YAKEEN NEET 2.0

2026

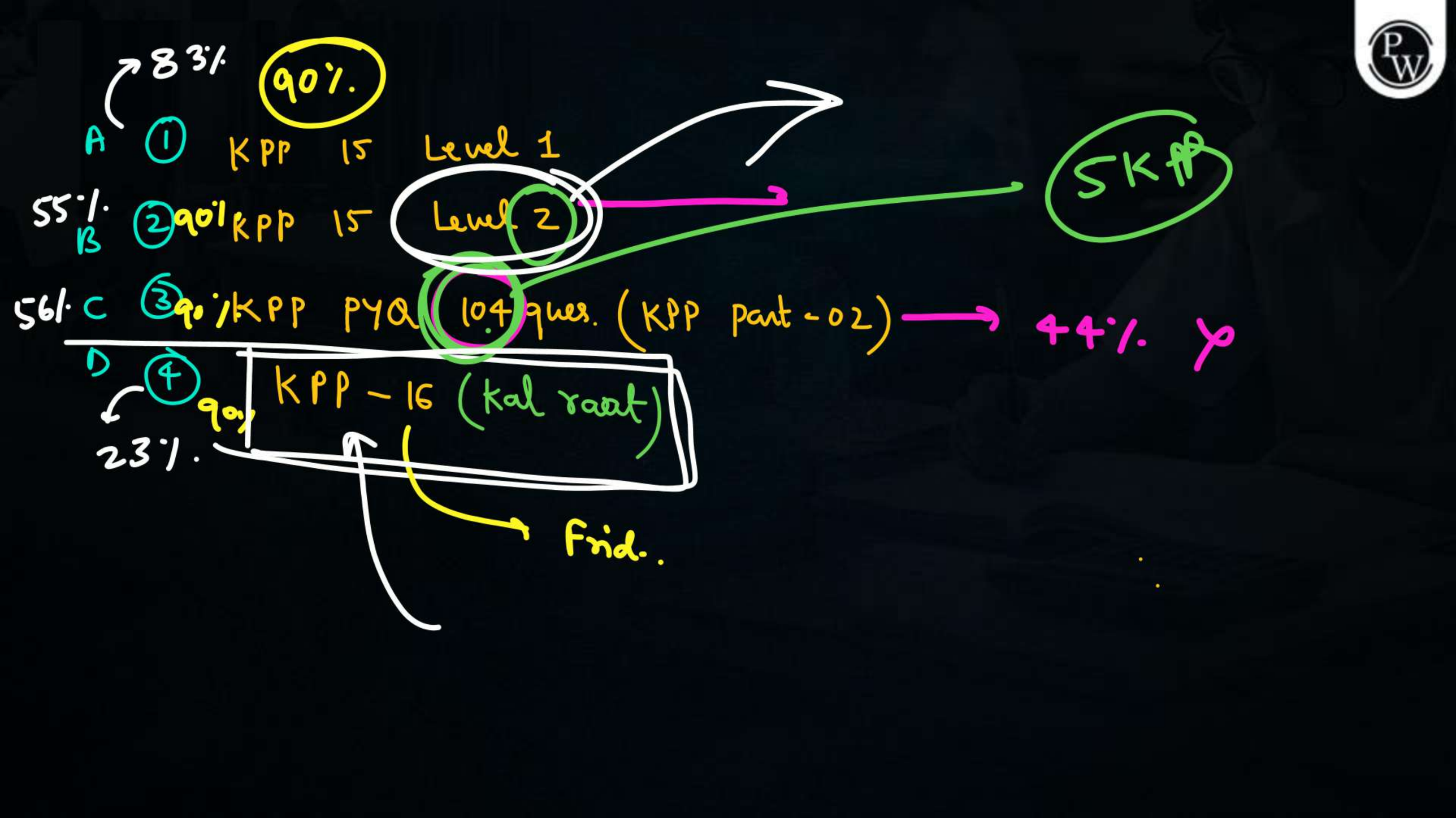
Motion in a Plane

PHYSICS | Lecture – 05

By – Saleem Ahmed Sir

Todays Goal

- Projectile motion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A
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Level 2
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C
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KPP - 16 (kal raat)
Frid.

1:30 hour

1D ⟶ one shot ⟶ 2hour (Upload)

2D

N Lm

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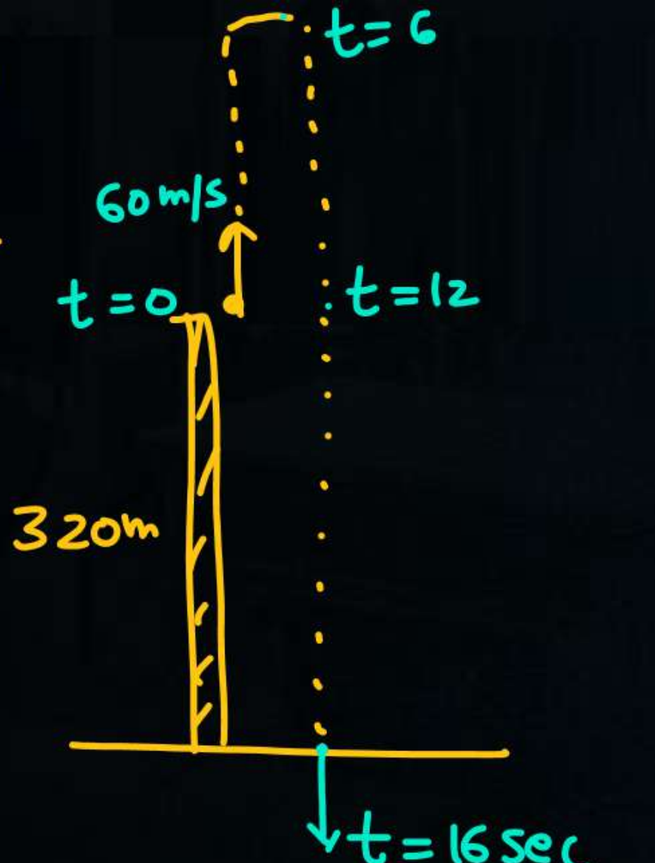
Fresh ⟶ Complete phy - - -

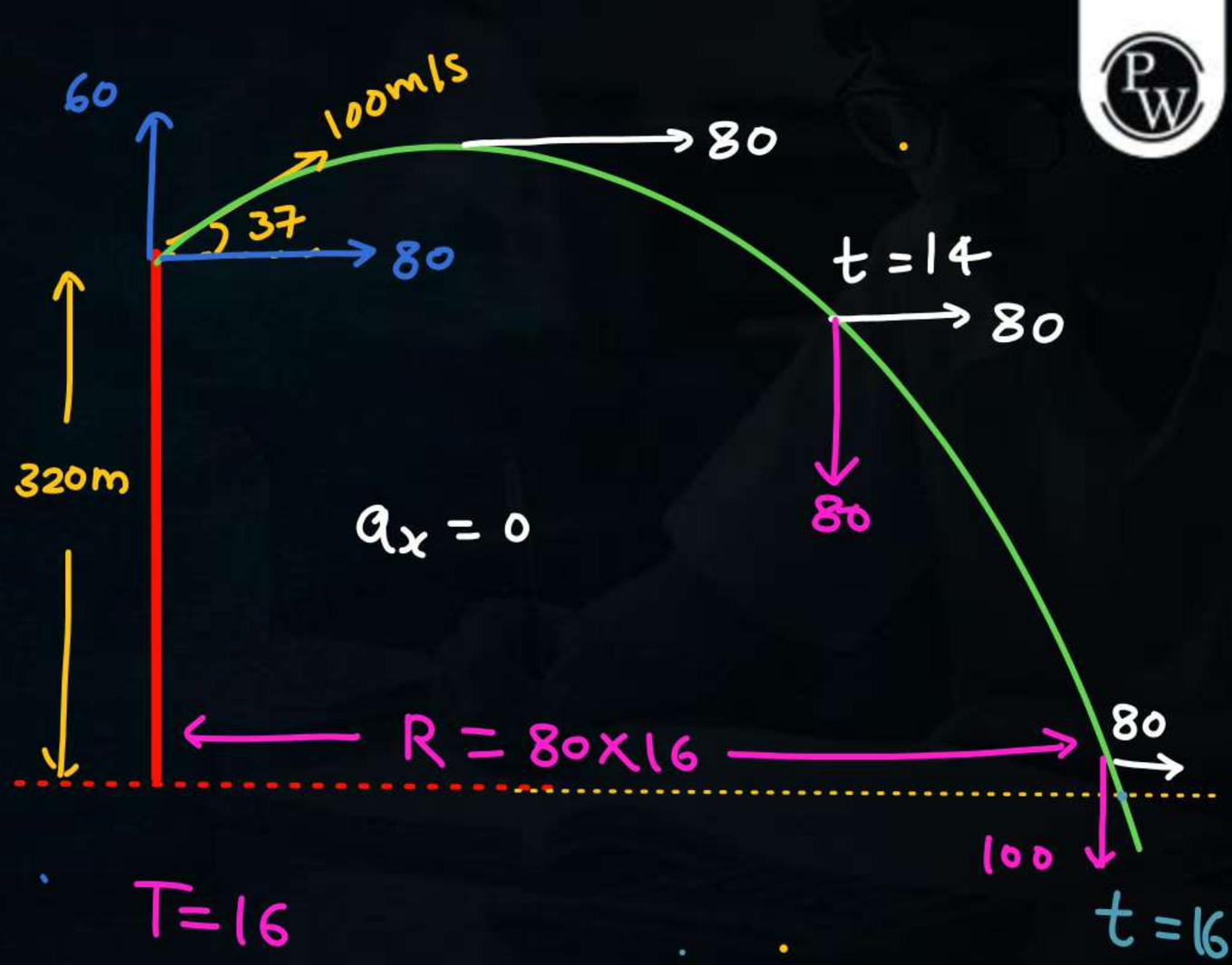
gkr

Q



$V = 100\ m/s$

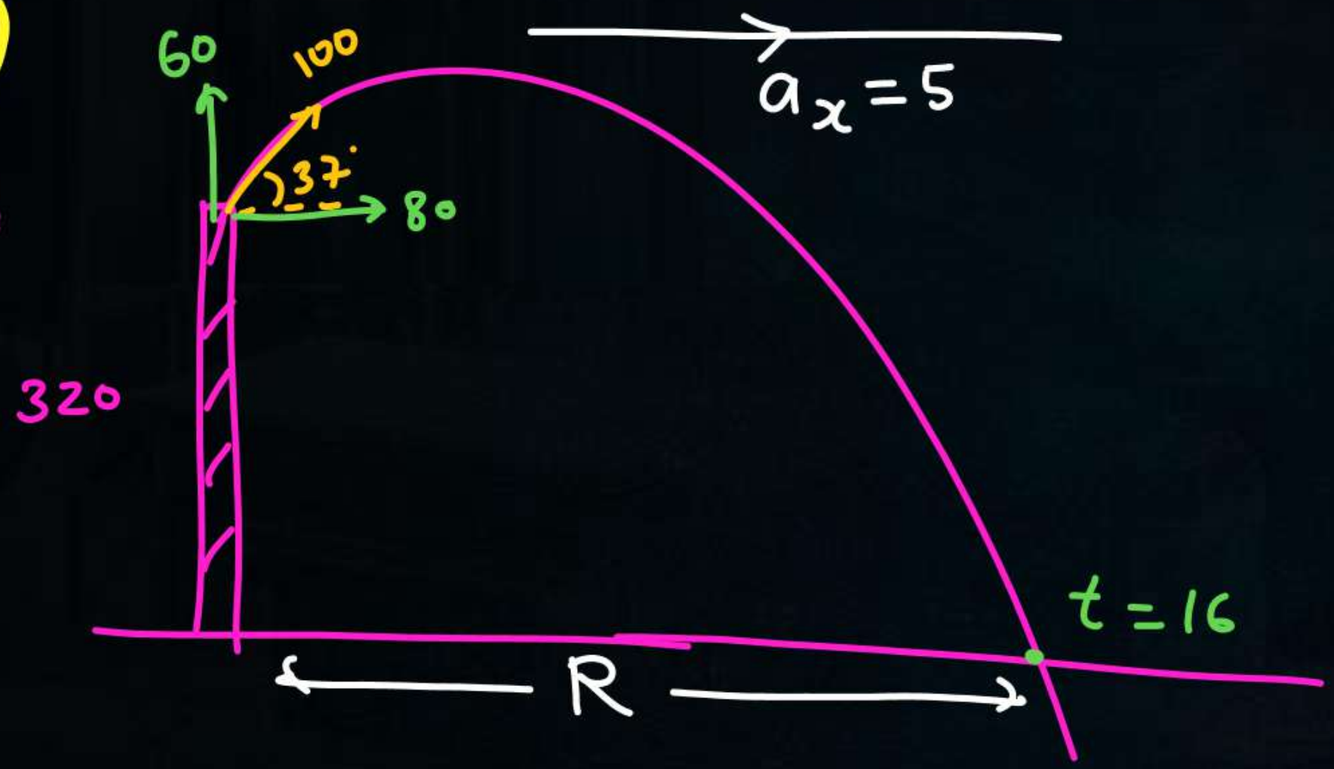
Q



$T = 16$

ghar

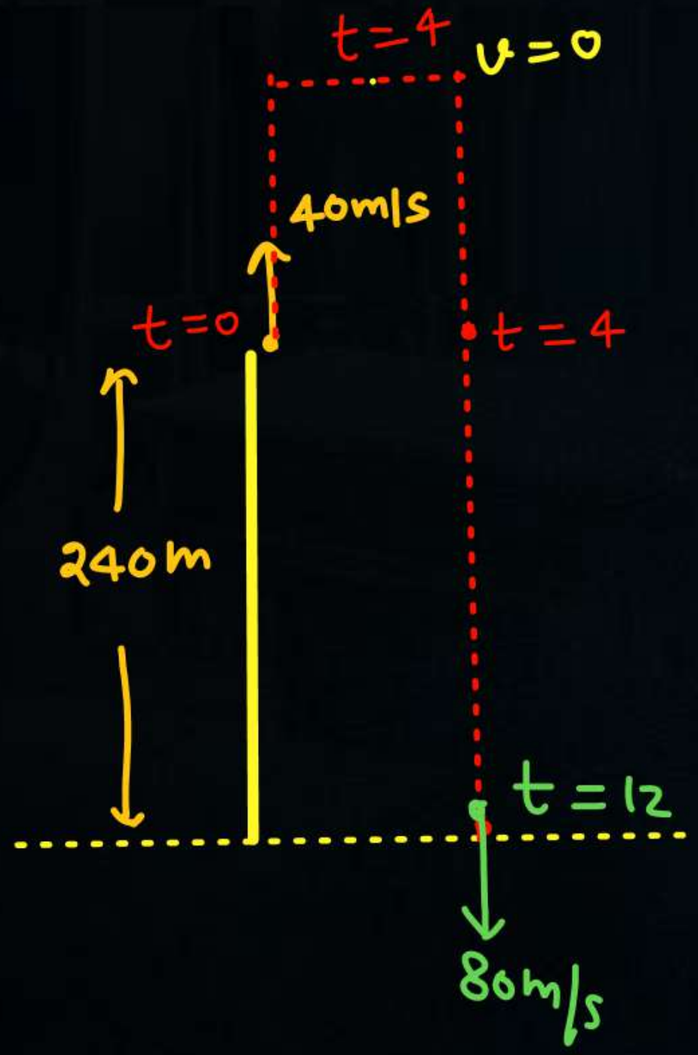
Q



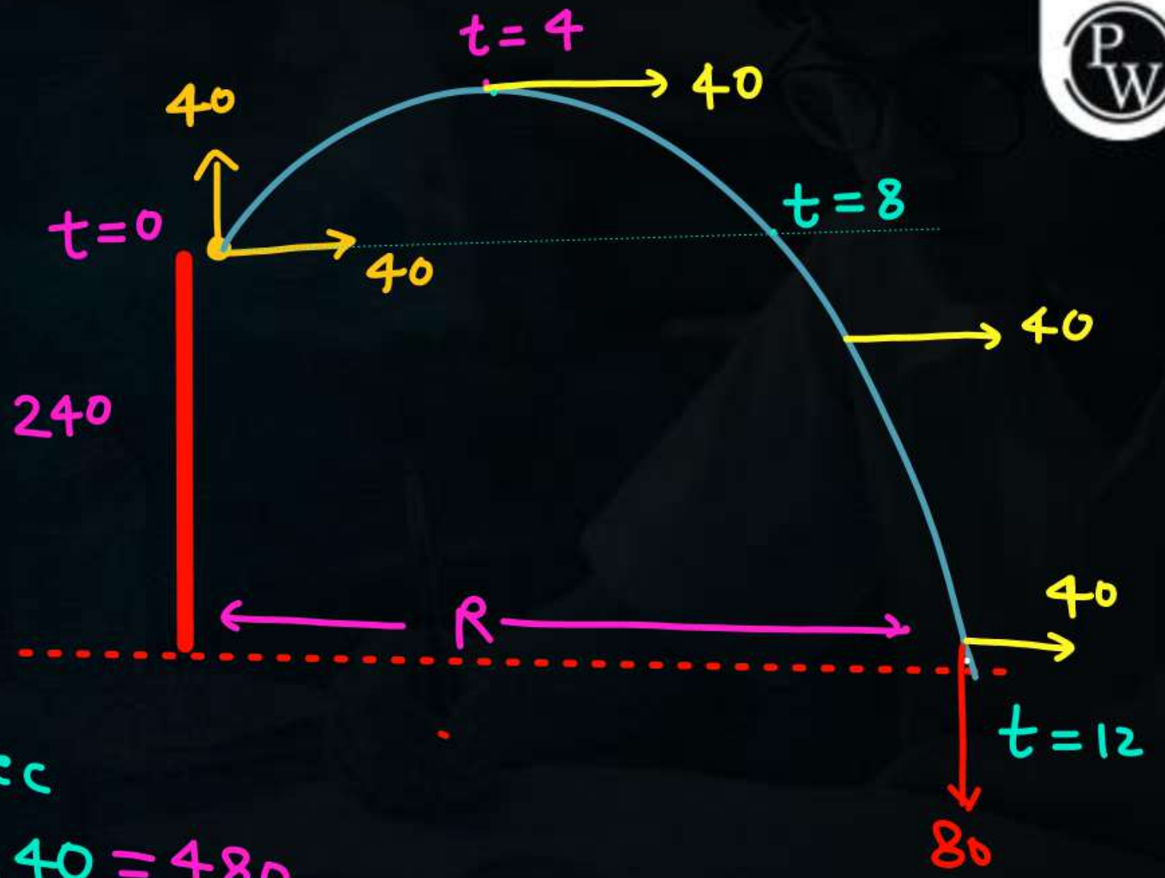
$$R = 80 \times 16 + \frac{1}{2} \times 5 \times 16^2$$

ghr

Q

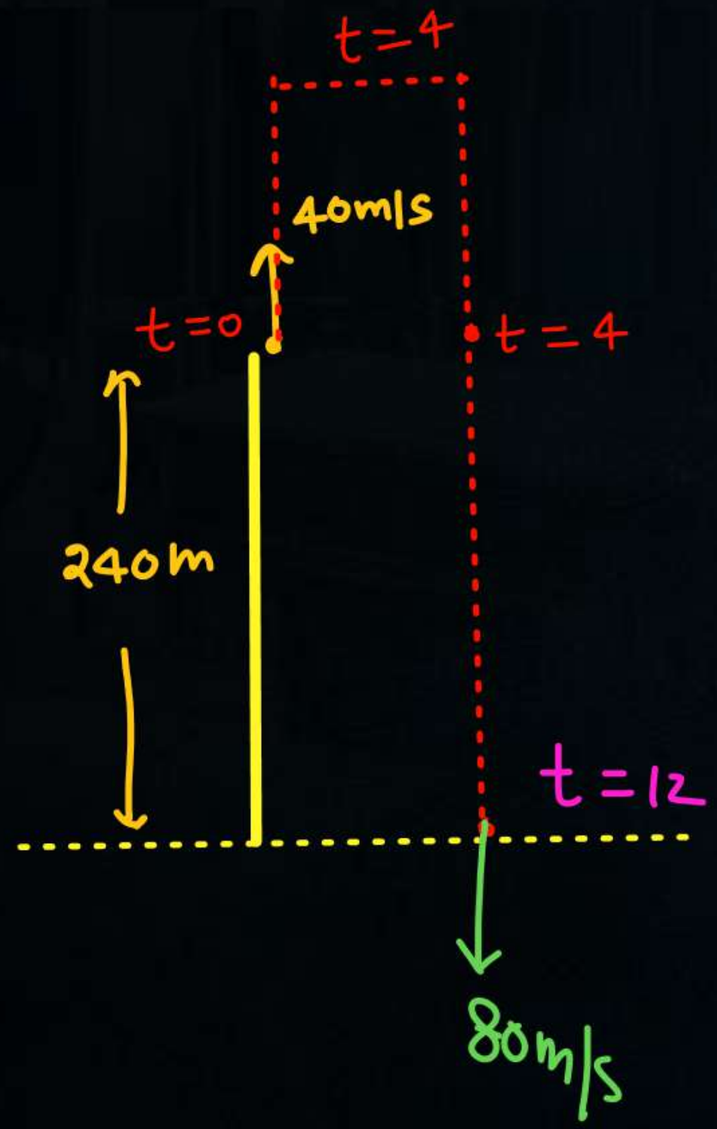


Q



- $T = 12$ sec
- $R = 12 \times 40 = 480$
- point of projection $(0,0) \equiv$ Strike $\equiv (480, -240)$
- $t = 10$, $\vec{v} = 40\hat{i} - 60\hat{j}$
- $t = 12$, $\vec{v} = 40\hat{i} - 80\hat{j}$

Q



$$-240 = 40t - \frac{1}{2} \times 10 \times t^2$$

$$-48 = 8t - t^2$$

$$t^2 - 8t - 48 = 0$$

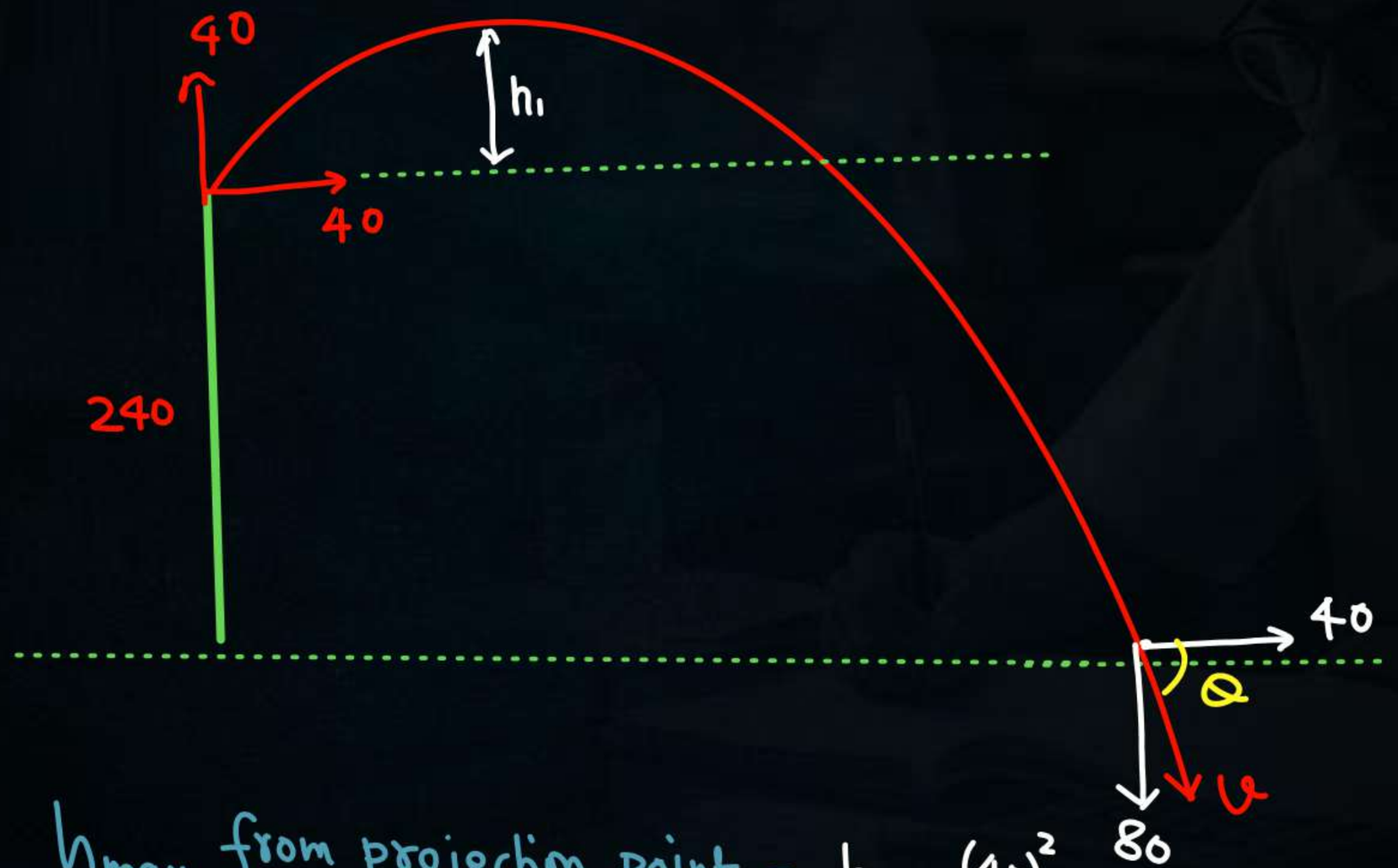
$$(t-12)(t+4) = 0$$

$$\boxed{t = 12 \text{ sec}}$$

ghr

*

at what angle with horizontal particle will strike the ground



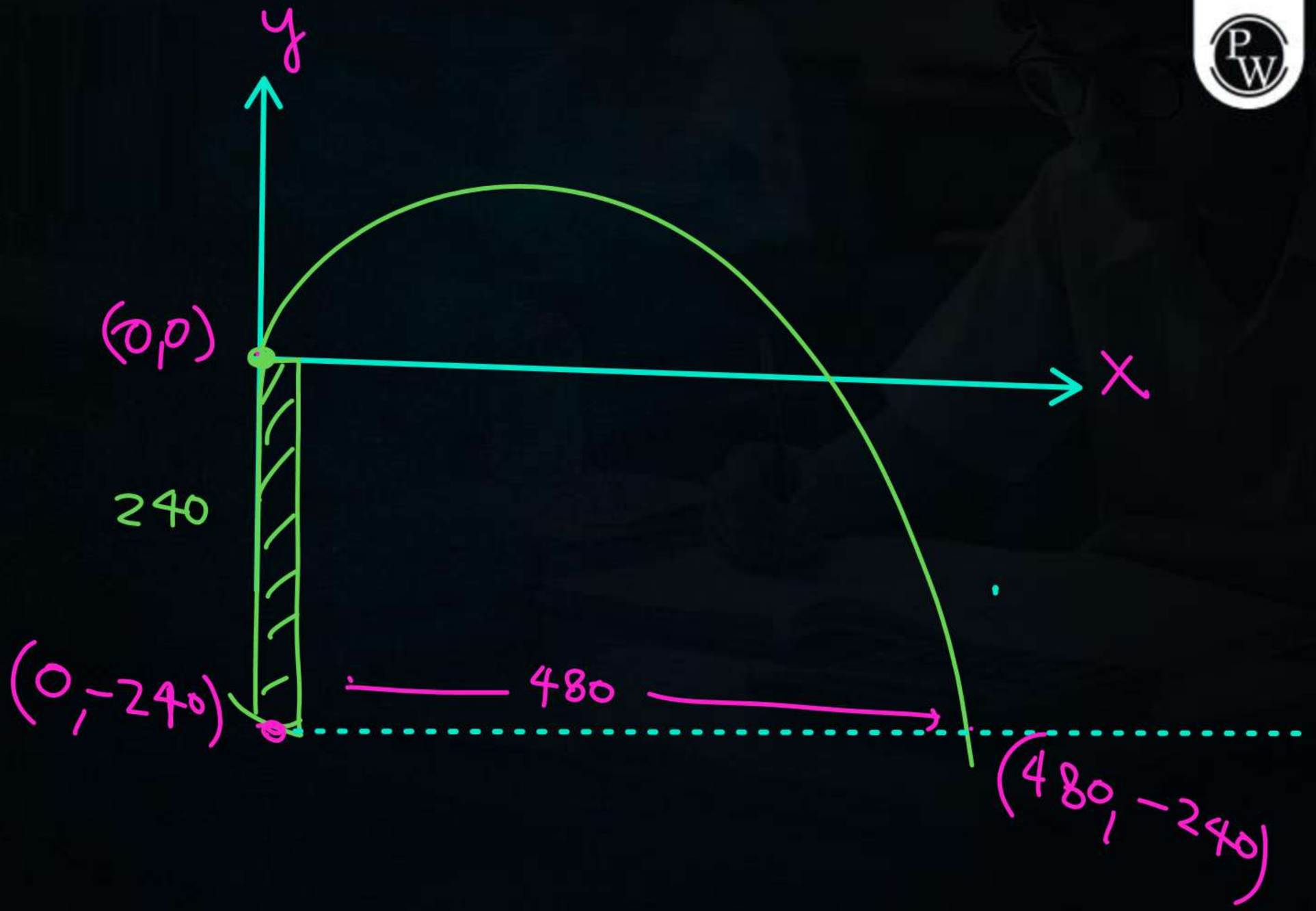
$$\tan\theta = \frac{V_y}{V_x} = \frac{80}{40}$$

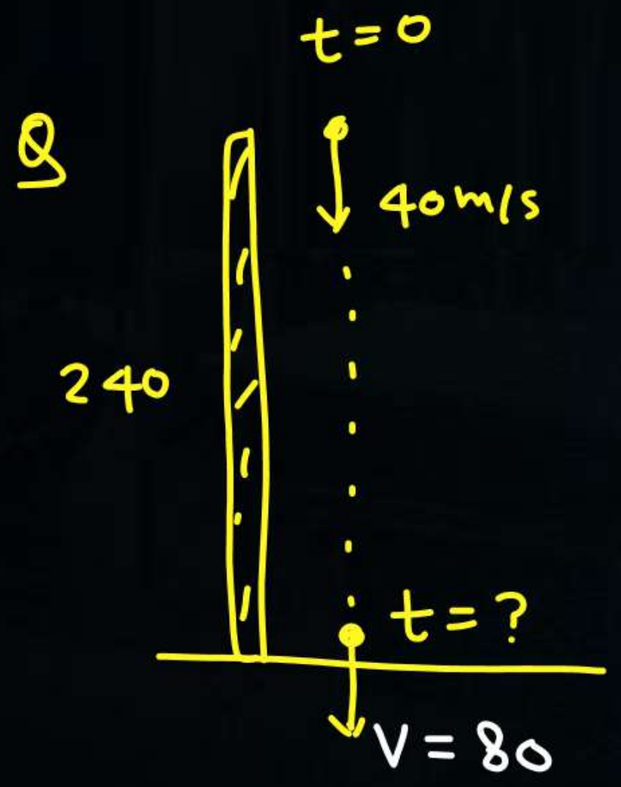
$$\boxed{\tan\theta = 2}$$

h_{max} from projection point $= h_1 = \frac{(40)^2}{2\times 10}$

" " ground $= 240 + \frac{(40)^2}{2\times 10}$

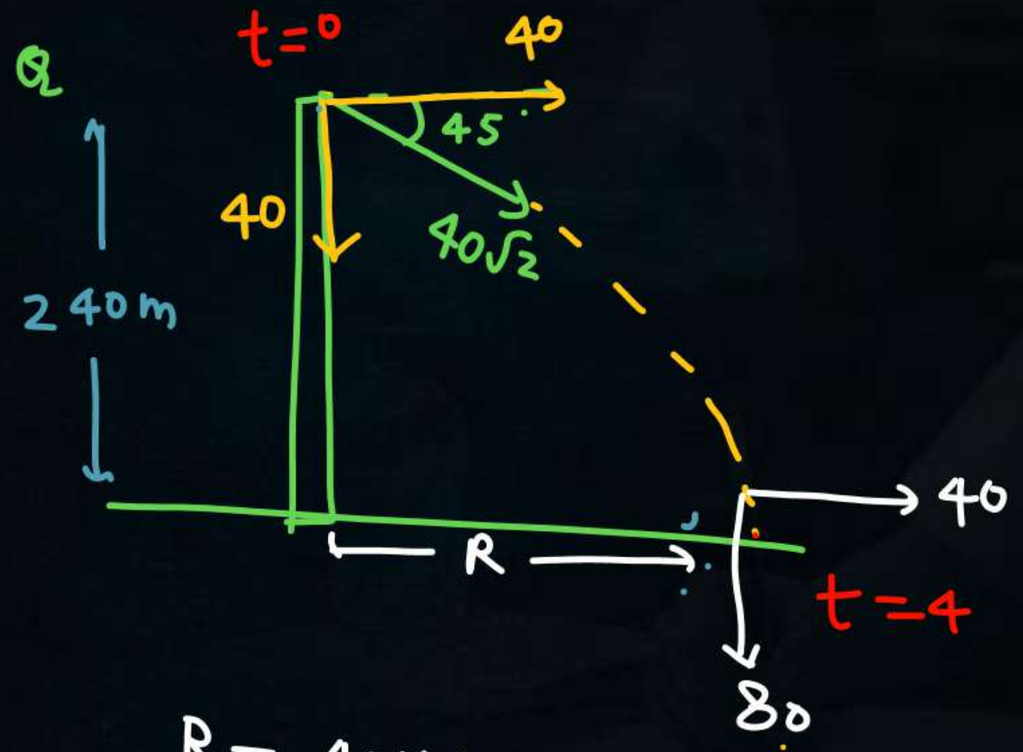
*


y
X
(0,0)
240
(0,-240)
480
(480,-240)



$240 = 40t + \frac{1}{2} \times 10 \times t^2$

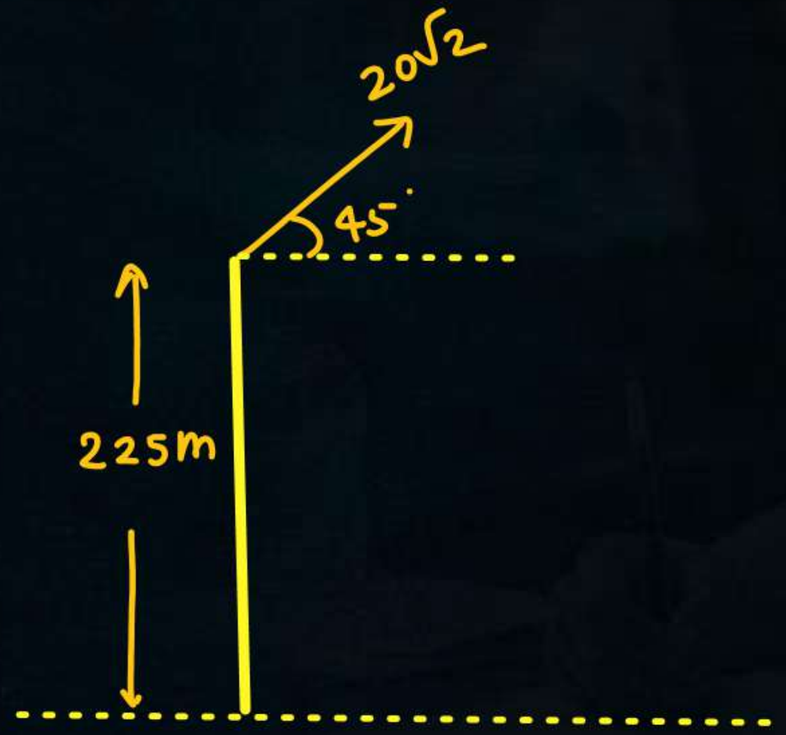
$t = 4$ sec



$R = 40 \times 4 = 160$

$T = 4$

Q A particle is projected with velocity $20\sqrt{2}$ at an angle 45° with horizontal from top of a tower of height 225 m. If projection point is origin. Analyse the ques in Saleem Bhaia style.



① Initial velocity $= 20\hat{i} + 20\hat{j}$

② $T = 9$ (sol next page)

③ h_{max} from ground $= 225 + \frac{(20)^2}{2\times 10}$

$= 245$

④ Range (from foot of tower) $= 9 \times 20$

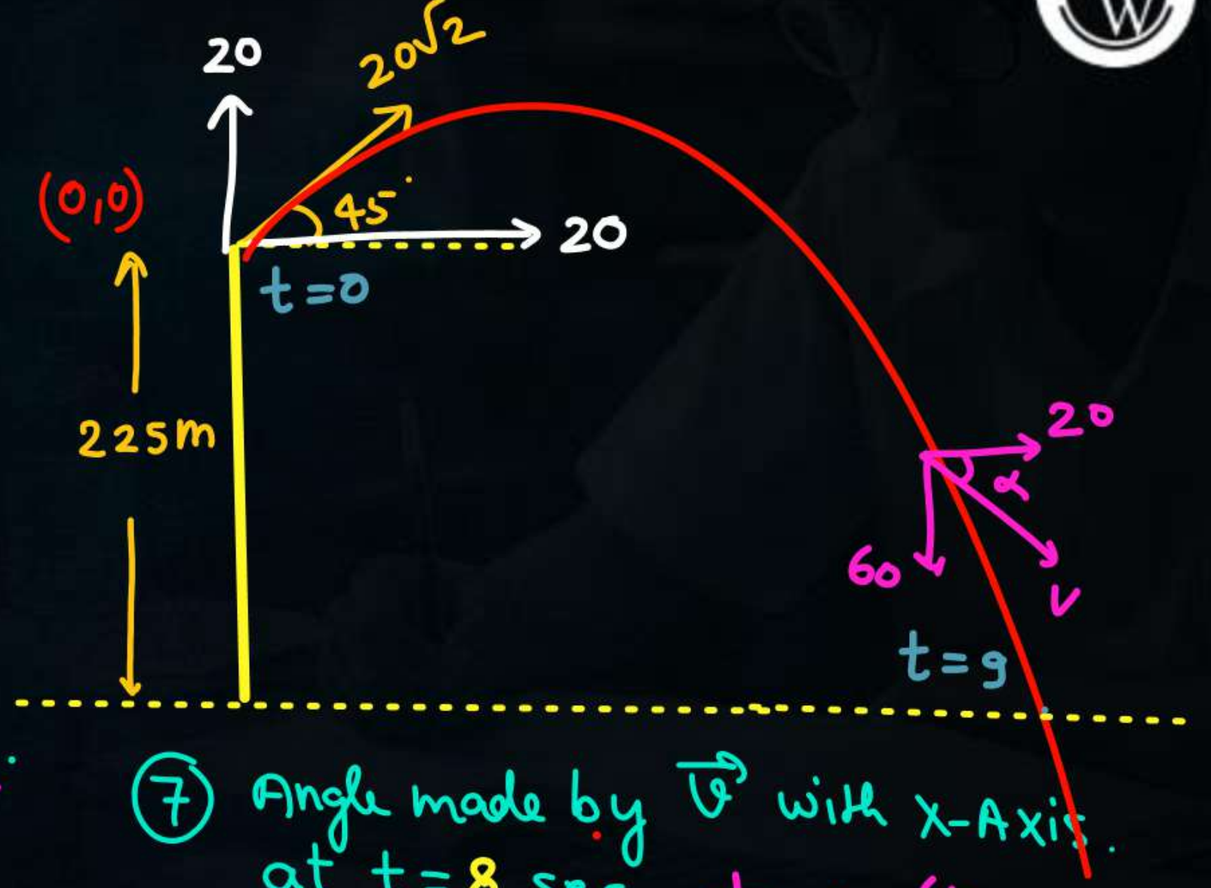
$= 180$

⑤ Velocity at highest point $= 20\hat{i}$

⑥ at $t = 8$ sec $\vec{v} = 20\hat{i} - 60\hat{j}$

$x = 20\times 8 = 160$

$y = 20\times 8 - \frac{1}{2}\times 10\times 8^2$



⑦ Angle made by $\vec{v}$ with X-Axis at $t = 8$ sec. $\tan\alpha = \frac{60}{20} = 3$

⑧ If $a_x = 10$ find

$R = 20\times 9 + \frac{1}{2}\times 10\times 9^2 = 585$

$$-225 = 20t - \frac{1}{2} \times 10 \times t^2$$

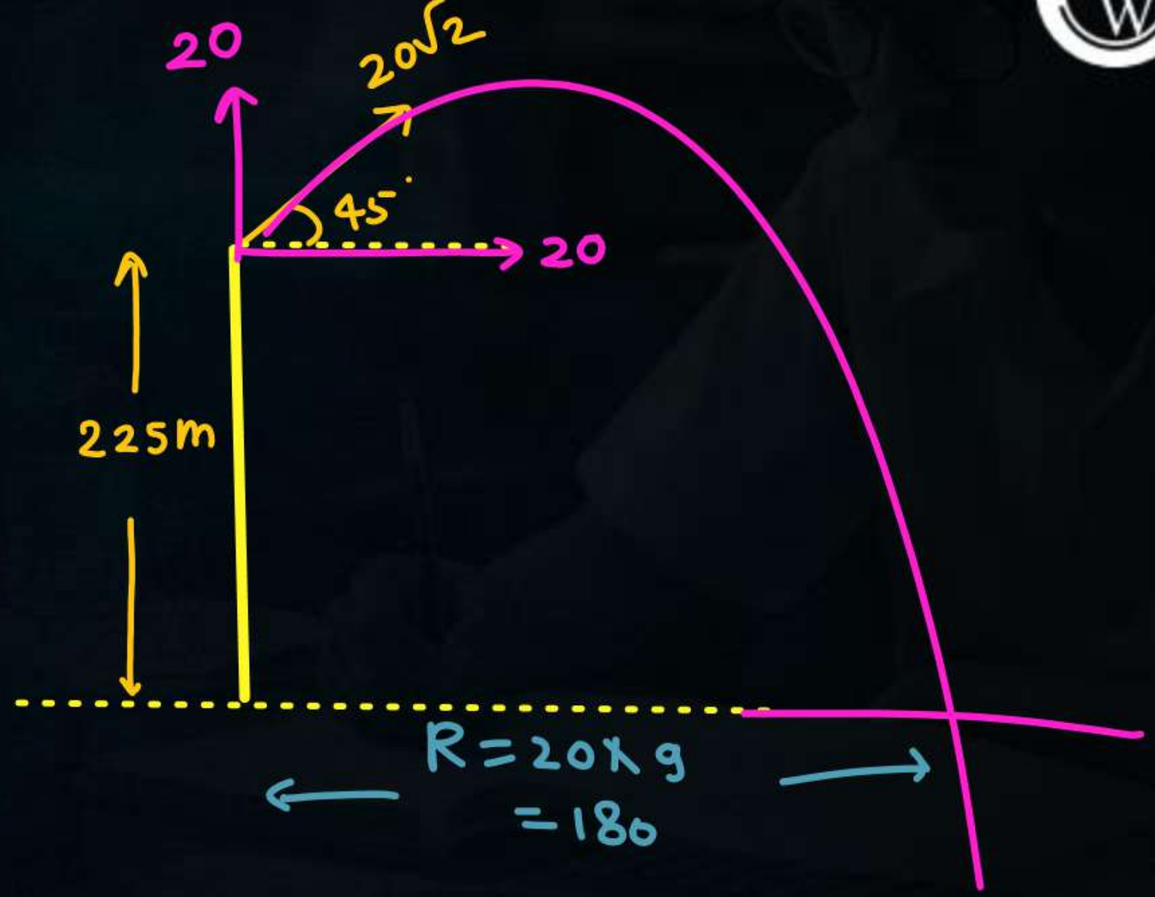
$$-450 = 40t - 10t^2$$

$$t^2 - 4t - 45 = 0$$

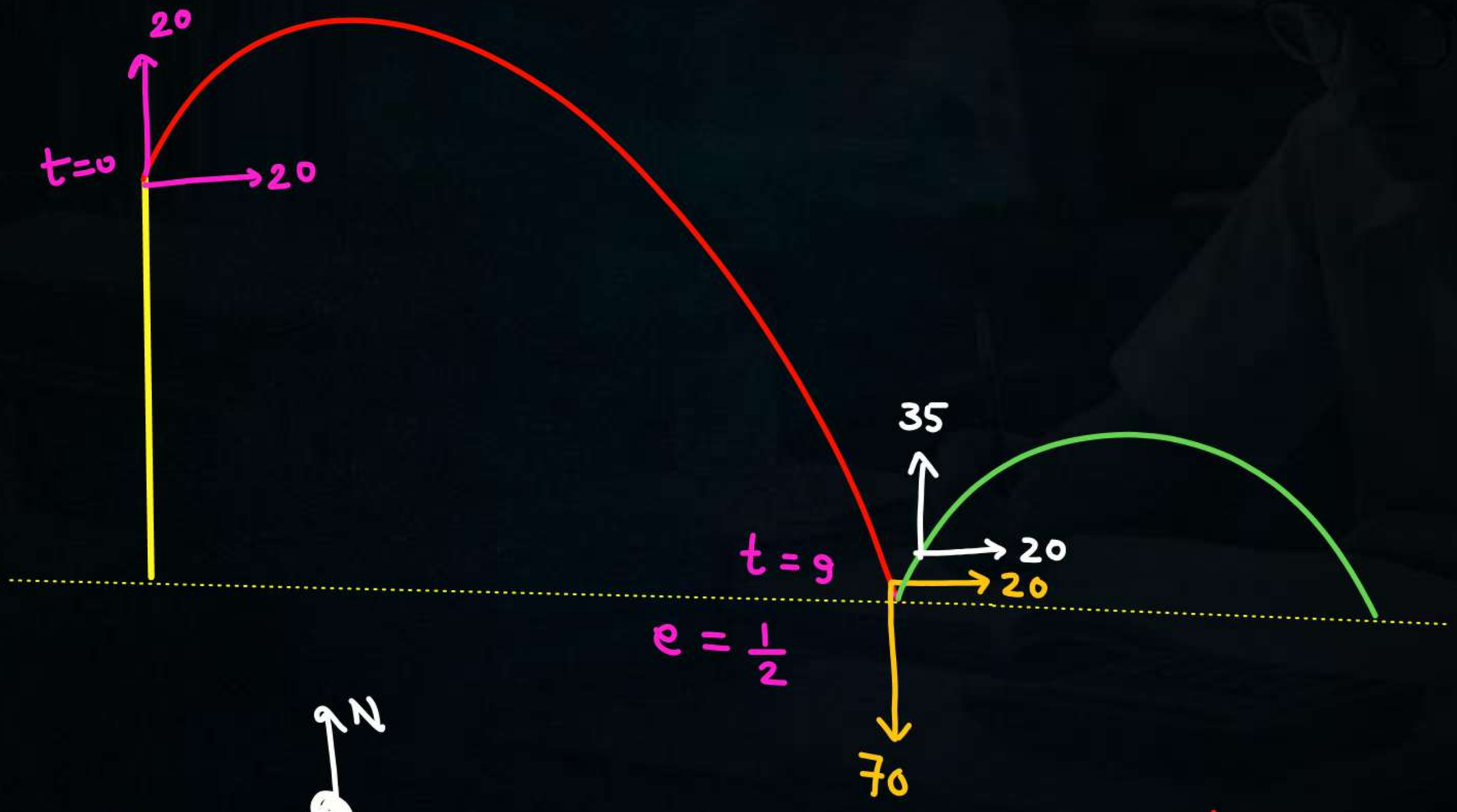
$$t^2 - 9t + 4t - 45 = 0$$

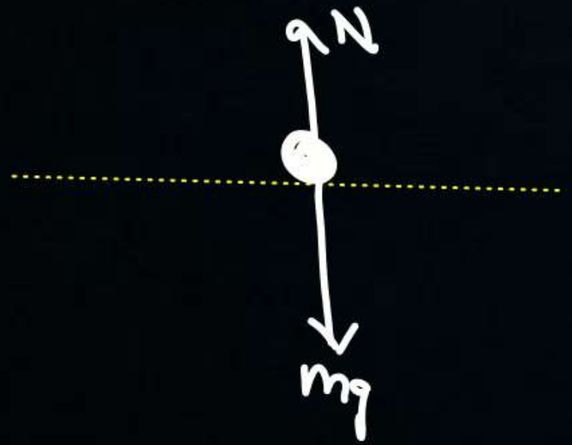
$$(t-9)(t+4) = 0$$

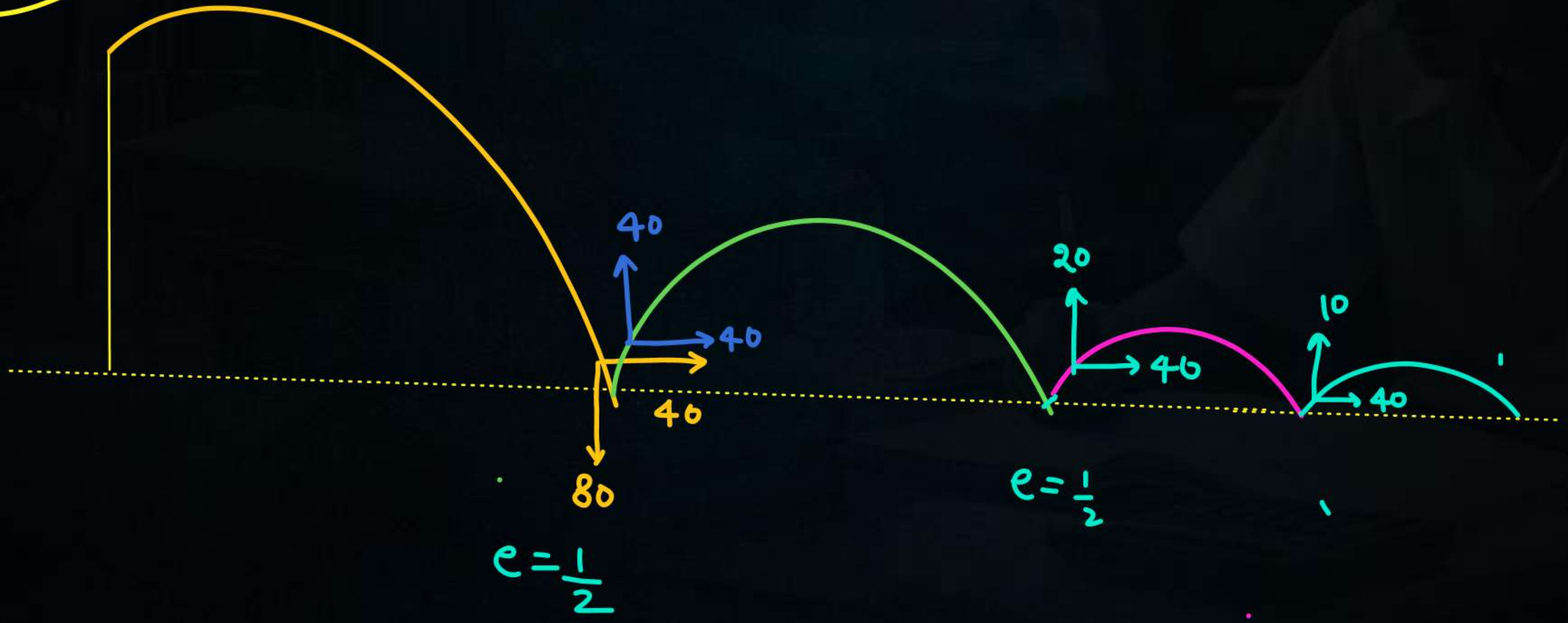
$$\boxed{t = 9 \text{ sec}}$$



Adv



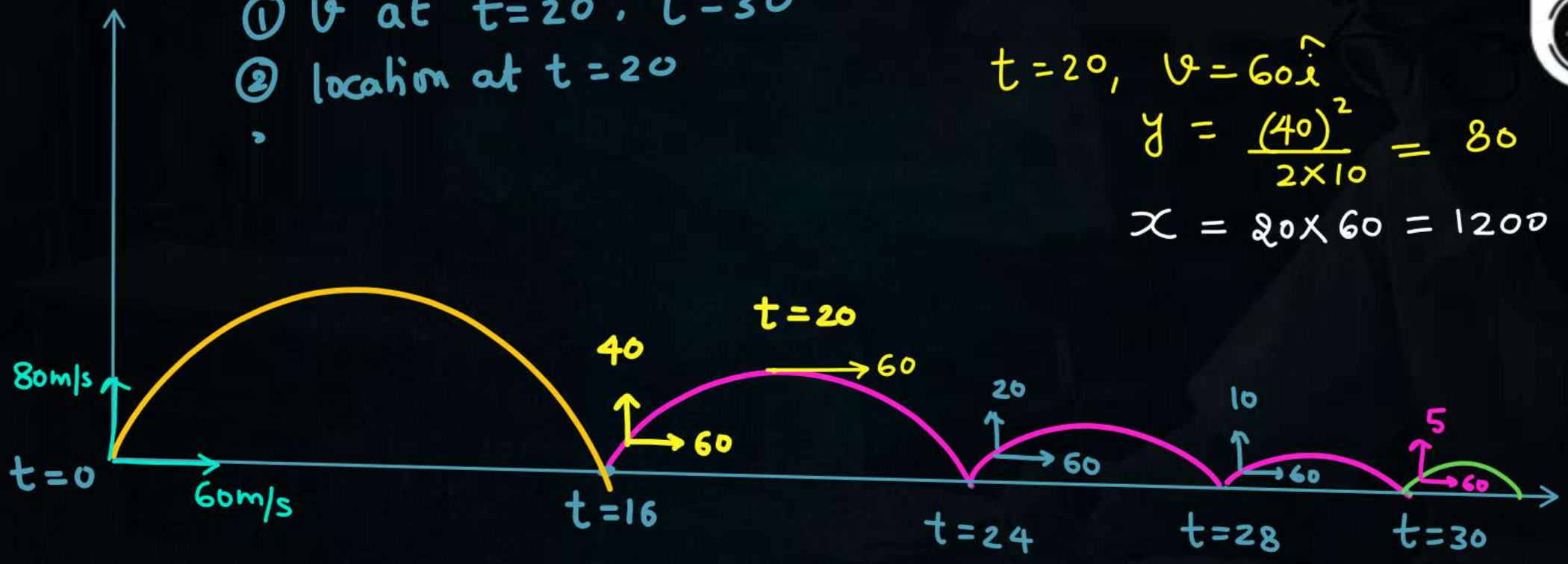



40
40
40
80
20
40
10
40
e = 1/2
e = 1/2

Ans

① v at $t=20$, $t=30$

② location at $t=20$



$e = \frac{1}{2}$

$t = 20$, $v = 60\hat{i}$

$y = \frac{(40)^2}{2\times 10} = 80$

$x = 20 \times 60 = 1200$

$t = 30^-$ $\Rightarrow 60\hat{i} - 10\hat{j}$

$t = 30^+$ $\Rightarrow 60\hat{i} + 5\hat{j}$

Projectile motion

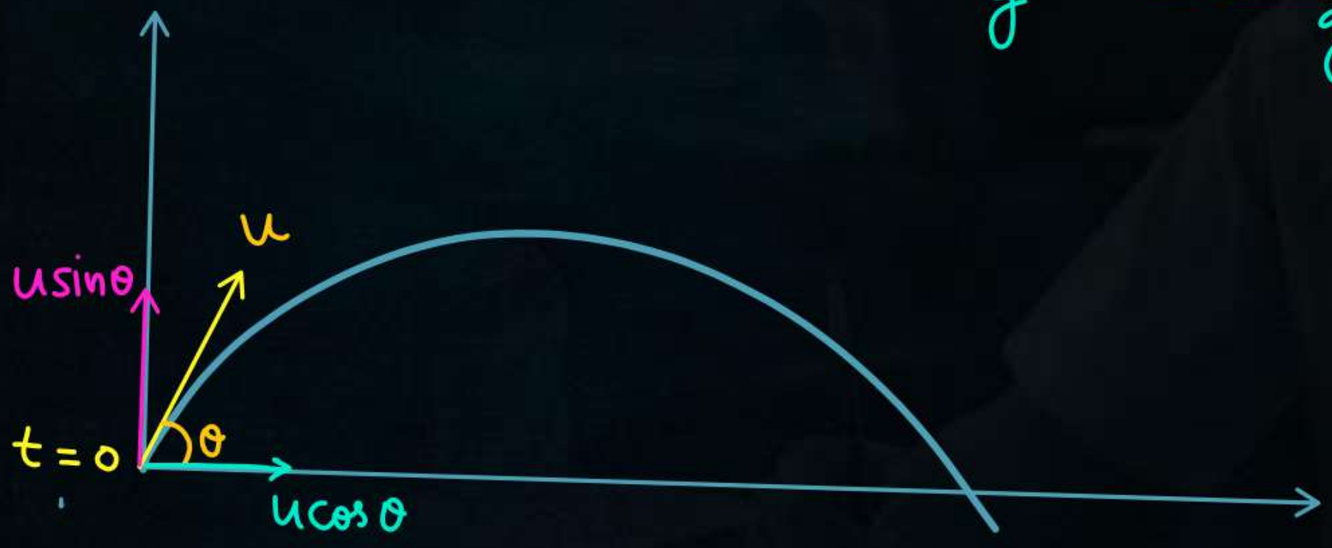
(1) $\vec{u}_i = u\cos\theta\,\hat{i} + u\sin\theta\,\hat{j}$

(2) when particle will reach highest point

$v_y = u_y + a_y t$ (y में)

$0 = u\sin\theta - gt$

$t = \frac{u\sin\theta}{g}$



(3) Time of flight $= \frac{2u\sin\theta}{g}$

(4) $h_{max} = ?$

$v_y^2 = u_y^2 + 2as$

$0 = (u\sin\theta)^2 - 2gh_{max}$

$$h_{max} = \frac{(u\sin\theta)^2}{2g}$$

(5) Range $= u\cos\theta \cdot T$

$= u\cos\theta \cdot \frac{2u\sin\theta}{g} = \frac{u^2\sin 2\theta}{g}$

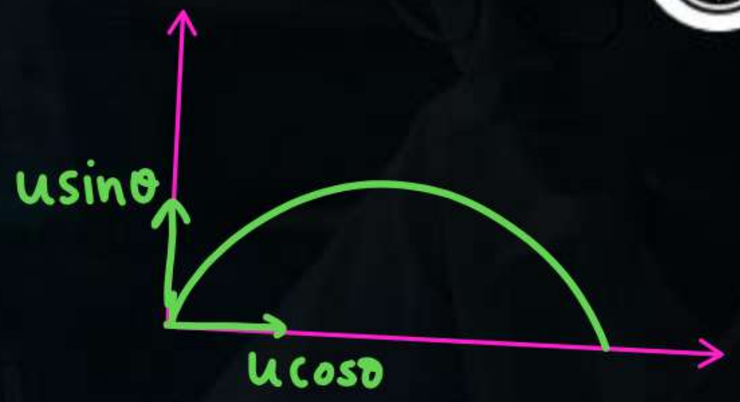
* $T = \frac{2u\sin\theta}{g}$

* $h_{max} = \frac{u^2\sin^2\theta}{2g}$

* Range $= \frac{u^2\sin 2\theta}{g}$

⑥

- $x = u\cos\theta \cdot t$
- $y = u\sin\theta \cdot t - \frac{1}{2}gt^2$



⑦ Find eq^ of trajectory

$t = \frac{x}{u\cos\theta}$

$y = u\sin\theta \cdot x\frac{x}{u\cos\theta} - \frac{1}{2}g\left(\frac{x}{u\cos\theta}\right)^2$

$y = x\tan\theta - \frac{1}{2}g\frac{x^2}{u^2\cos^2\theta}$

वादने

$y = x\tan\theta\left(1 - \frac{x}{R}\right)$

(8) $\vec{v}$ at time t

$$\vec{v} = u\cos\theta\,\hat{i} + (u\sin\theta - gt)\hat{j}$$

(9) Angle made by $\vec{v}$ with horizontal.

$$\tan\alpha = \frac{v_y}{v_x} = \frac{u\sin\theta - gt}{u\cos\theta}$$

(10) तूफान $a_x = \checkmark$

$T \longrightarrow$ Same

h_{max}

$$R = u\cos\theta\, T \pm \frac{1}{2} a_x T^2$$

Projectile motion

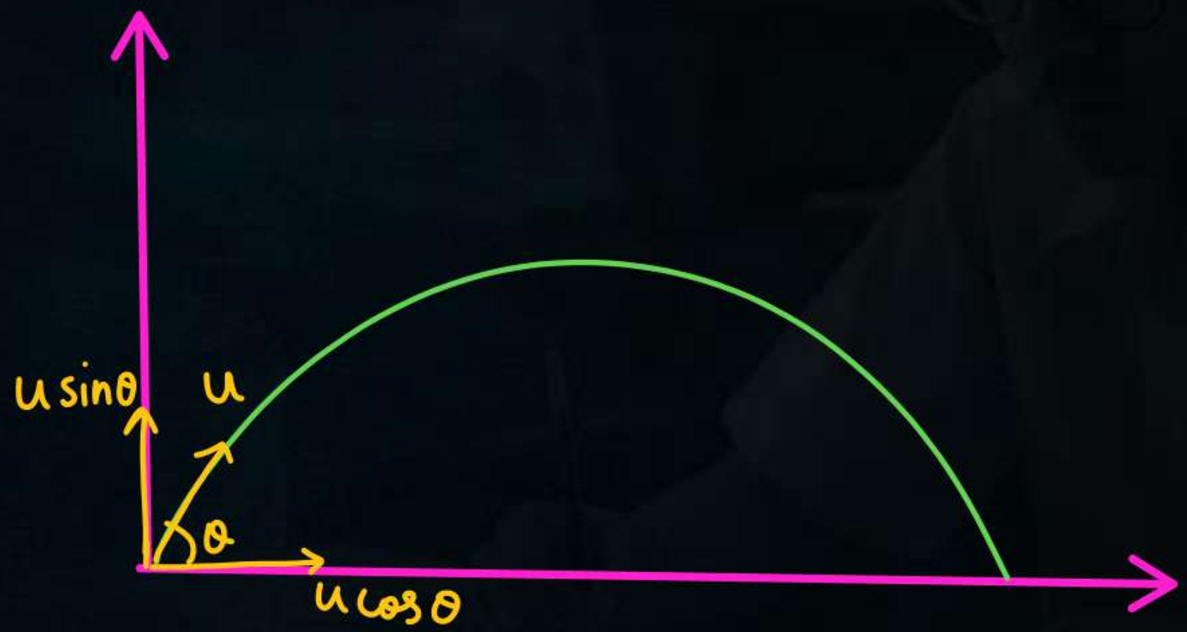
① $\vec{u_i} =$

② $0 = u\sin\theta - gt$

$$t = \frac{u\sin\theta}{g}$$

③ Range $= u\cos\theta \times T$

④ h_{max}

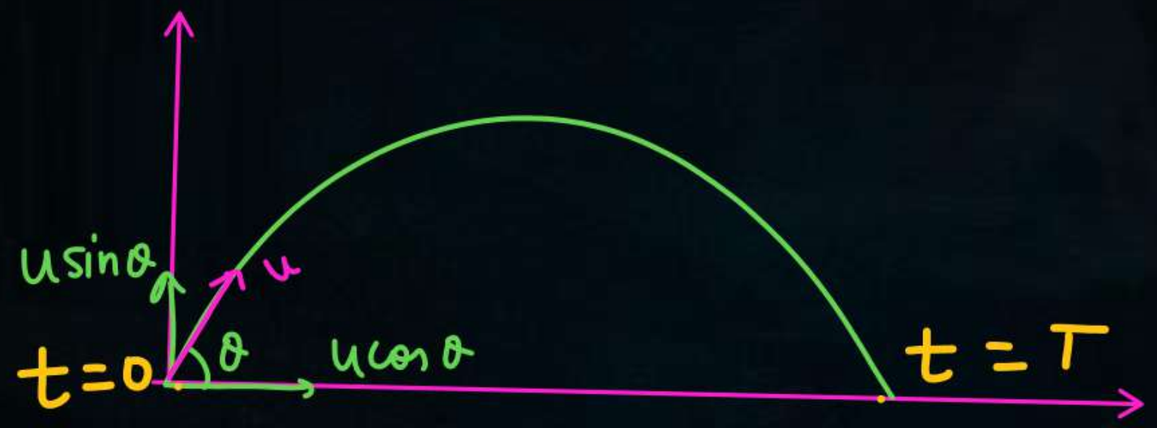


$$t = \frac{x}{u\cos\theta}$$

$$x = u\cos\theta \cdot t$$

$$y = x\tan\theta - \frac{1}{2}g\left(\frac{x}{u\cos\theta}\right)^2$$

$$v =$$



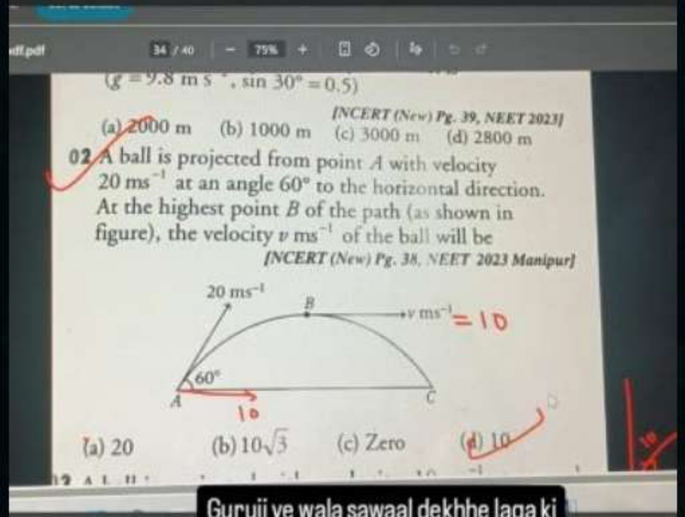
$$y \equiv S_y = u_y t + \frac{1}{2} a_y t^2$$

$$0 = (u\sin\theta)T - \frac{1}{2} g T^2$$

$$\frac{2\,u\sin\theta}{g} = T$$

1:28 5G 90

Mentions · awaraneetaspirant 3h
See translation >



$(g = 9.8\ \text{m s}^{-2}, \sin 30° = 0.5)$

[NCERT (New) Pg. 39, NEET 2023]

(a) 2000 m (b) 1000 m (c) 3000 m (d) 2800 m

02. A ball is projected from point A with velocity $20\ \text{ms}^{-1}$ at an angle 60° to the horizontal direction. At the highest point B of the path (as shown in figure), the velocity $v\ \text{ms}^{-1}$ of the ball will be

[NCERT (New) Pg. 38, NEET 2023 Manipur]

(a) 20 (b) $10\sqrt{3}$ (c) Zero (d) 10

Guruji ye wala sawaal dekhhe laga ki Velocity 0 hogi kyuki hamne padha projectile ka highest point pe uska velocity 0 hota hai ..par answer aapne 10 mark Kiya phir samaj aya ki ye tho VELOCITY VECTOR ka MOD nikalke hoga ..to guruji is confusion ko door kese karna hai ..

SP[illegible]KHE BOLDIA

Add to your story

Send message...

Home Work

- Solve KPP '104' ques pls pls pls.
  (Last day)
- KPP-17 (will be uploaded today 8pm)
- Revise notes.. (very imp for today)

THANK YOU