Todays Goal

- tunning point

- v, a, Avrg acc, inst-acc.

→ KPP $\overset{2}{\varepsilon}$ (7 4 ques) = upload

7 4 ques → All

Thursday
Friday $\Big\}$ = Complete

H.w

Promise

$$\text{Q}$$

$$\Rightarrow \quad x = \frac{t^3}{3} - 3t^2 + 9t + 10$$

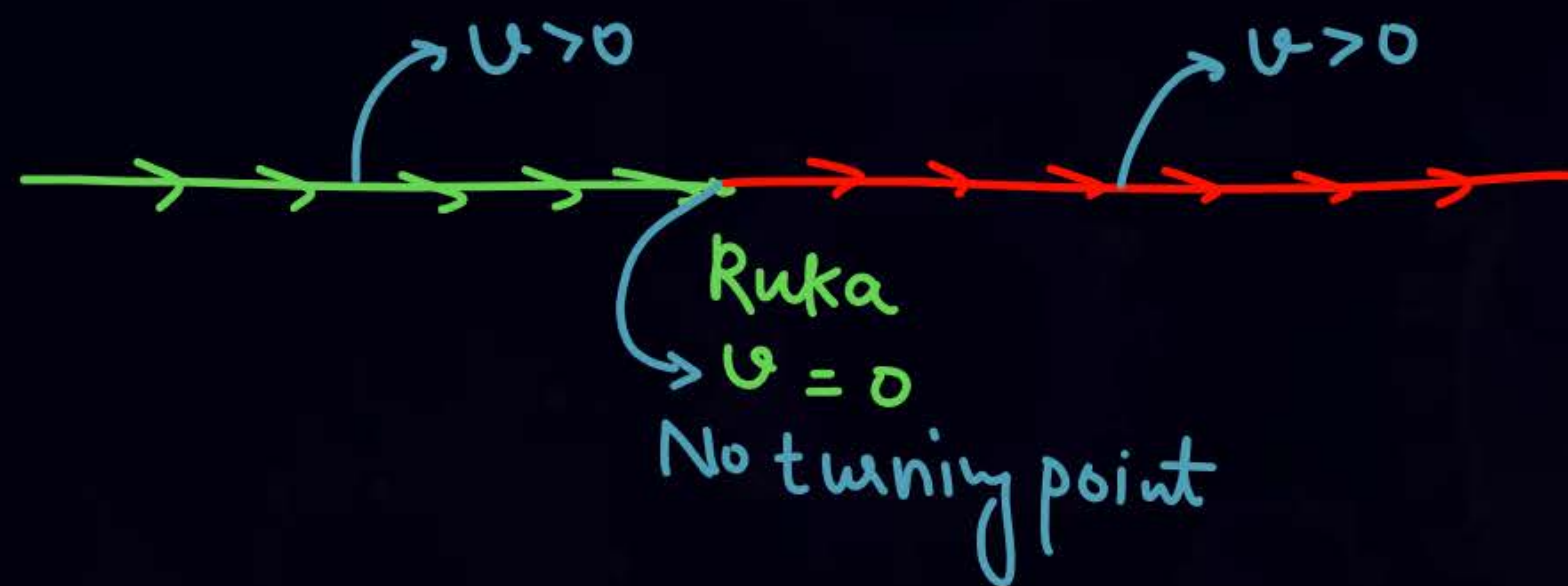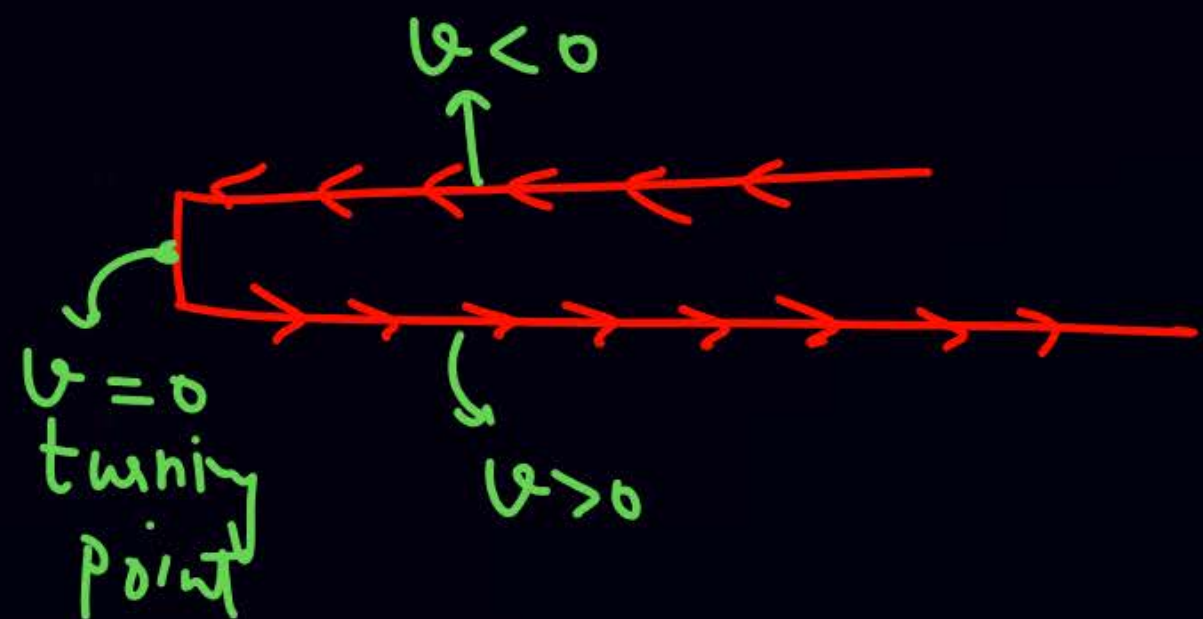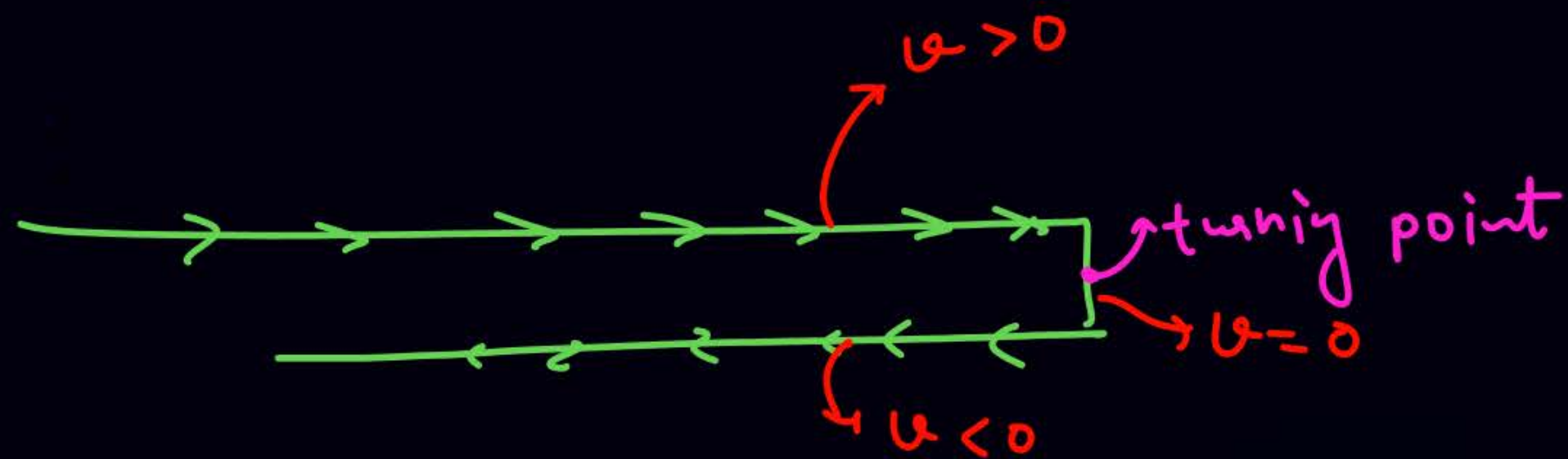Sol $\quad v = \frac{dx}{dt} = \frac{3t^2}{3} - 6t + 9 + 0$

$$v = t^2 + 9 - 6t = (t-3)^2$$

$$v = (t-3)^2$$
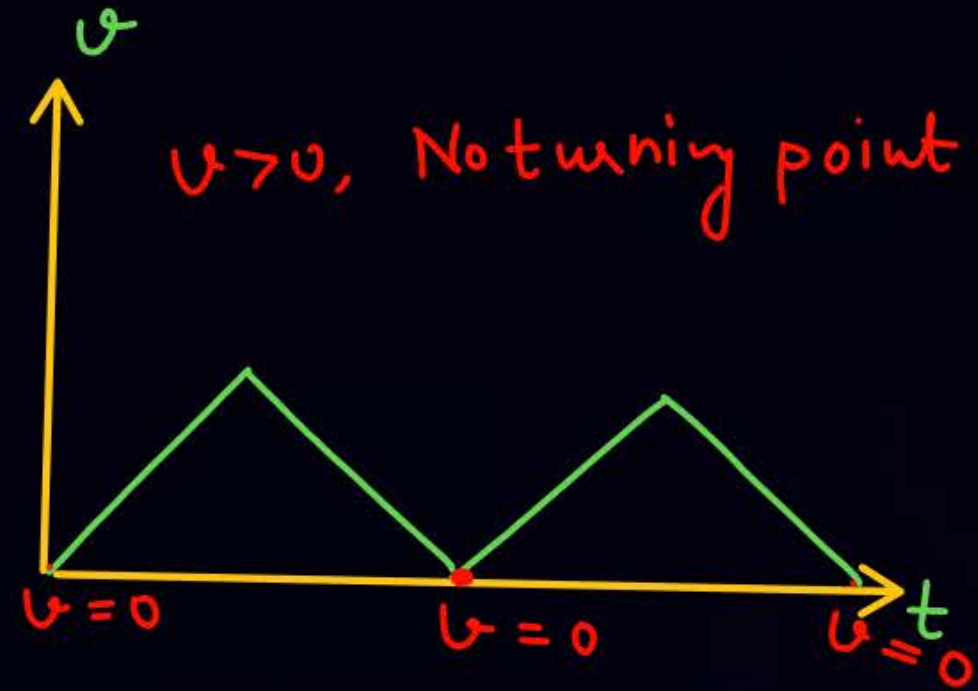
$$\boxed{v = 0, \quad t = 3}$$ correct

$$\boxed{v > 0}$$

$\hookrightarrow$ turning point $\times$

kisi bhi cheez ka square hamesha positive होता hai

$v > 0$

turning point

$v = 0$

$v < 0$

$v < 0$

$v = 0$
turning
Point

$v > 0$

$v > 0$

$v > 0$

Ruka
$v = 0$
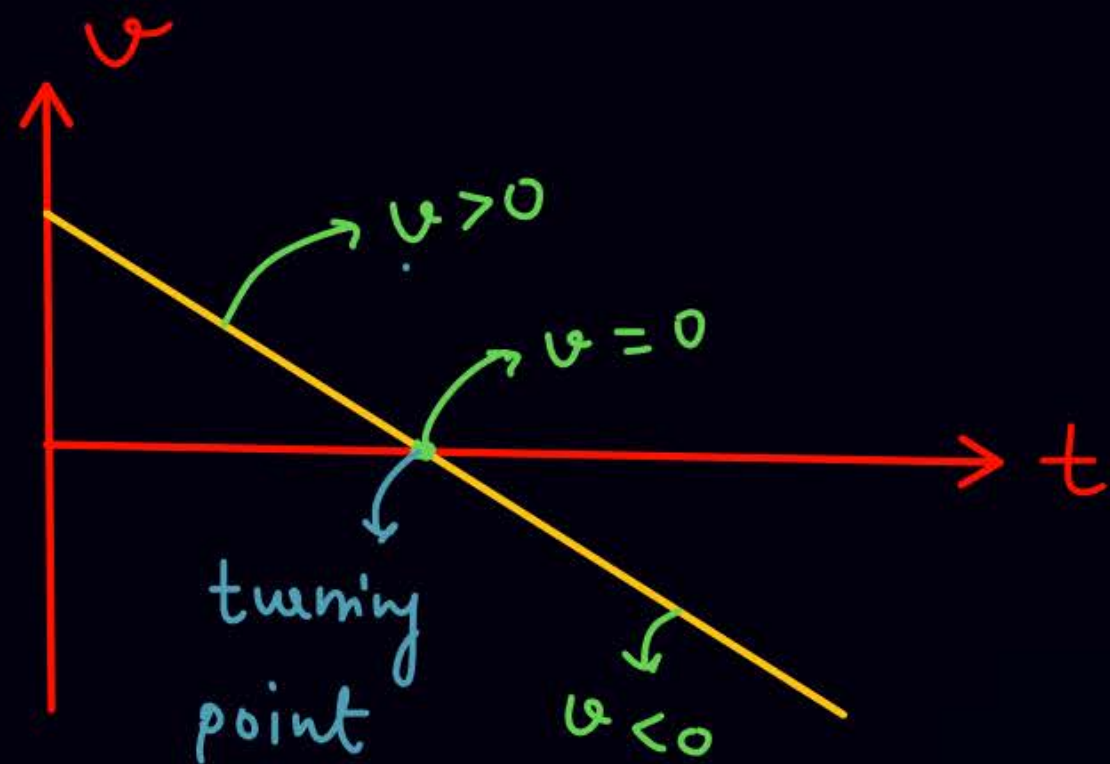No turning point

* Turning point par $v = 0$

* But Agar $v = 0$ to jaruri Nahi ki vo turning point ho.

*** Turning point matlab → $v = 0$ hona chaiye aur $\bar{v}$ ka sign change hona chahiye. (a, x Ka Nahi)

Graph → यह x Nahi ha

(V)

No tuning point

$v > 0$

$v > 0$

$v = 0$

t

v

$v > 0$, No tuning point

$v = 0$ $v = 0$ $v = 0$

t

v

No tuning point

t

v

$v > 0$

$v = 0$

turning
point

$v < 0$

t

v

turning point

$v > 0$

$v = 0$

$v < 0$

t

SKC **

ye dhyan se
dekhna hai ki
X-Y-Axis me kya hai

x

10 —

slope < 0
$v < 0$

$x > 0$
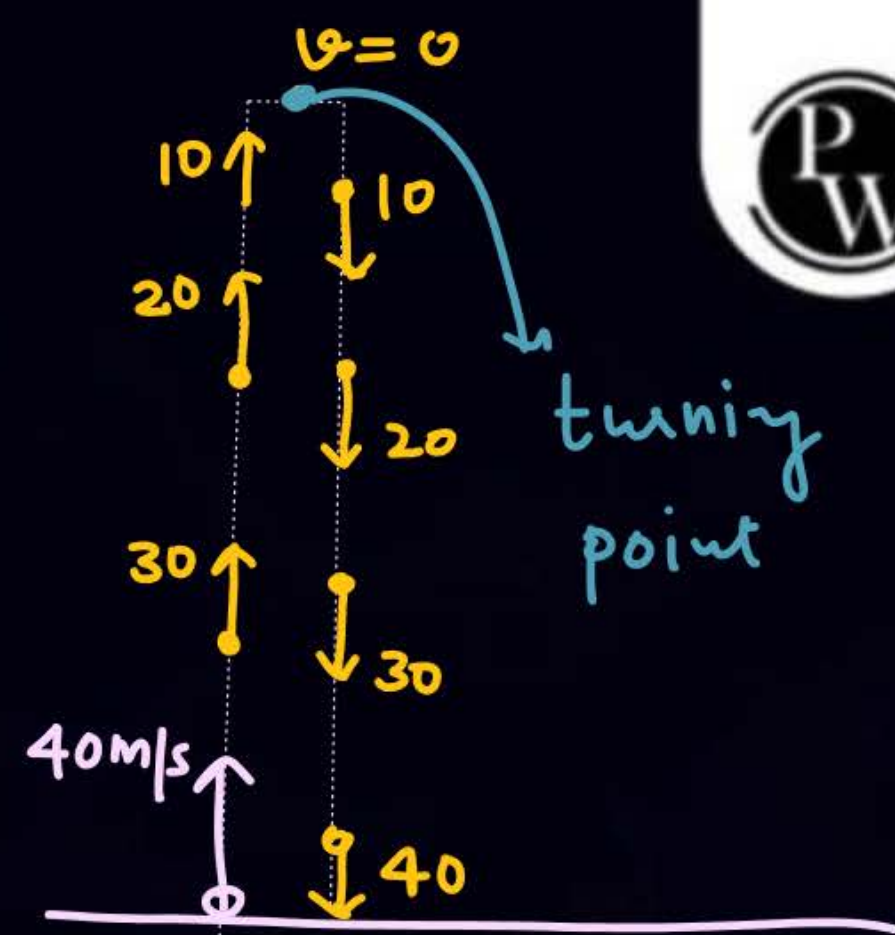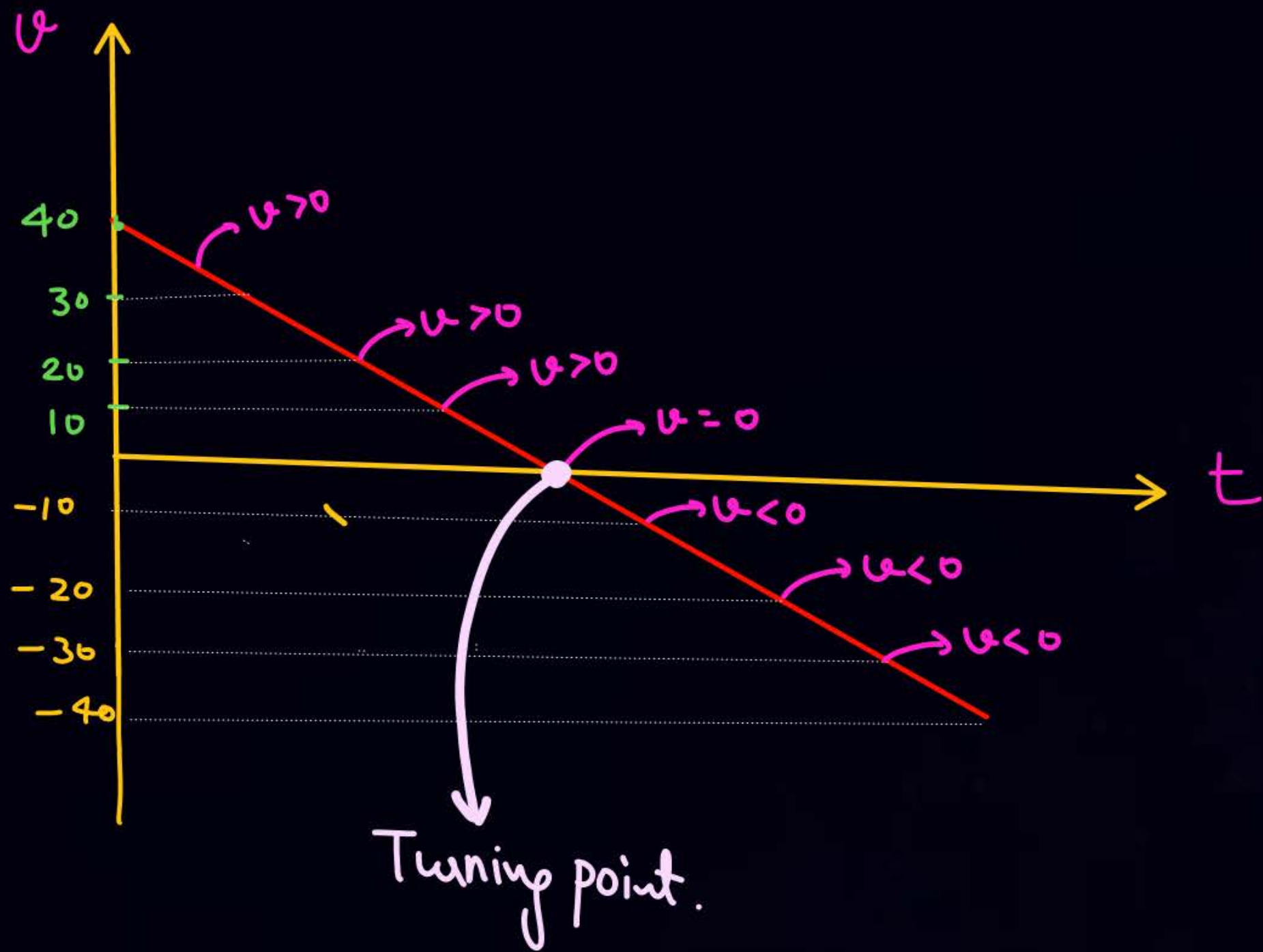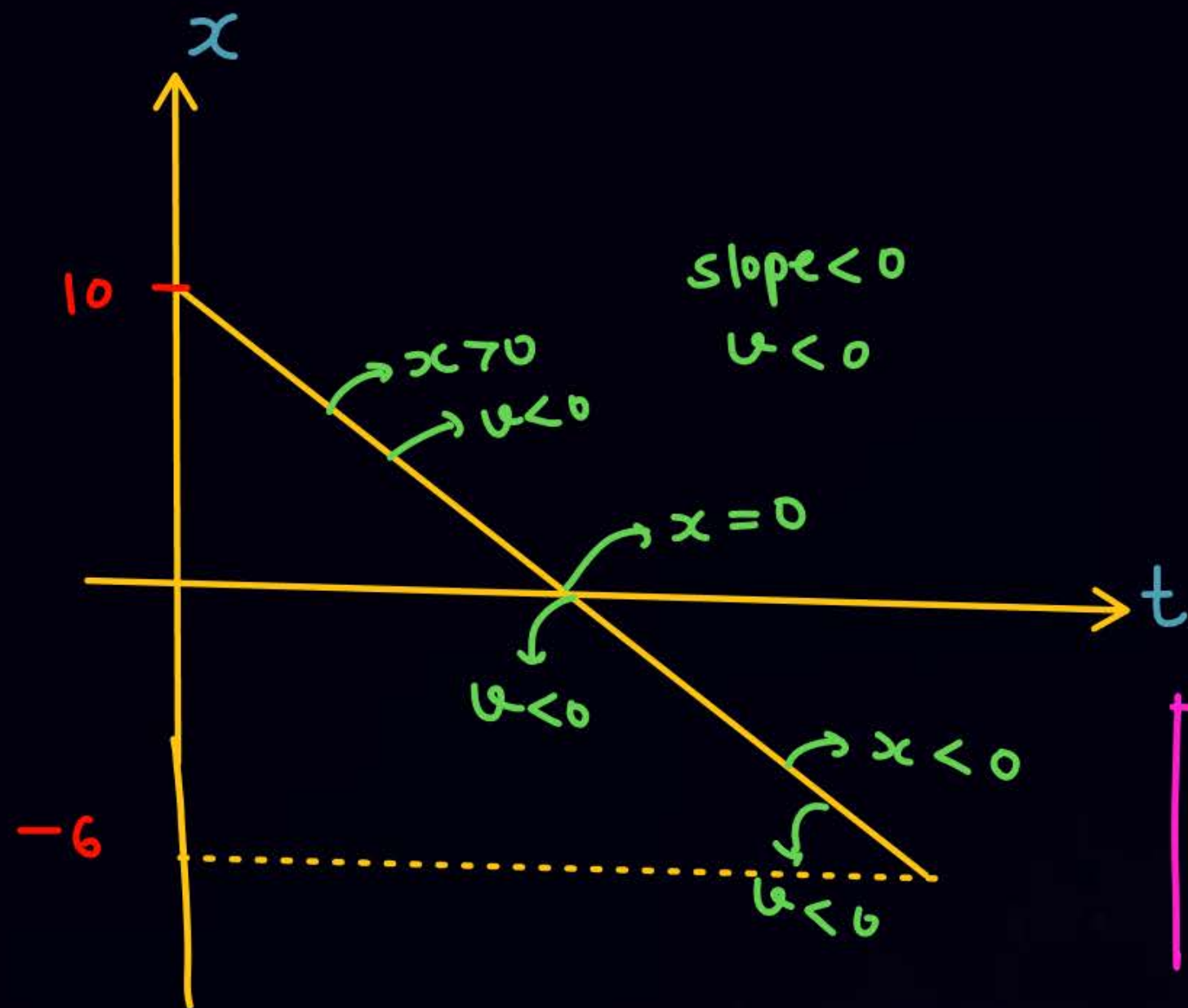$v < 0$

$x = 0$

$v < 0$

$x < 0$

$v < 0$

-6

t

Rasta

$x = -6$ $x = 0$ $x = 10$

$(x-t)$ graph ka slope
$= v$ Deta hai

Q

$v > 0$

$v > 0$

$v = 0$

No turning point

Q

$x > 0$

$v < 0$

$x > 0$

$v > 0$

turning point

(Pls Revise Graph today)

Top-left graph (y vs x):

$y > 0$
$x > 0$

$x > 0$
$y < 0$

Top-right graph (Kaddu vs t):

Kaddu

$t > 0$
Kaddu > 0

$t > 0$
Kaddu < 0

Bottom-left graph (x vs t):

$x > 0$
$t > 0$

$\rightarrow x > 0$

$x < 0$
$t > 0$

$x < 0$

Bottom-right graph (v vs t):

$v > 0$
$t > 0$

$\rightarrow v > 0$

$v < 0$
$t > 0$

$v < 0$

Acceleration.

- Rate of change of velocity.

- Avrg Acc $= \langle \vec{a} \rangle = \dfrac{\text{change in velocity}}{\text{total time}}$

$$\langle \vec{a} \rangle = \dfrac{\vec{V_f} - \vec{V_i}}{\text{total time}}$$

- Inst Acc $= \vec{a} = \dfrac{d\vec{v}}{dt}$

$$a = \dfrac{dv}{dt}$$

acc

Avrg Acc $= \dfrac{\Delta \vec{V}}{\Delta t}$

Inst- Acc $= \dfrac{d\vec{v}}{dt}$

$$x \xrightarrow{\text{diff}} v \xrightarrow{\text{diff}} a$$

Q $\quad V = 3t^2 + 4t + 10$

① Avg acc. from $t=0$ to $t=2\,sec$

$t=0, \quad V_i = 10$

$t=2, \quad V_f = 12+8+10 = 30$

$$\langle \vec{a} \rangle = \frac{\vec{V_f} - \vec{V_i}}{time} = \frac{30-10}{2-0} = 10$$

ⓑ find acc at $t=2$

$$a = \frac{dv}{dt} = 6t + 4$$

$t=2$ put $\quad a = 6 \times 2 + 4 = \underline{16}$

ⓒ Find initial velocity & initial acc

$t=0, \quad v = 10$

$$a = \frac{dv}{dt} = 6t + 4$$

At $t=0, \quad a = 4$

$$\text{Avrg Acc} = \frac{\text{final acc} - \text{initial acc}}{\text{time}}$$

Q $\quad x = t^3 + t^2 + 6t + 10$

① Find v, a at $t = 2$ sec.

$$v = \frac{dx}{dt} = 3t^2 + 2t + 6$$

$$a = \frac{dv}{dx} = 6t + 2$$

$t = 2, \quad v = 3 \times 2^2 + 2 \times 2 + 6 = 22$

$t = 2, \quad a = 6 \times 2 + 2 = 14$

ⓑ find initial position, initial velocity initial acc

$t = 0, \quad x = 10$

$t = 0, \quad v = 3t^2 + 2t + 6 = 6$

$t = 0, \quad v = 6$

$$a = 0 + 2 = 2$$

Q $\quad x = t^3 + t^2 + 6t + 10$

find avrg velocity and avrg acc from $t = 0 \longrightarrow t = 2$ sec.

Avrg Velocity $= \dfrac{x_f - x_i}{time} = \dfrac{34 - 10}{2 - 0} = 12$

$t = 0, \quad x_i = 10$

$t = 2, \quad x_f = 8 + 4 + 12 + 10 = 34$

Avrg speed $= 12$

$v = 3t^2 + 2t + 6$

Avrg acc $= \dfrac{V_f - V_i}{time} = \dfrac{22 - 6}{2 - 0}$

$t = 0, \quad V_i = 6 \qquad\qquad = \underline{\underline{8}}$

$t = 2 \quad V_f = 12 + 4 + 6 = 22$

$$Q \quad x = 2t^3 + 3t^2 + 4t + 10$$

(1) find v, a at $t = 2$

$$v = 6t^2 + 6t + 4 \qquad t = 2, \quad v = 24 + 12 + 4$$
$$a = 12t + 6 \qquad\qquad\qquad v = 40$$

$$\boxed{a = 30}$$

$t = 0, \quad x_i = 10$

$t = 2, \quad x_f = 16 + 12 + 8 + 10$
$$\qquad\qquad = 46$$

(2) $\quad t = 0 \longrightarrow t = 2$

$$\langle velocity \rangle = \frac{x_f - x_i}{\text{time}} = \frac{46 - 10}{2} = 18$$

$t = 0, \quad v = 4$

$t = 2, \quad v = 24 + 12 + 4$
$$\qquad\qquad = 40$$

$$\langle acc \rangle = \frac{40 - 4}{2} = 18$$

(0,20)

drop initial

10m

10m

fix

Final 20m/s

(0,0) ⟵ 30m ⟶ (30,0)

x

①

②

③

$\bcancel{④}$ Data Insuff. bcz time not given

find ratio of magnitude of
Avg velocity to the Avg acc.

$$\frac{|<\vec{v}>|}{|<\vec{a}>|} = \frac{\left|\frac{\vec{d}}{time}\right|}{\left|\frac{\Delta\vec{v}}{time}\right|} = \frac{Displacement}{Change\ in\ velocity}$$

$$\vec{d} = 30\hat{i} - 20\hat{j}$$

$$\vec{V_f} - \vec{V_i} = 20\hat{i} - 0$$

$$= \frac{\sqrt{(30)^2 + (20)^2}}{20}$$

$$= \frac{\sqrt{13}}{2}$$

※ Q

$$x = t^3 - 6t^2 + 60t + 10$$

find velocity when acc become zero.

Sol

$$v = 3t^2 - 12t + 60$$

$$a = 6t - 12 = 0 \quad \boxed{t = 2}$$

put $t = 2$, $v = 12 - 24 + 60 = \underline{48}$

Q find acc when v become zero.

$$x = 2t^3 - 15t^2 + 36t + 11$$

Sol $v = 6t^2 - 30t + 36$

$$a = 12t - 30$$

$v = 0$, $6t^2 - 30t + 36 = 0$

$$t^2 - 5t + 6 = 0$$

$$(t-3)(t-2) = 0$$

$$t = 2, \ t = 3$$

$t = 2$, $a = 12 \times 2 - 30 = -6$

$t = 3$ $a = 12 \times 3 - 30 = 6$

$*$ If a is decreasing $\Rightarrow$ v will decrease (False)

join it → for SKC Book

Homework

only yahi karna hai

– KPP - 13 (Pls solve 1 - 50 ques)

Discussion ⟶ Vedio will be provided

Imp ques in KPP 13 ⇒ (23 - 26), 27, 28, 31, 37, 40,
must try

45, 41,

(ques No ⇒ 52 Ke Bad Mat try karna)

– DPP