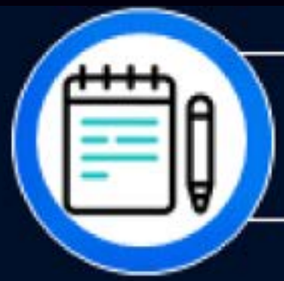
YAKEEN NEET 2.0

2026

Motion in a Plane

PHYSICS | Lecture - 11

By - Saleem Ahmed Sir



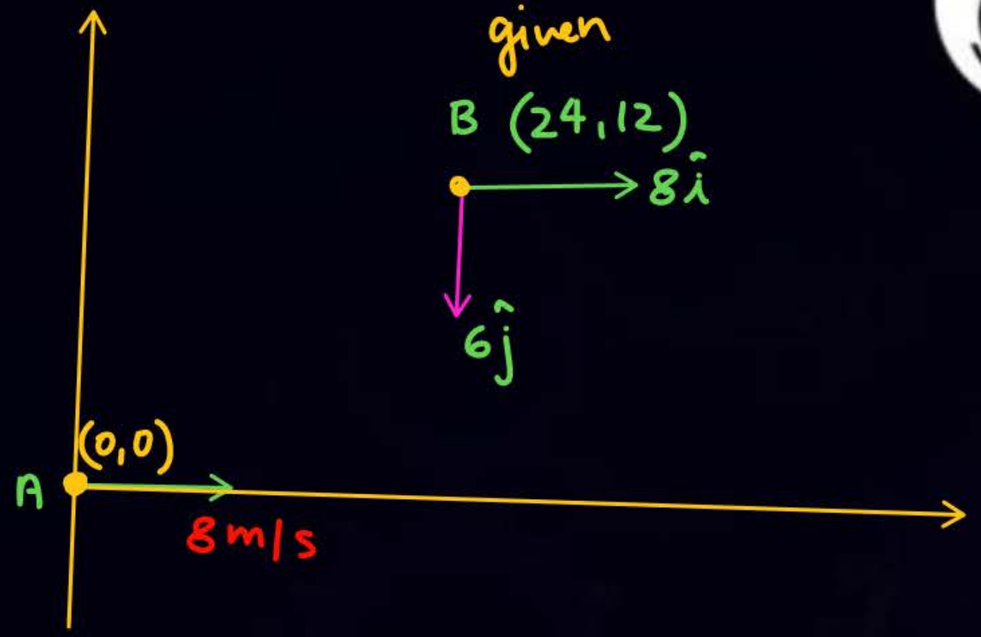
Topics to be covered

- Minimum Distance Between Two Moving Particles

Q $\vec{v}_A = 8\hat{i}$ at $(0,0)$, $t=0$

$\vec{v}_B = 8\hat{i} - 6\hat{j}$ at $(24,12)$, $t=0$

Find min gap b/w the particle & when.



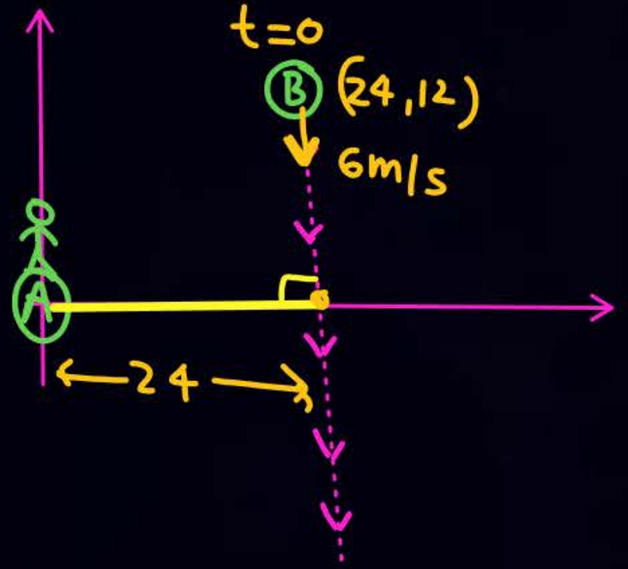
Sol $\quad$ w.r.t. A

$$\vec{v}_{B/A} = \vec{v}_B - \vec{v}_A = 8\hat{i} - 6\hat{j} - 8\hat{i} = -6\hat{j}$$

$$\vec{v}_{B/A} = -6\hat{j}$$

$$d_{min} = 24$$

$$t = \frac{12}{6} = 2$$



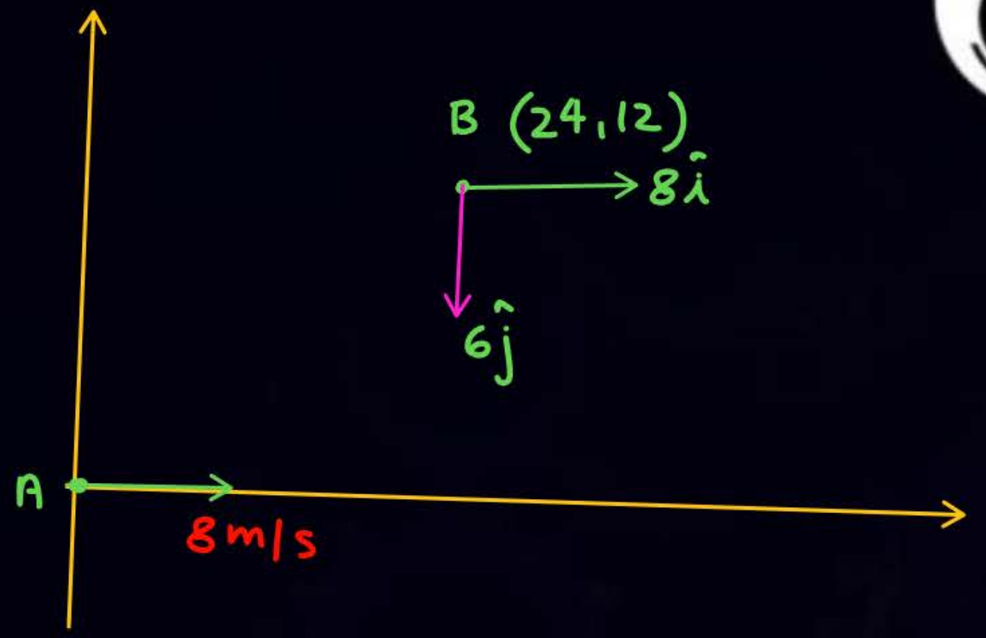
M-2

wr.t. B

$$\vec{v}_{A/B} = 8\hat{i} - (8\hat{i} - 6\hat{j}) = 6\hat{j}$$

$d_{min} = 24$

$t = \frac{12}{6} = 2\,sec$



SKC OP

① Sabse pahle kisi ek particle ki khopdi par jakar baith jao.

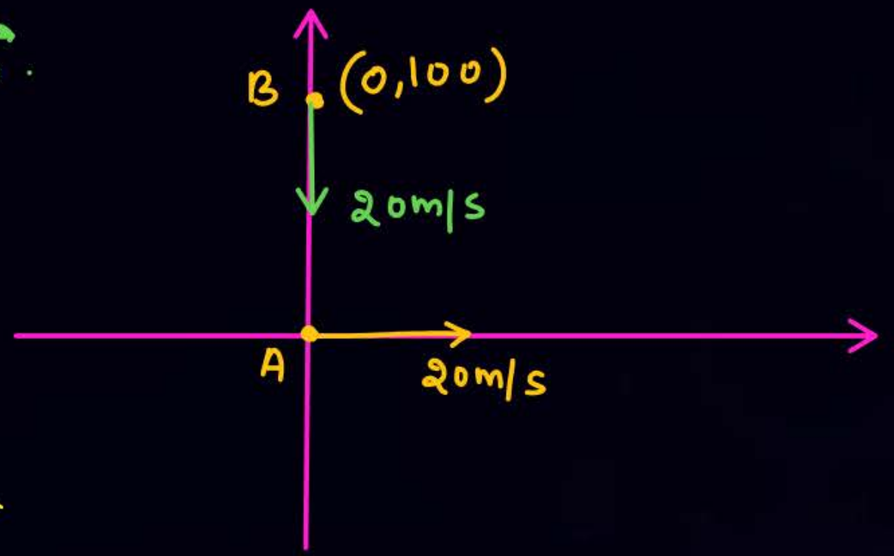
② $\vec{v}_{B/A} = \checkmark$ (let) A की khopdi par baitha ho

③ Naya Daigram Banaya & $\dot{B}$ ka path draw kia

④ $\dot{B}$ ke path par perpendicular draw kar do.

Q find min gap b/w $\vec{A}$ & $\vec{B}$.

Soln

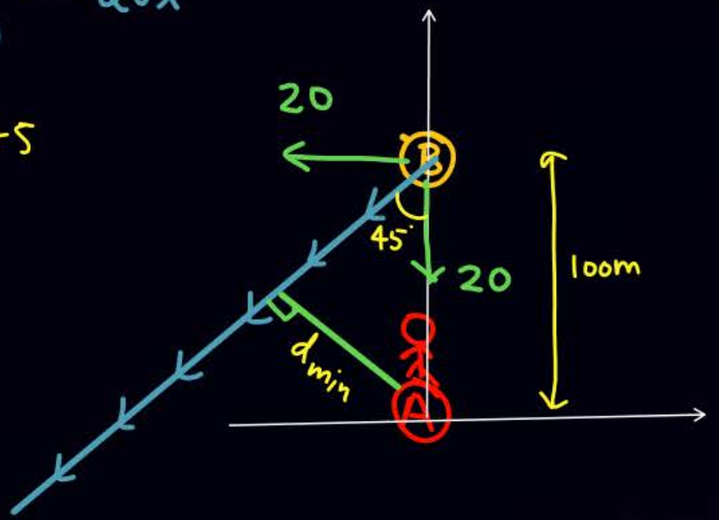


wrt A

$\vec{v}_{BIA} = -20\hat{j} - 20\hat{i}$

$d_{min} = 100\sin 45$

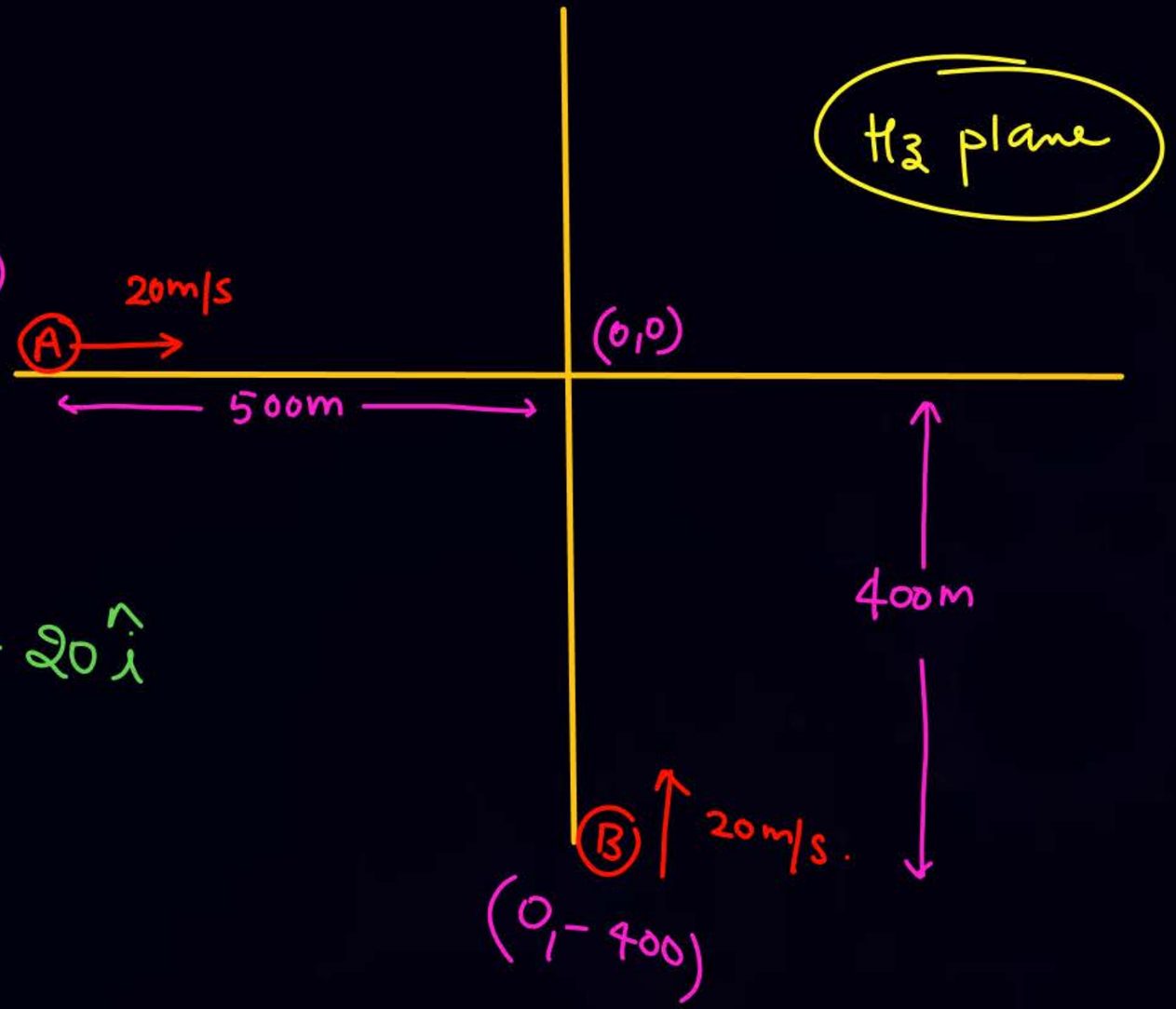
$= \frac{100}{\sqrt{2}}$



$t = \frac{100\cos 45^\circ}{20\sqrt{2}}$

$\boxed{t = 2.5}$

Q Find min. gap



Soln wrt A

$$\vec{v}_{B/A} = 20\hat{j} - 20\hat{i}$$

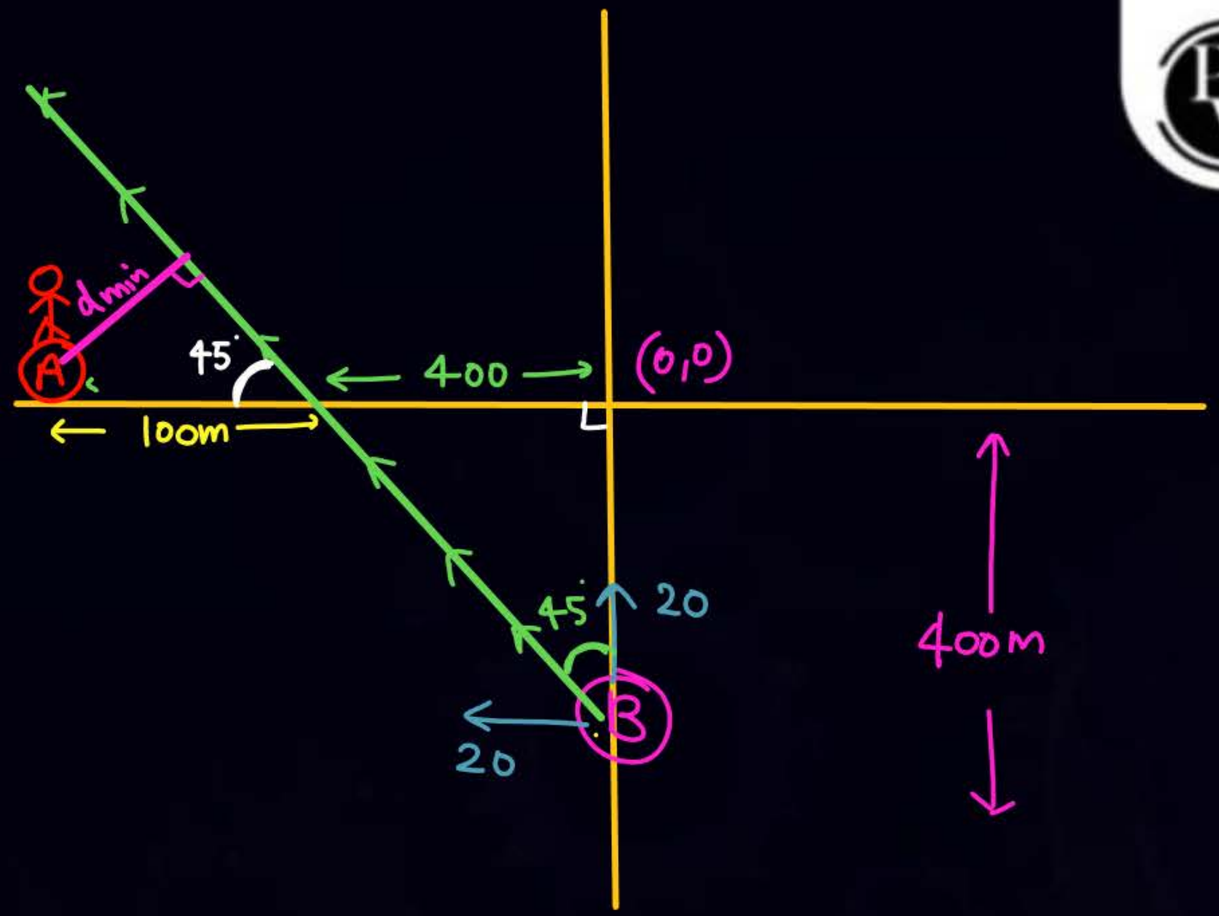
$$\vec{v}_{B/A} = 20\hat{j} - 20\hat{i}$$

$$d_{min} = 100\sin 45 = \frac{100}{\sqrt{2}}$$

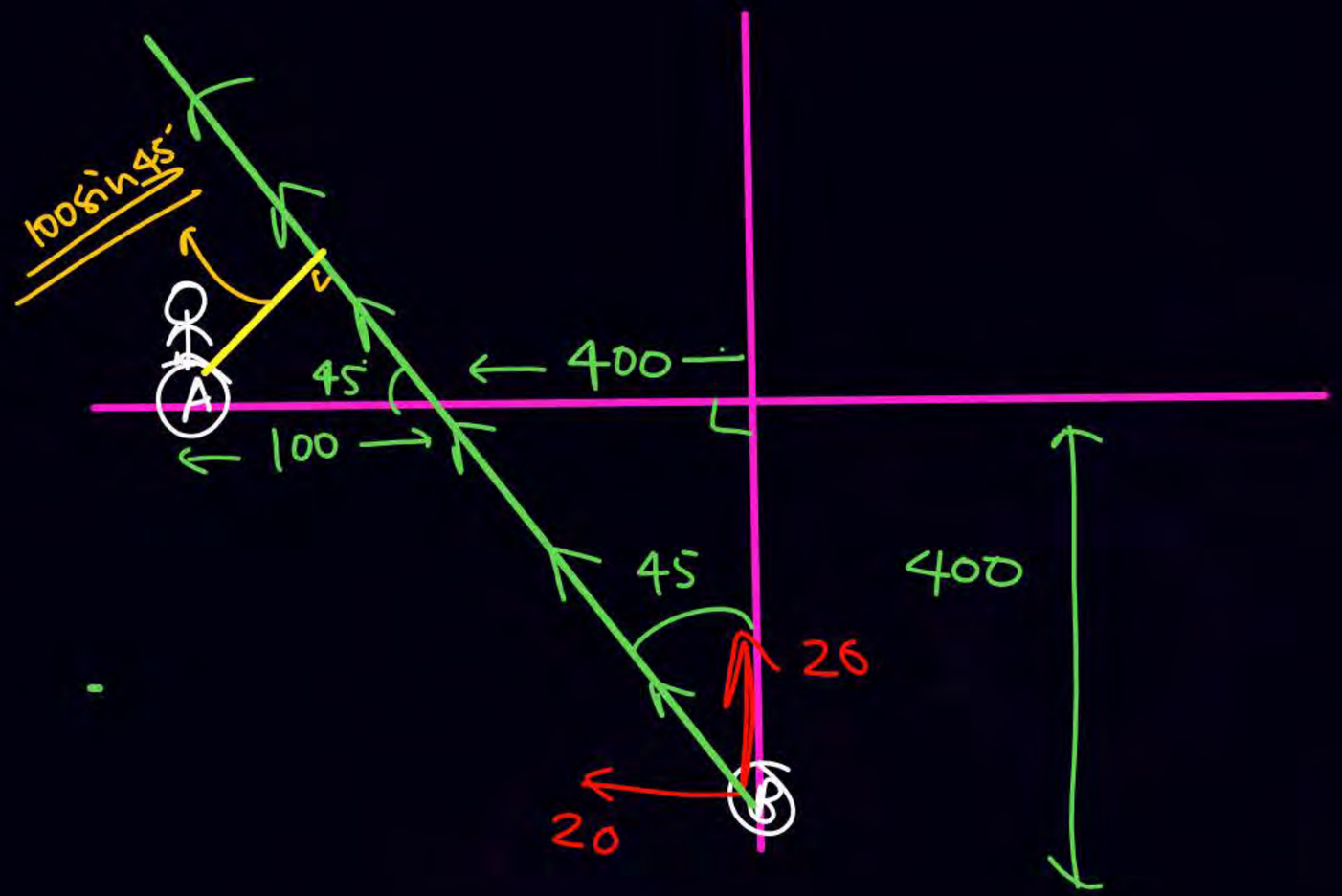
(JA)

$$t = \frac{400\sqrt{2} + \frac{100}{\sqrt{2}}}{20\sqrt{2}} = \frac{S_{rel}}{v_{rel}}$$

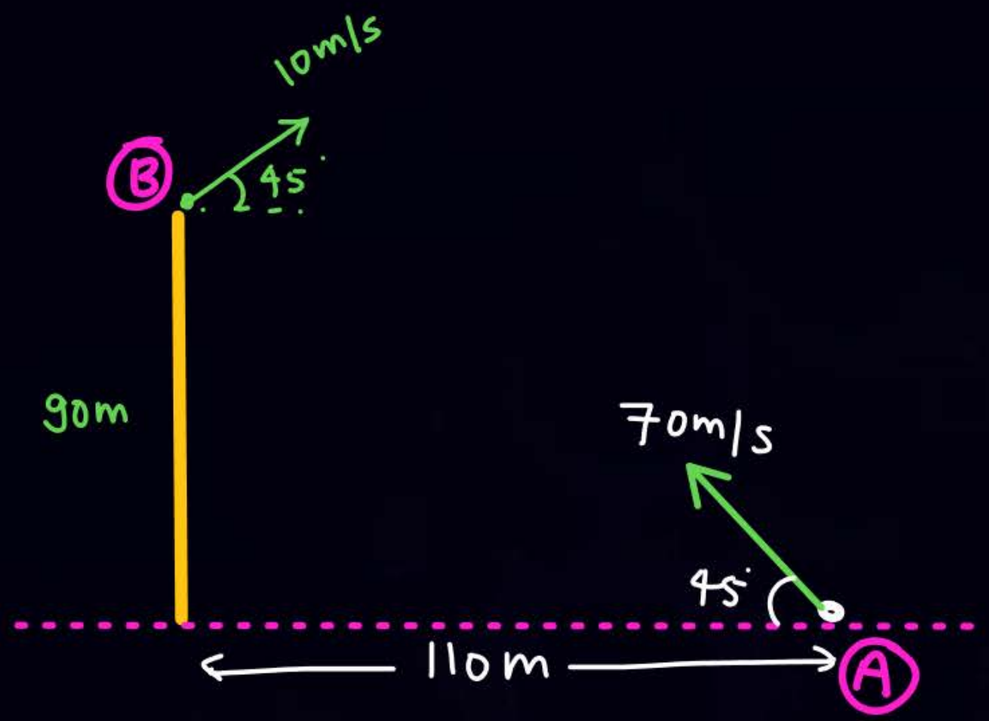
$$= \underline{22.5 \text{ sec}}$$



$$v_{B|A} = 20\hat{j} - 20\hat{i}$$



Q find min gap b/w particles.



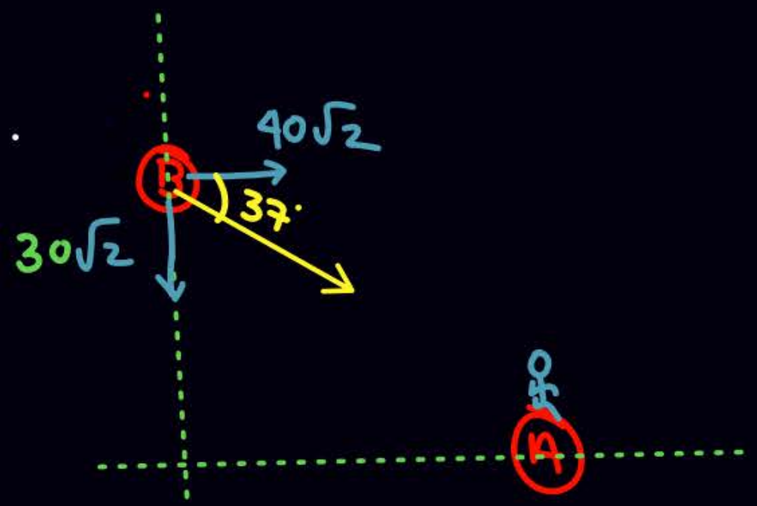
$$\vec{v}_B = \frac{10}{\sqrt{2}}\hat{i} + \frac{10}{\sqrt{2}}\hat{j}$$

$$\vec{v}_B = 5\sqrt{2}\,\hat{i} + 5\sqrt{2}\,\hat{j}$$

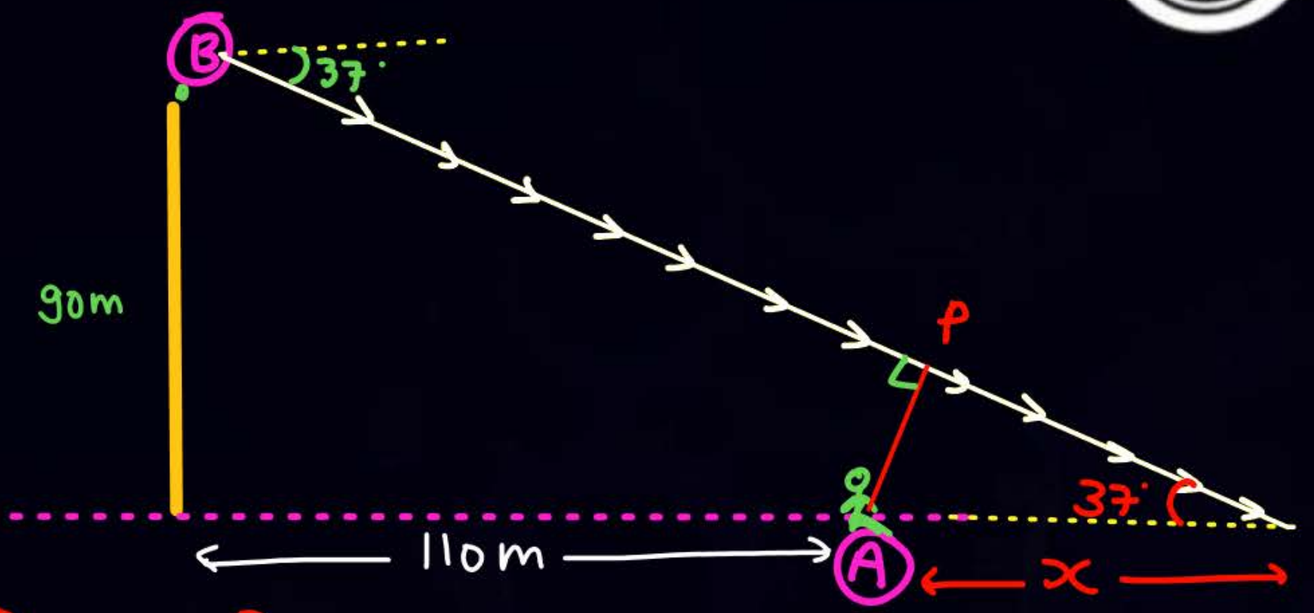
$$\vec{v}_A = -\frac{70}{\sqrt{2}}\hat{i} + \frac{70}{\sqrt{2}}\hat{j}$$

$$\vec{v}_A = -35\sqrt{2}\,\hat{i} + 35\sqrt{2}\,\hat{j}$$

$$\vec{v}_{B/A} = 40\sqrt{2}\,\hat{i} - 30\sqrt{2}\,\hat{j}$$



$$a_{B/A} = 0$$



$$\tan 37^\circ = \frac{90}{110+x} = \frac{3}{4}$$

$$120 = 110 + x$$

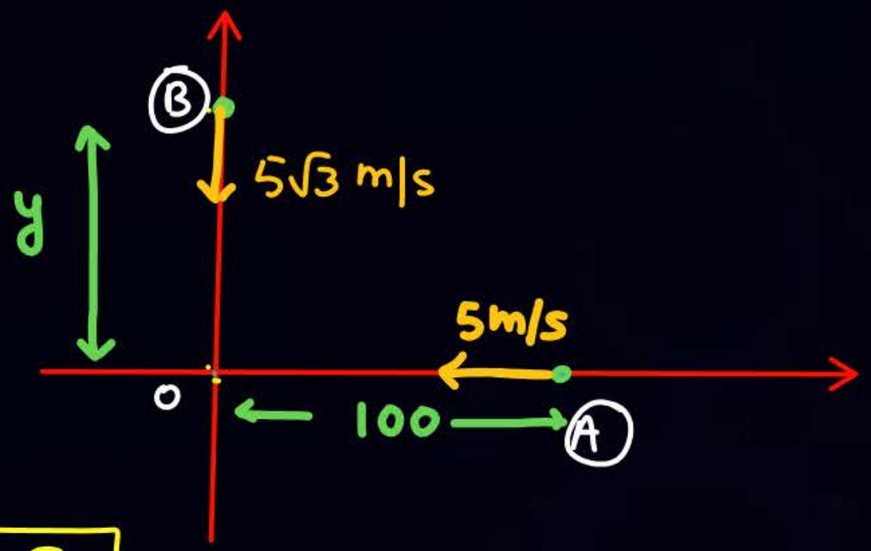
$$\boxed{x = 10}$$

Ans $AP = x \sin 37^\circ$

$= 10 \sin 37^\circ = 6$

#

Q find 'y' so that they will collide.



Soln $t = \frac{100}{5} = 20\ \text{sec}$ (A)

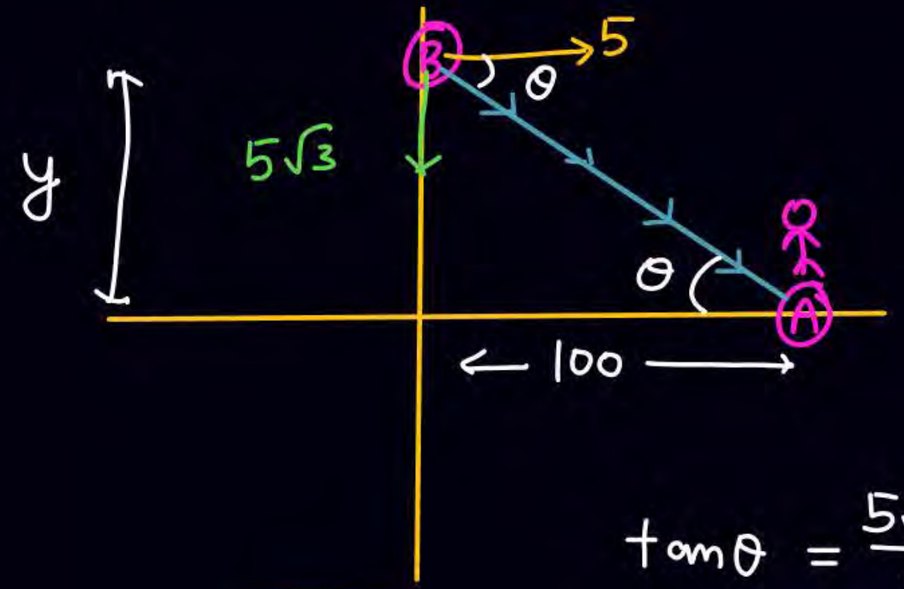
(B) $t = 20 = \frac{y}{5\sqrt{3}}$, $\boxed{y = 100\sqrt{3}}$

M-2 $\vec{v}_{B/A} = -5\sqrt{3}\hat{j} - (-5\hat{i})$

$= 5\hat{i} - 5\sqrt{3}\hat{j}$

M-2

$\vec{v}_{B/A} = 5\hat{i} - 5\sqrt{3}\hat{j}$



SKC

① Ek ki khopdi par baakiyon dusre ki velocity Nikalo

② Naya daigram Banao & Apni taraf aane do.

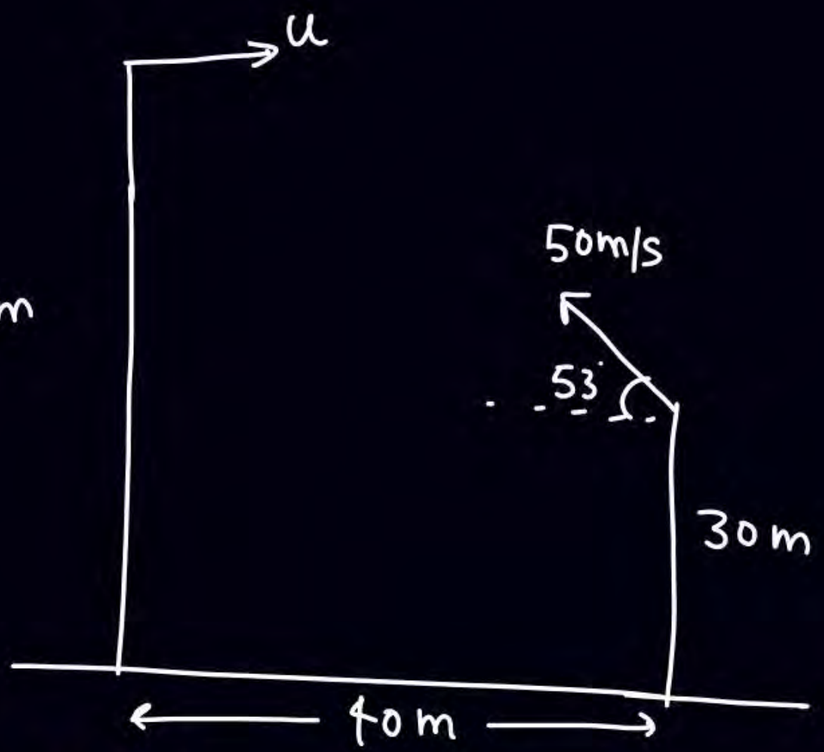
③ Apply $\tan\theta =$ ✓

↳ Do bar

$$\tan\theta = \frac{5\sqrt{3}}{5} = \frac{y}{100}$$

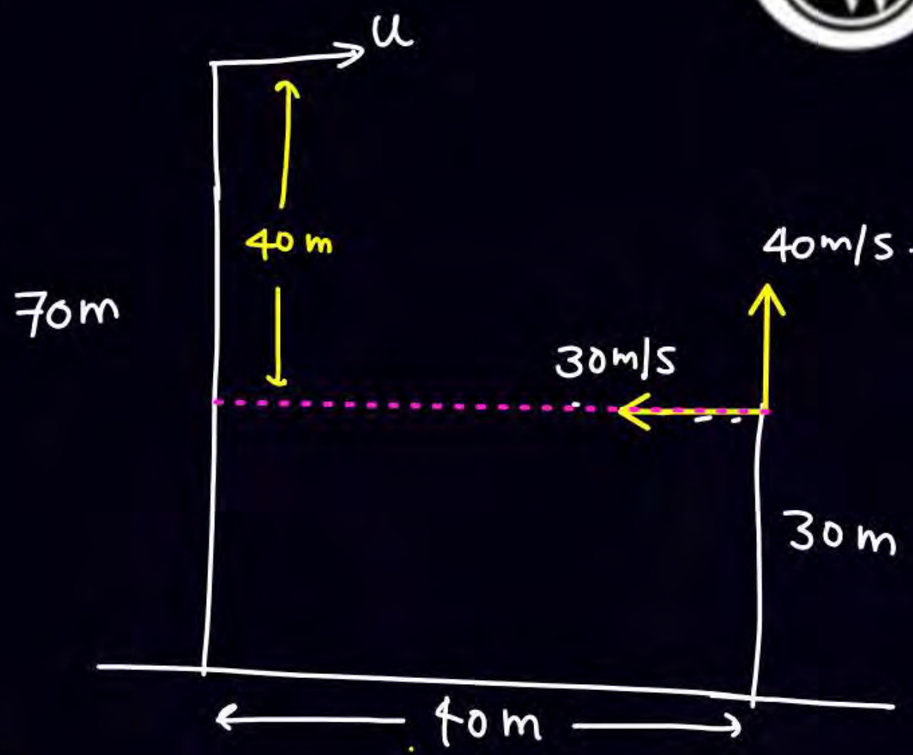
$$\boxed{y = 100\sqrt{3}}$$

Q



If they collide at mid air find when they will collide.

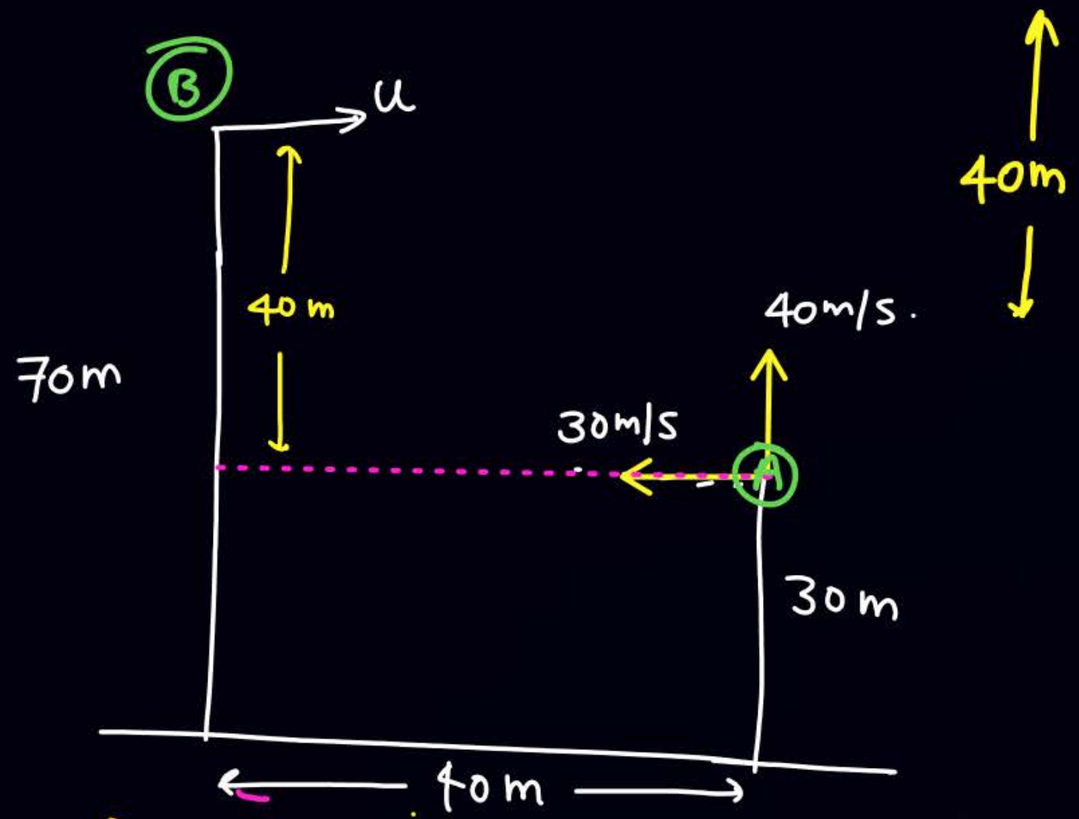
Soln

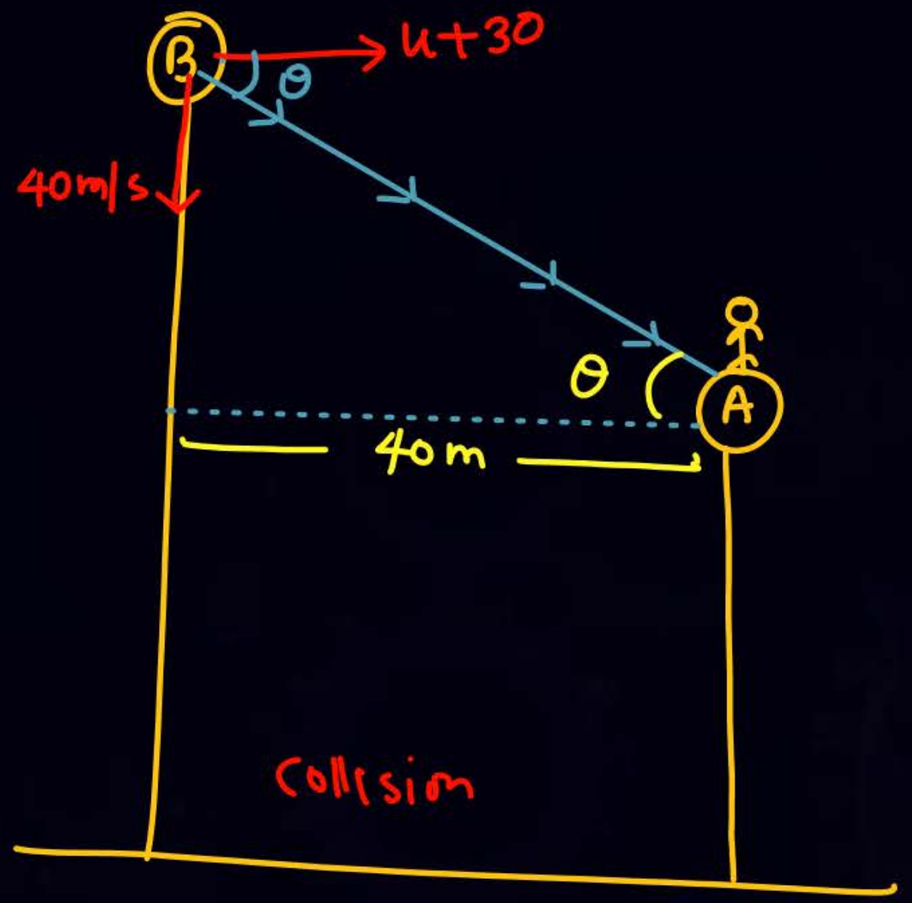


$t = 1$, $(u+30) \times 1 = 40$

$u = 10$

Soln





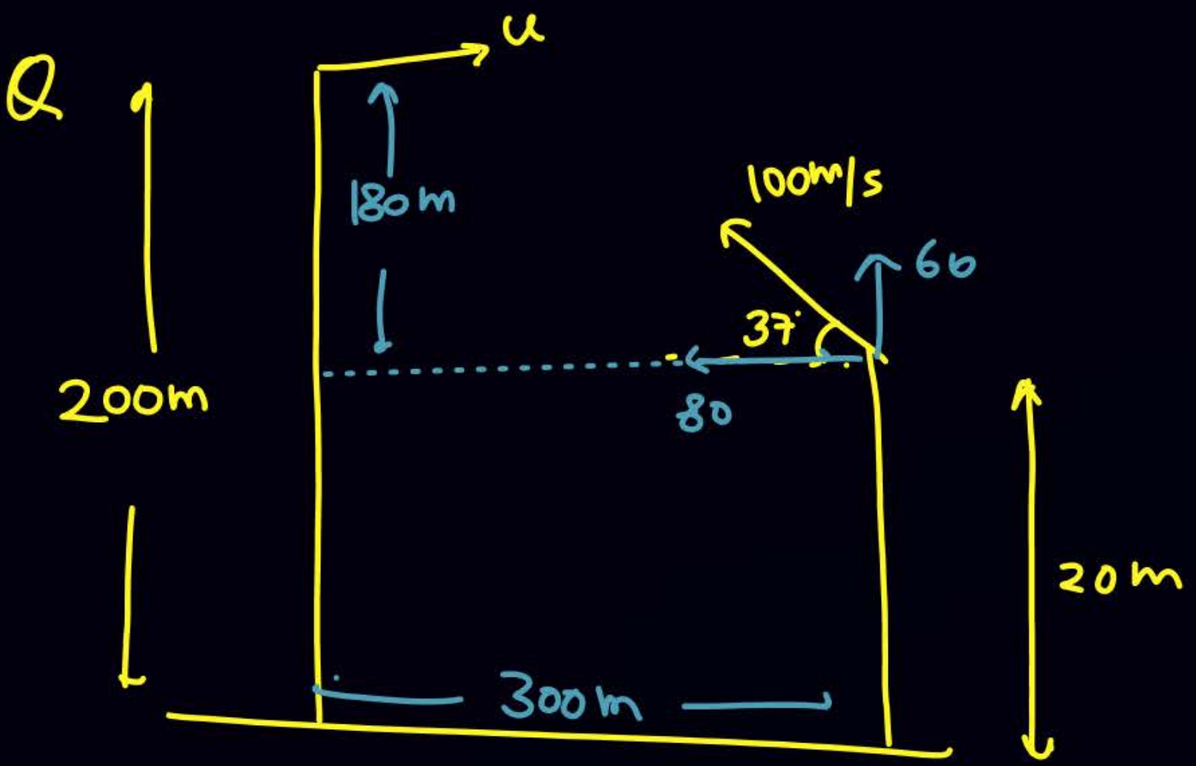
① $\vec{v}_{B/A} = \vec{v}_B - \vec{v}_A = u\hat{i} - (-30\hat{i} + 40\hat{j})$

$= (u+30)\hat{i} - 40\hat{j}$

$\tan\theta = \frac{40}{u+30} = \frac{40}{40}$

$u = 10$

Q



Collision के लिए $u = ?$

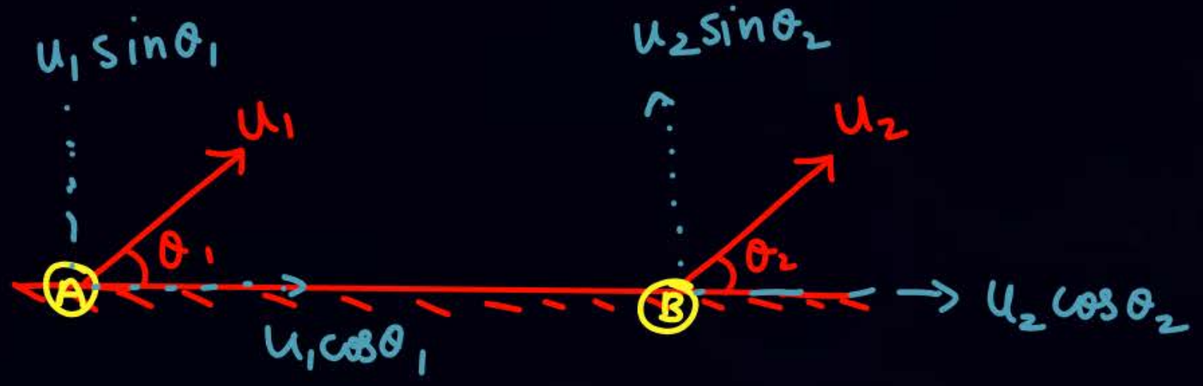
$t = ?$

$t = 3$

$(u + 80) \times 3 = 300$

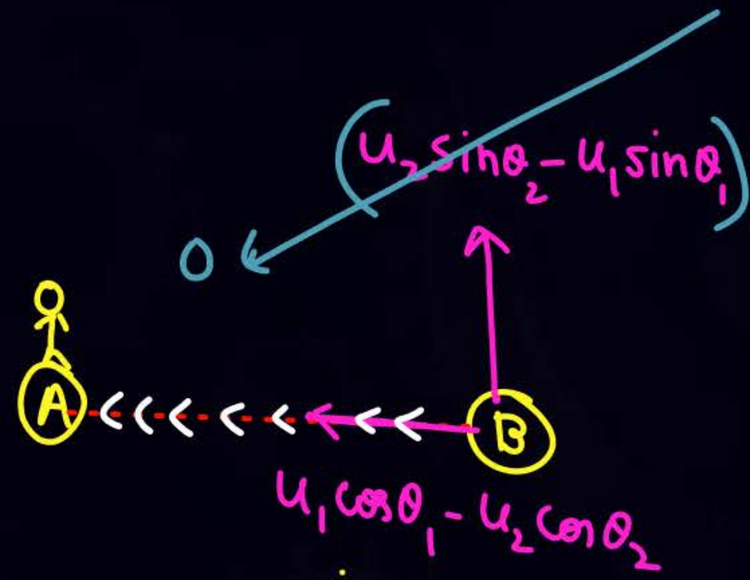
$u = 20$

Collision of two Projectile



$$\vec{v}_{B/A} = u_2\cos\theta_2\,\hat{i} + u_2\sin\theta_2\,\hat{j} - (u_1\cos\theta_1\,\hat{i} + u_1\sin\theta_1\,\hat{j})$$

$$\vec{v}_{B/A} = -(u_1\cos\theta_1 - u_2\cos\theta_2)\,\hat{i} + (u_2\sin\theta_2 - u_1\sin\theta_1)\,\hat{j}$$



Condition for collision

$$u_2\sin\theta_2 - u_1\sin\theta_1 = 0$$

$$\boxed{u_2\sin\theta_2 = u_1\sin\theta_1}$$

initial vertical velocity same hona chahiye

Q

find u so that both collide in air

Sol

$40\sqrt{2}\sin 45^\circ = u\sin 37^\circ$

$40 = u \times \frac{3}{5}$

$u = \frac{200}{3}$

Q

find u so that both collide in air.

Sol

$100\sin 37^\circ = V$

$V = 60$

SSS8

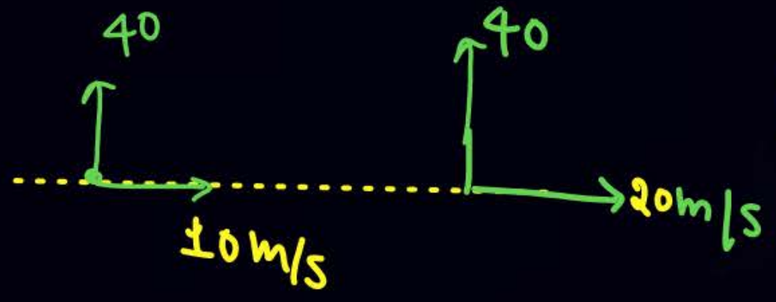
In which of the following case collision is possible.

①

No

②

No

③ 

No

④

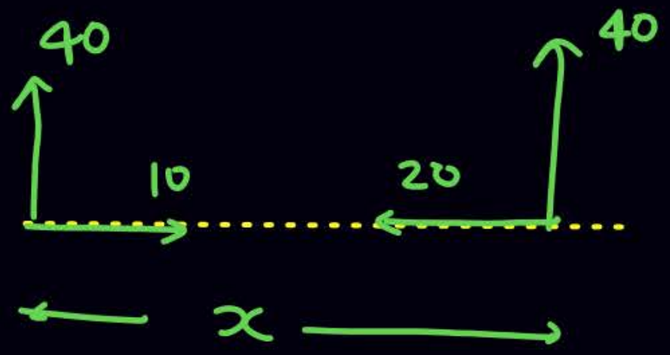
T = 8

(a) If $x = 240$

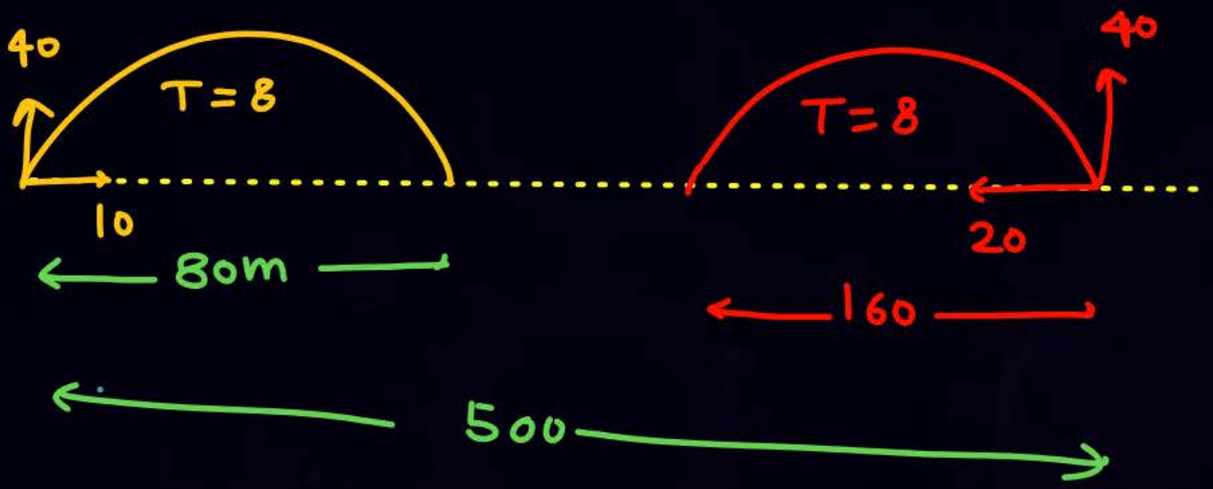
$U_{rel} = 30$

(Both collide at ground)

④



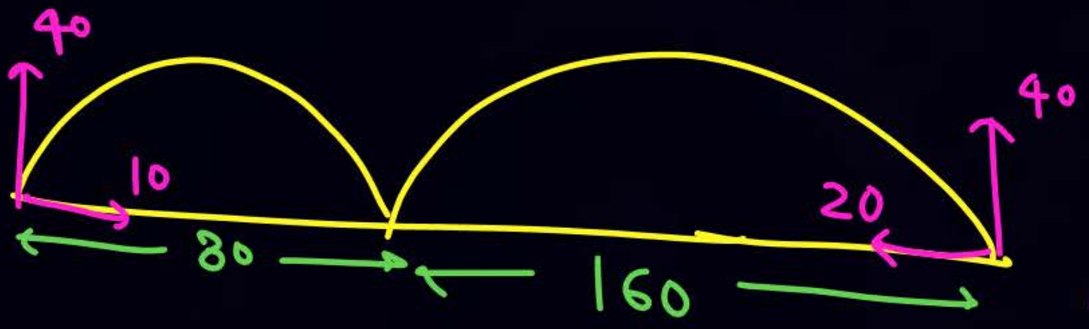
(a) If $x = 500$ (Collision No)



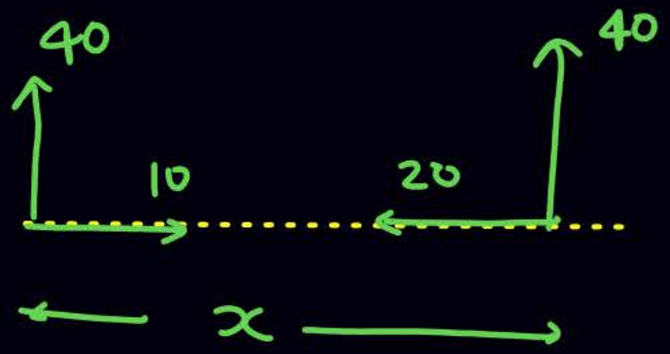
(b) find range of x for collision

$T = 8 \Rightarrow \boxed{x \leq 240}$

© If $x = 240$



④



ⓓ If $x = 90$ ($x < 240$ collision)

x में $\Rightarrow$ $90 = 30t$

$\boxed{t = 3}$

$x_{rel} = (V_{rel})_x \cdot t$

$90 = 30t$

$t = 3$

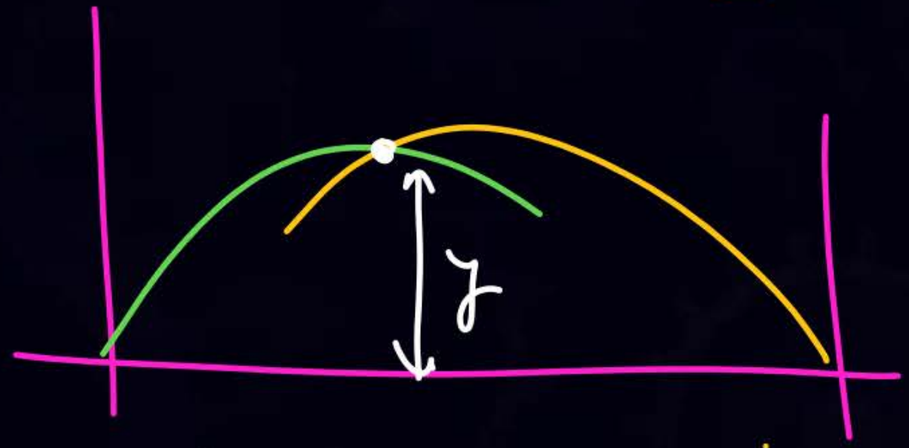
ⓔ If $x = 150$

$x_{rel} = V_{rel}\, t$

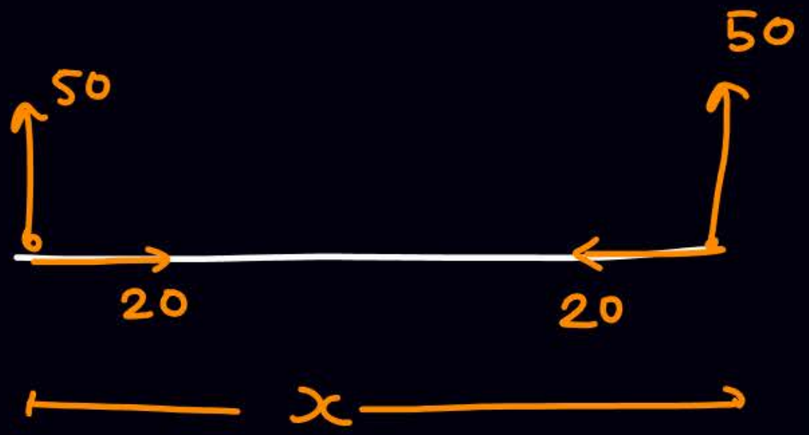
$150 = 30t$

$t = 5$

$y = 40 \times 5 - \frac{1}{2} \times 10 \times 5^2$



Q

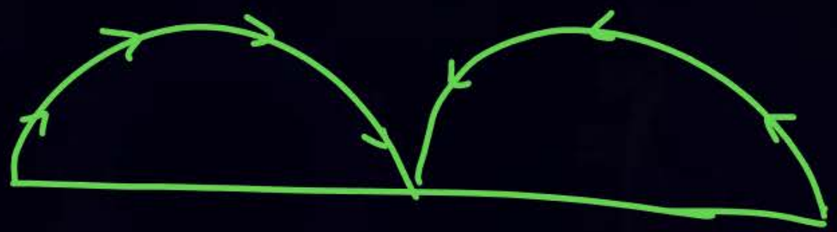


find range of x for collision

Sol^{n} $x \leq 400$

(a) If $x > 400$

(b) $x = 400$

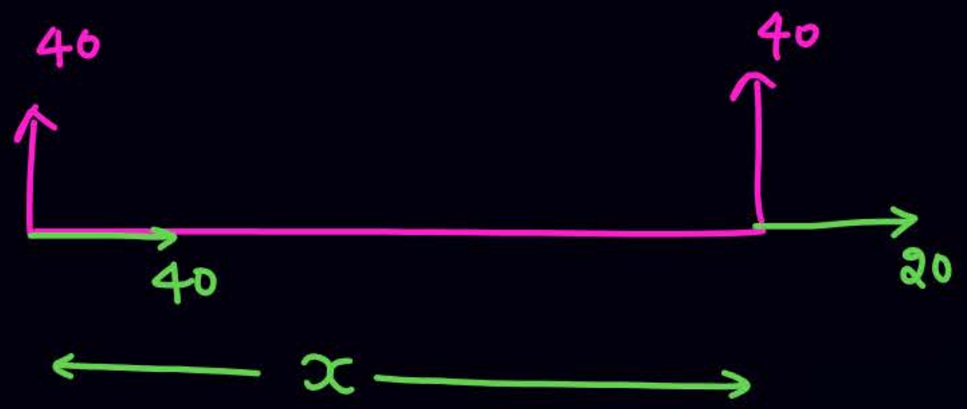


(c) $x = 200$

$t = 5$

SSSQ

H/W Q



① If $x = 500$

② $x = 160$

③ $x = 80$

Home Work

- Revise all the notes. ≡(Cover backlog)
- DPP

Revise basic diff and integration and equation of motion
We will need in circular motion kinematics

THANK YOU