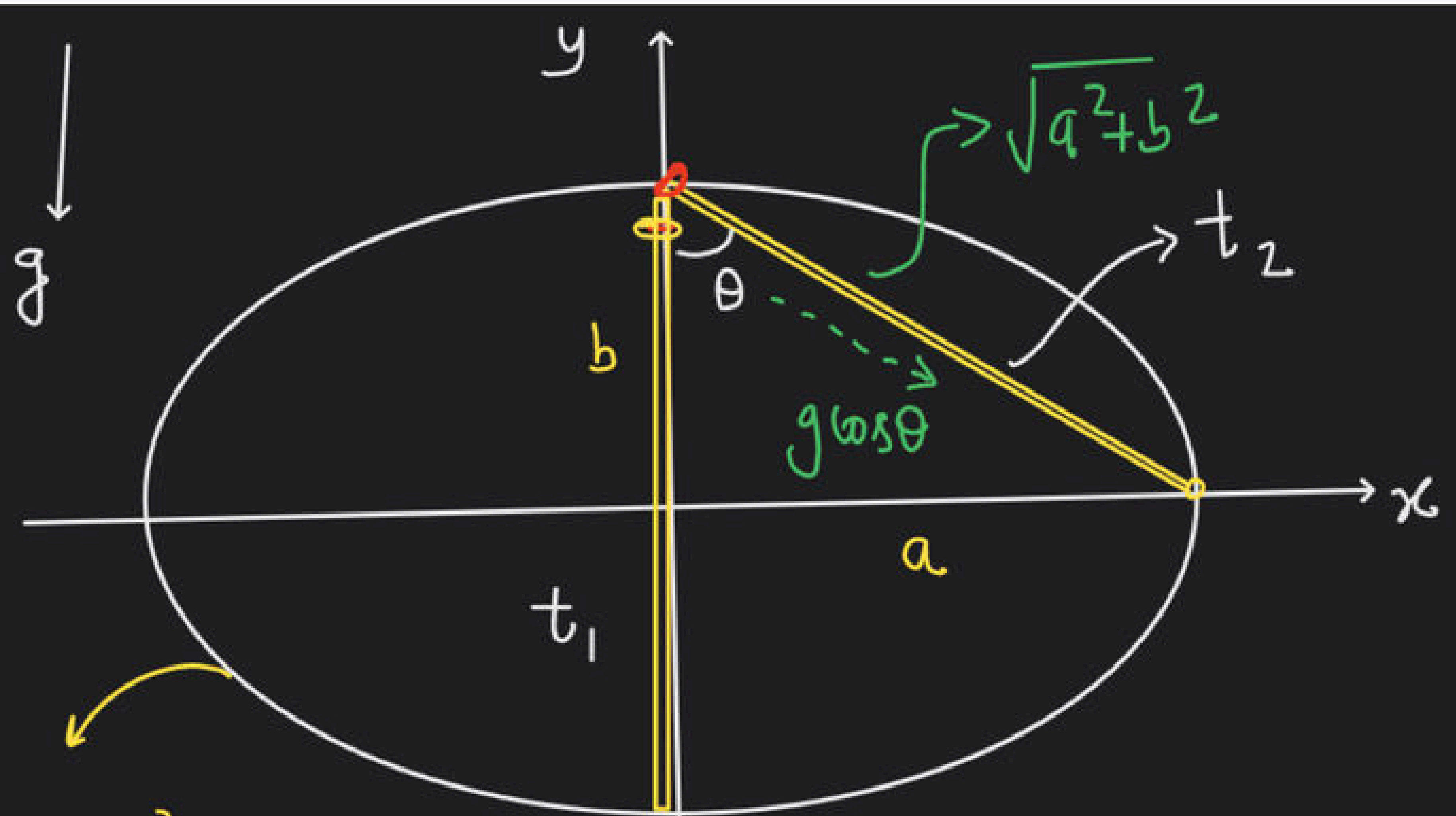
$$t_2 = \sqrt{\frac{4R\cos\theta}{g\cos\theta + a_0\sin\theta}}$$

H.C.



$$\frac{t_1}{t_2} = ?$$

★★★



$$\frac{t_1}{t_2} = ?$$

$t_2 =$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

$$\sqrt{a^2+b^2} = \frac{1}{2} \cdot g\cos\theta \cdot t_2^2$$

$$\operatorname{Tan}\theta = \frac{a}{b}$$

$$t_1 = \sqrt{\frac{2 \cdot 2b}{g}}$$

$$\operatorname{Cos}\theta = \frac{b}{\sqrt{a^2+b^2}}$$

$$t_2 = \sqrt{\frac{2(a^2+b^2)}{gb}}$$

$$\boxed{\frac{t_1}{t_2} = \sqrt{\frac{2b^2}{a^2+b^2}}}$$

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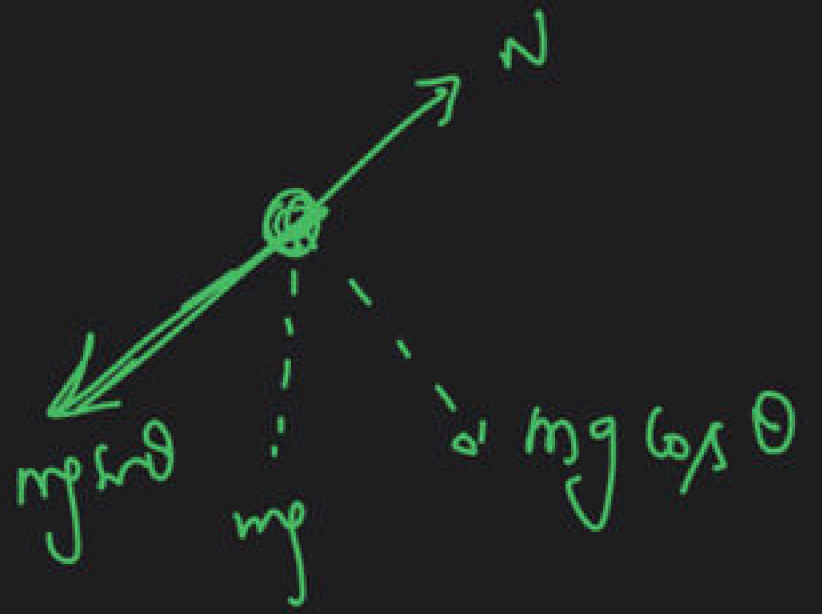

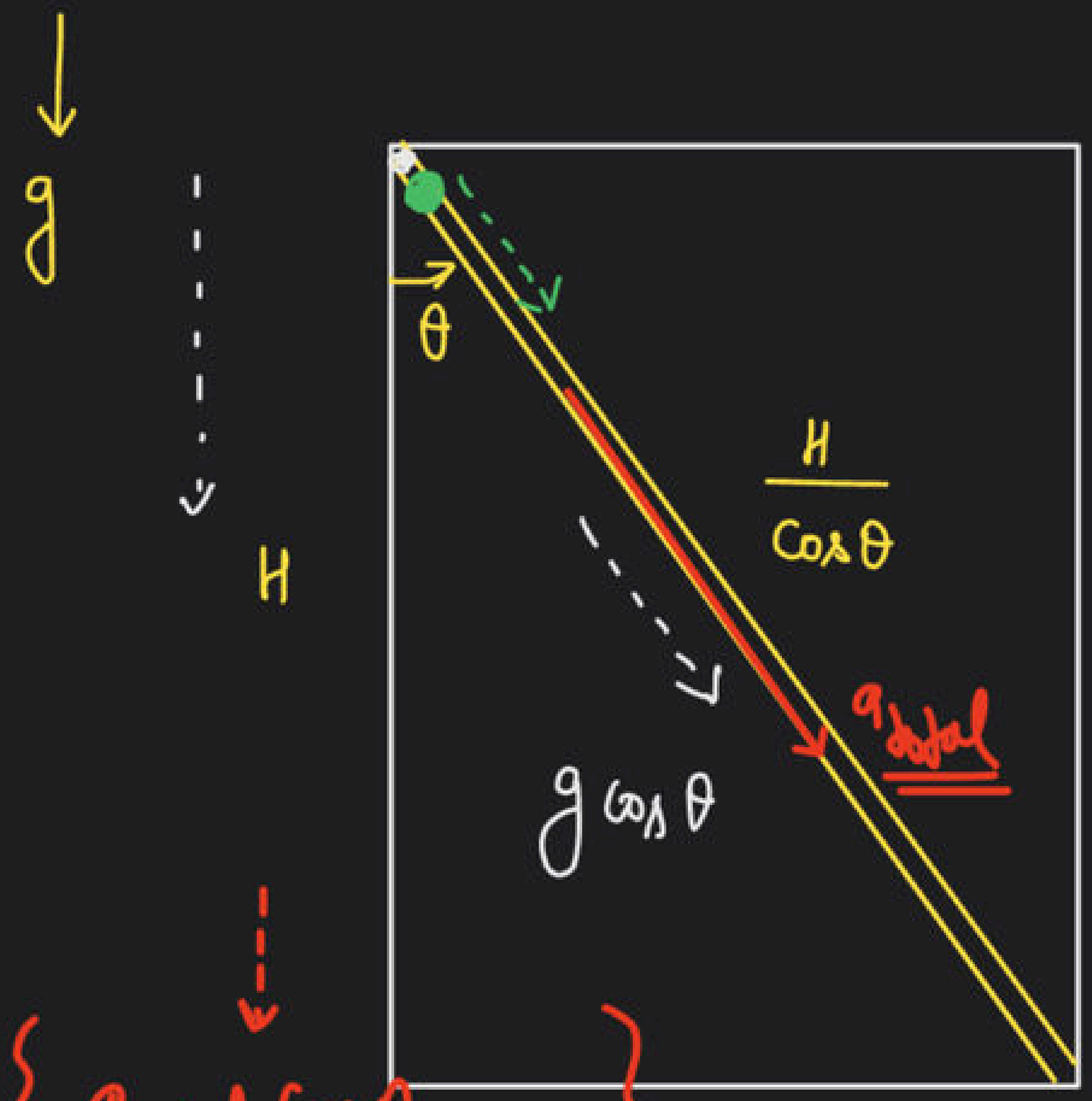

$$\left\{ a_{total}\cos\theta \rightarrow g\cos^2\theta \right\}$$

$$\frac{H}{\cos\theta} = \frac{1}{2}\cdot g\cos\theta\cdot t^2$$

$$\boxed{t = \sqrt{\frac{2H}{g\cos^2\theta}}}$$

$$t = \sqrt{\frac{2H}{g\cos^2\theta}}$$

$$t = \sqrt{\frac{2H}{g}}$$

wrong

T — yes

F — No

$$\left\{ \underbrace{\vec{s} = \cancel{\vec{u}}t + \frac{1}{2}\vec{a}t^2} \right\}$$

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