

YAKEEN NEET 2.0

2026

Basic Maths and Calculus (Mathematical Tools)

Physics

Lecture - 8

By- Manish Raj (MR Sir)





Topics to be covered

Rectangular hyperbola, Parabola, circle.
All (H/W)
slope variation

surface(tan)

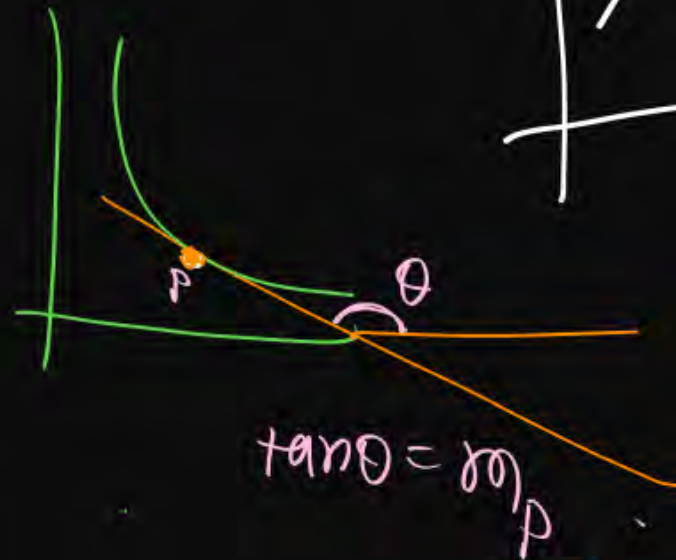
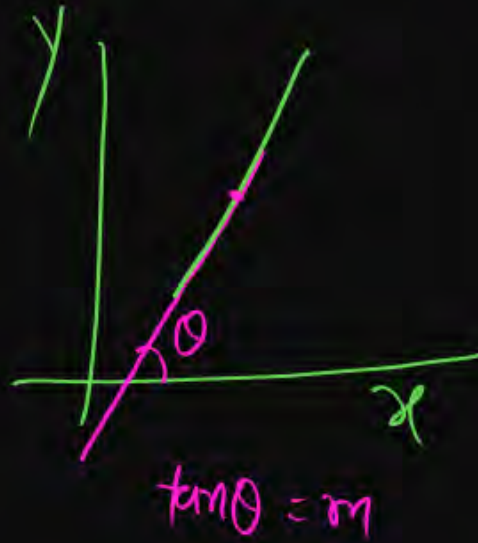
1 Graph to MR → Chhoo-kar mere ~~man~~ Ko, Tune Kiya Kya ishara??

2

MR to Graph → Chhoo-kar Tere ~~man~~ Ko
Maine Kiya slope Ka
Ishara.

3

4





Recap of previous lecture

Straight line

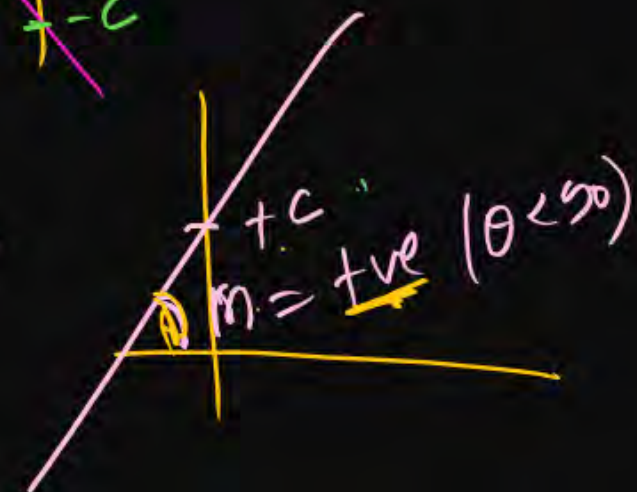
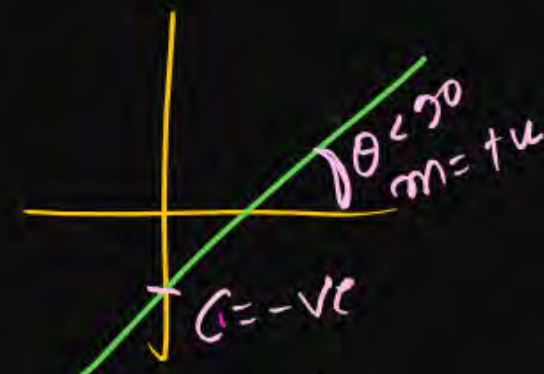
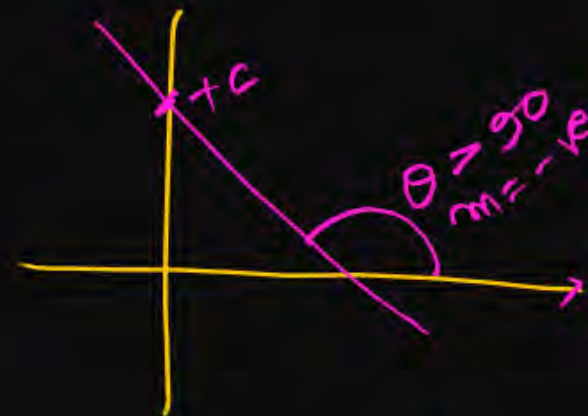
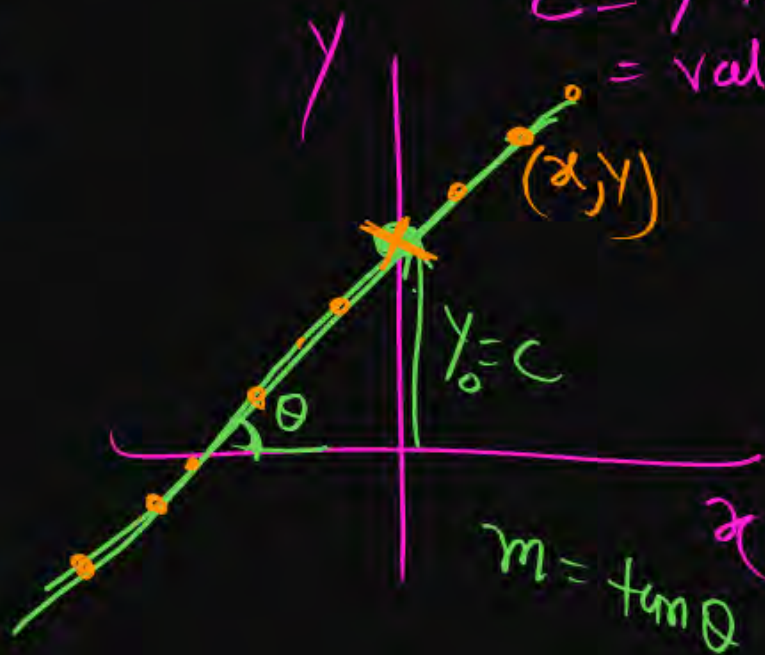
- # Straight line ka ek hi nasa \rightarrow slope and Intercept fixed ho hamara ✓
- # Straight line ne bola \rightarrow Tum mujhe mera m & c de do mai tumhe kisi bhi point ka x & y dunga.

$$y = mx + c$$

$m = \text{slope}$

$c = y \text{ intercept}$
 $= \text{value of } y \text{ when } x = 0$

$$m = \tan \theta \rightarrow \theta = \text{Angle b/w +ve } x\text{-axis \& graph in Anti-clockwise direction}$$



19. Ramlal and Pinky buy pizza of same thickness and radius 10 cm and 15 cm respectively in 50 and 100 rupees who is smarter?

(Q) Ramlal and Pinky buy Pizza of same thickness and radius 10cm & 15cm, in 50 & 100 rupees, who is smart??

65%
(a) Ramlal: (Bhokwa, Bakhada, gadha, Bihari, Chomra)

35%
(b) Pinky (correct)
(Smart)

$$R = 10 \text{ cm}$$

$$\text{Area } \pi(10)^2 = 100\pi$$

$$\text{1 unit Area ka cost} = \frac{50}{100\pi} = \frac{0.5}{\pi}$$

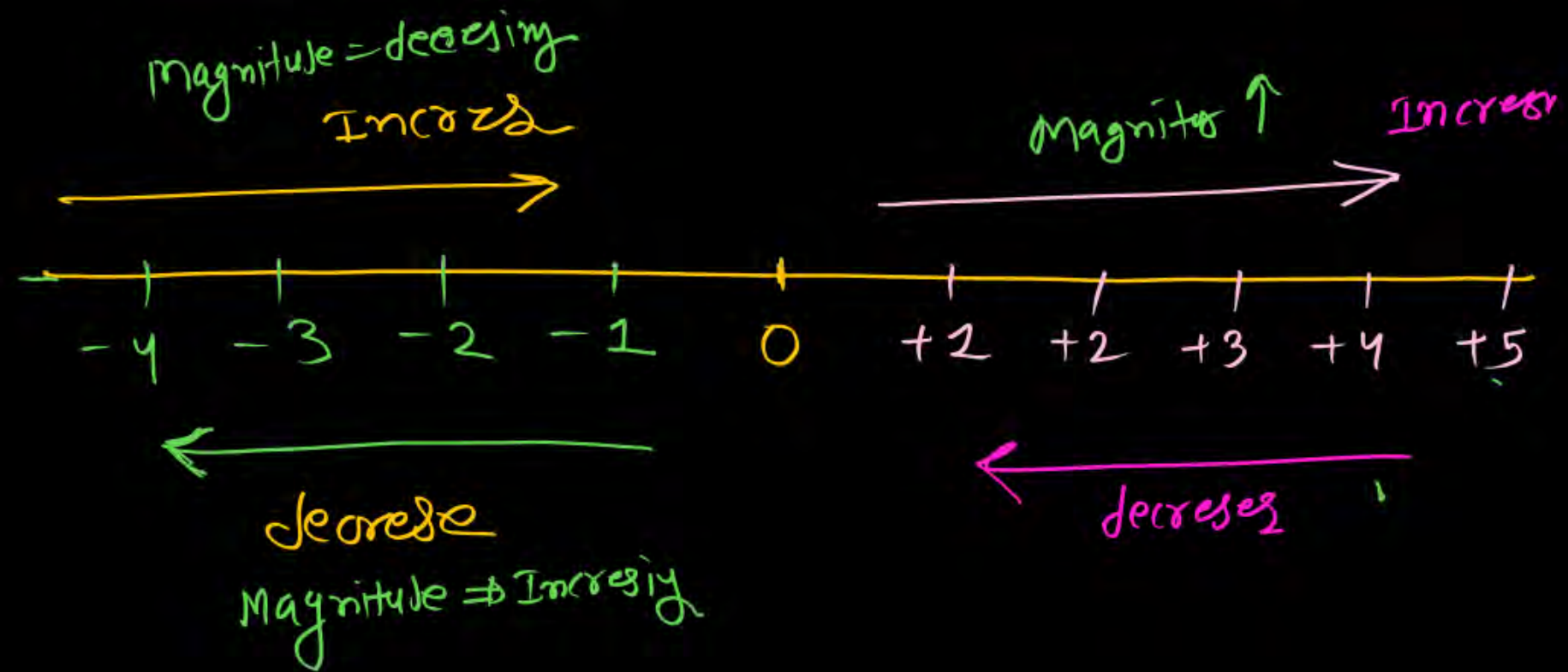
$$\frac{0.5}{\pi} \text{ cost per unit area}$$

$$\text{Area } \pi(15)^2 = 225\pi$$

$$\text{1 unit Area ka cost} = \frac{100}{225\pi} = \frac{0.44}{\pi}$$

Pinky

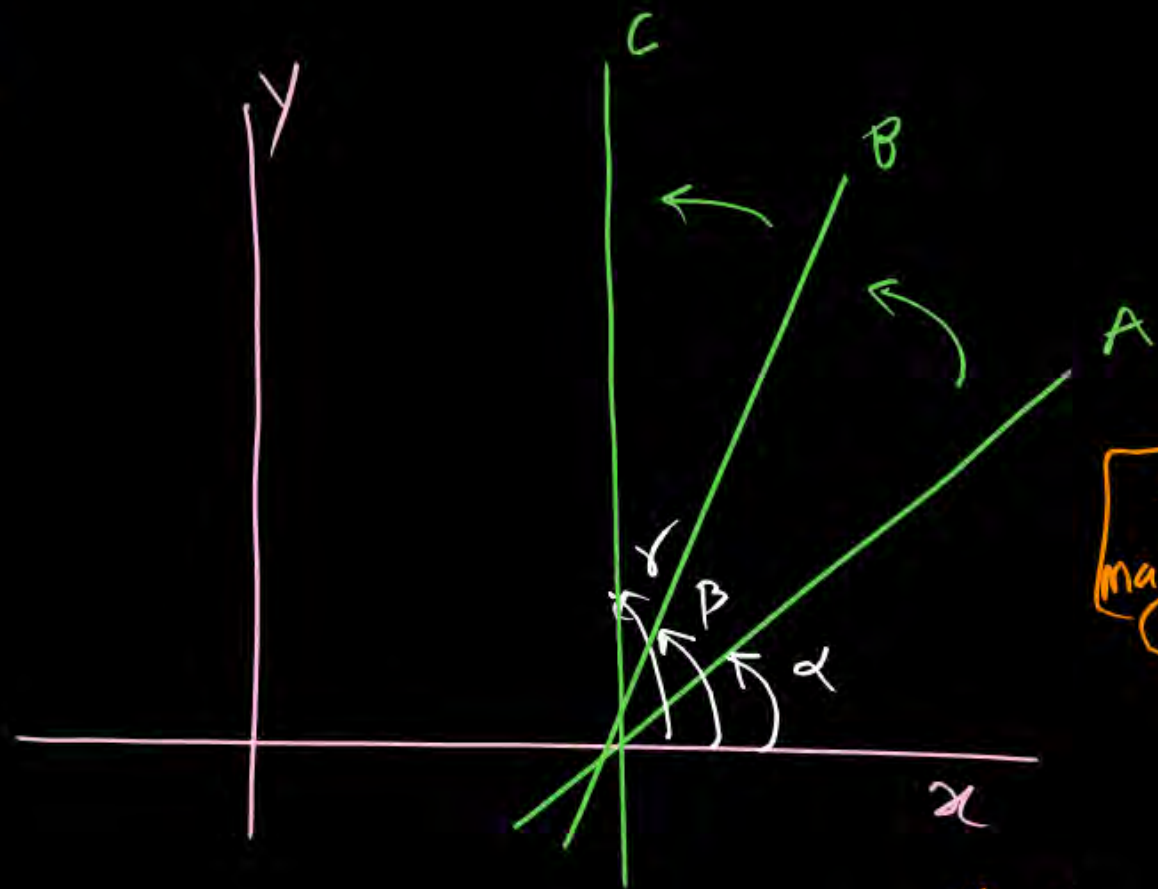
Number system मिश्रण है।



Mod = Magnitude ko Datata hai

$|+4| = +4$ $|-5| = 5$
 $|-4| = +4$ $|-2| = 2$

Noted down



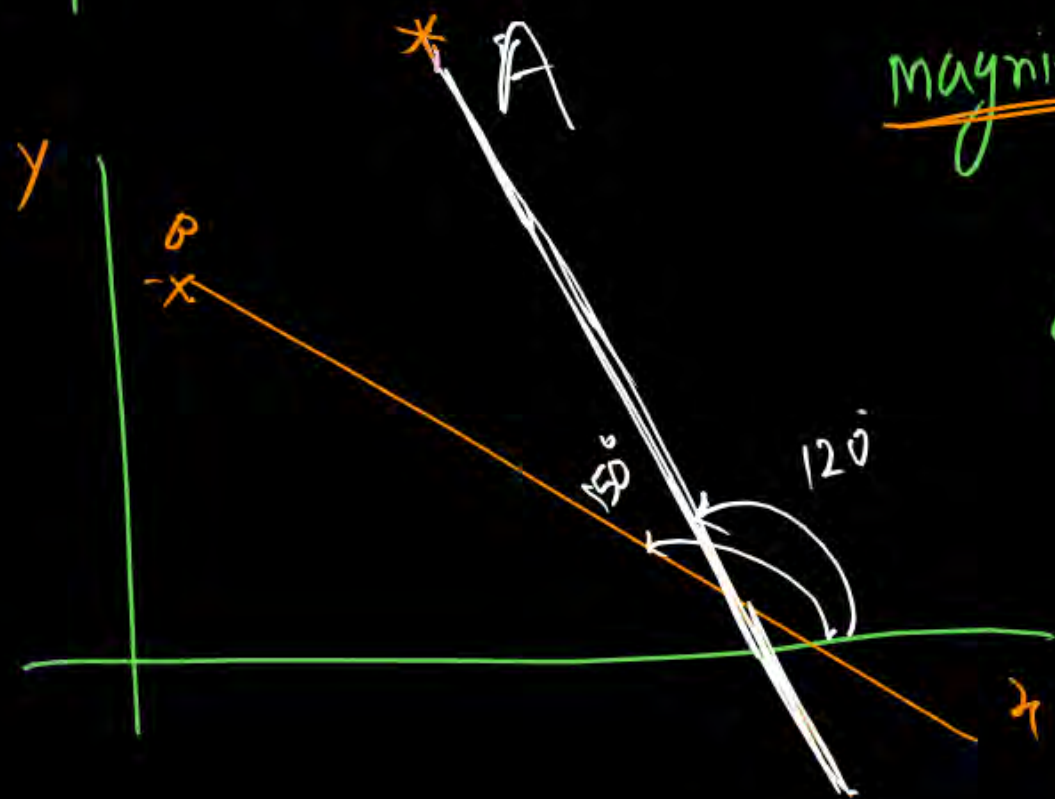
Slope Increasing from A to B to C



straight line Jitna vertical hoga.
magnitude of slope utna Jayda.

[slope (C > B > A)
magnitude of slope (C > B > A)]

magnitude of slope (A > B) -ve ko ignore
slope of (B > A)



$$\begin{aligned}\tan(120^\circ) &= \tan(180^\circ - 60^\circ) \\ &= -\tan 60^\circ \\ &= -\sqrt{3}\end{aligned}$$

$$m_A = \tan(120^\circ) = -\sqrt{3} = -1.71$$

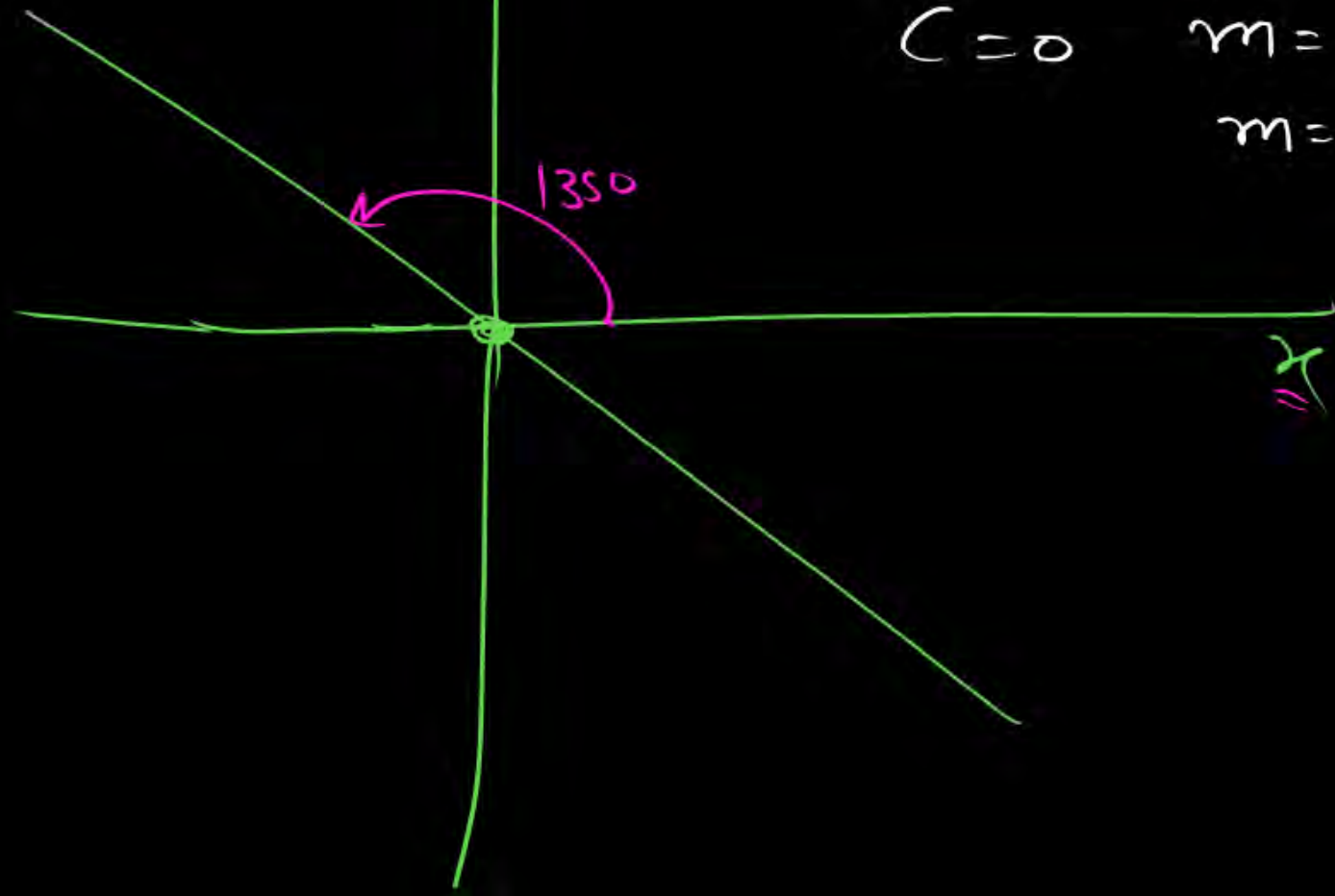
$$m_B = -\tan(150^\circ) = -\frac{1}{\sqrt{3}} = -0.58$$

Draw Graph B/w Spring force & elongation, ($K=1$)
(NEET)

$\vec{F} = -K\vec{x}$ ← given hat
 $F = -Kx$

$y = mx + C$
 $F = -Kx + 0$

$C = 0$ $m = -K$
 $m = -1 = \tan\theta$
 $\theta = 135^\circ$



Question

H/W

Find equation of the line which makes intercept +4 and 5 on the x and y-axis. *repetition*

1 ~~X~~ $5x + 4y + 20 = 0$ $(0 + 4y + 20 = 0)$
 $4y = -20$
 $y = -5$

x -Intercept
 $y = 0$

value of y at $x=0$

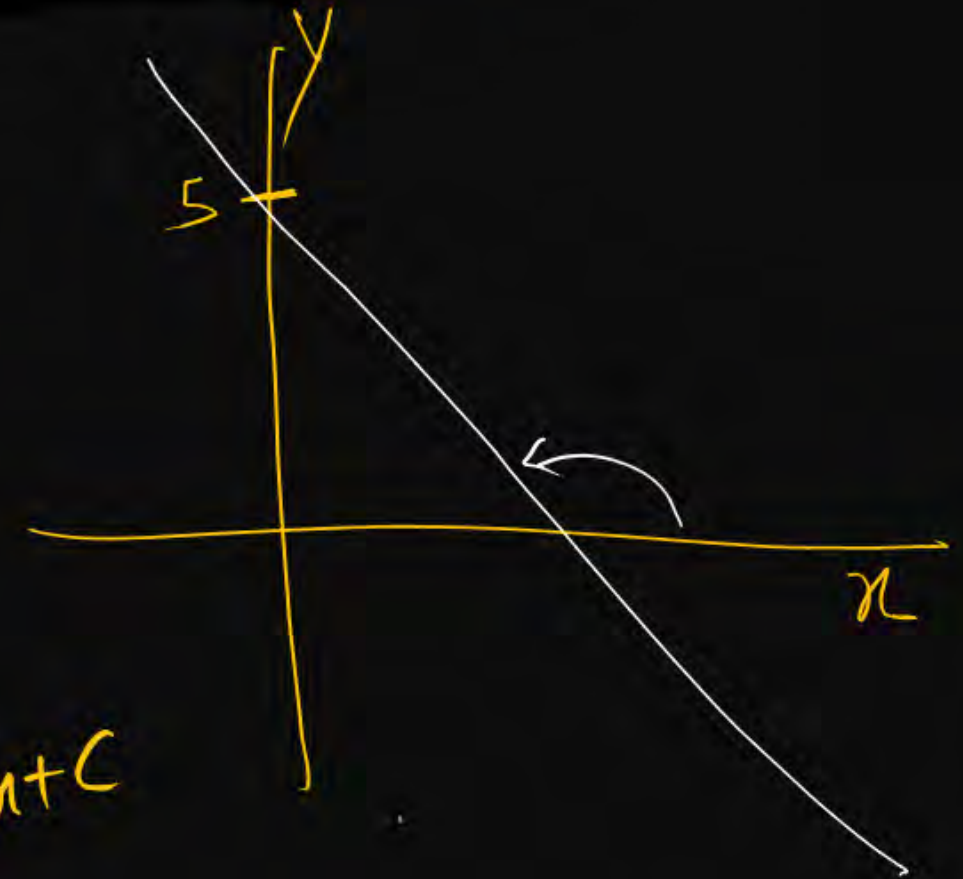
2 $4y + 5x - 20 = 0$ $(4y - 20 = 0)$
 $x = \frac{20}{5} = +5$

3 ~~X~~ $4y - 5x = -20$
 $4y = 5x - 20$

4 ~~X~~ $4x + 5y + 20 = 0$

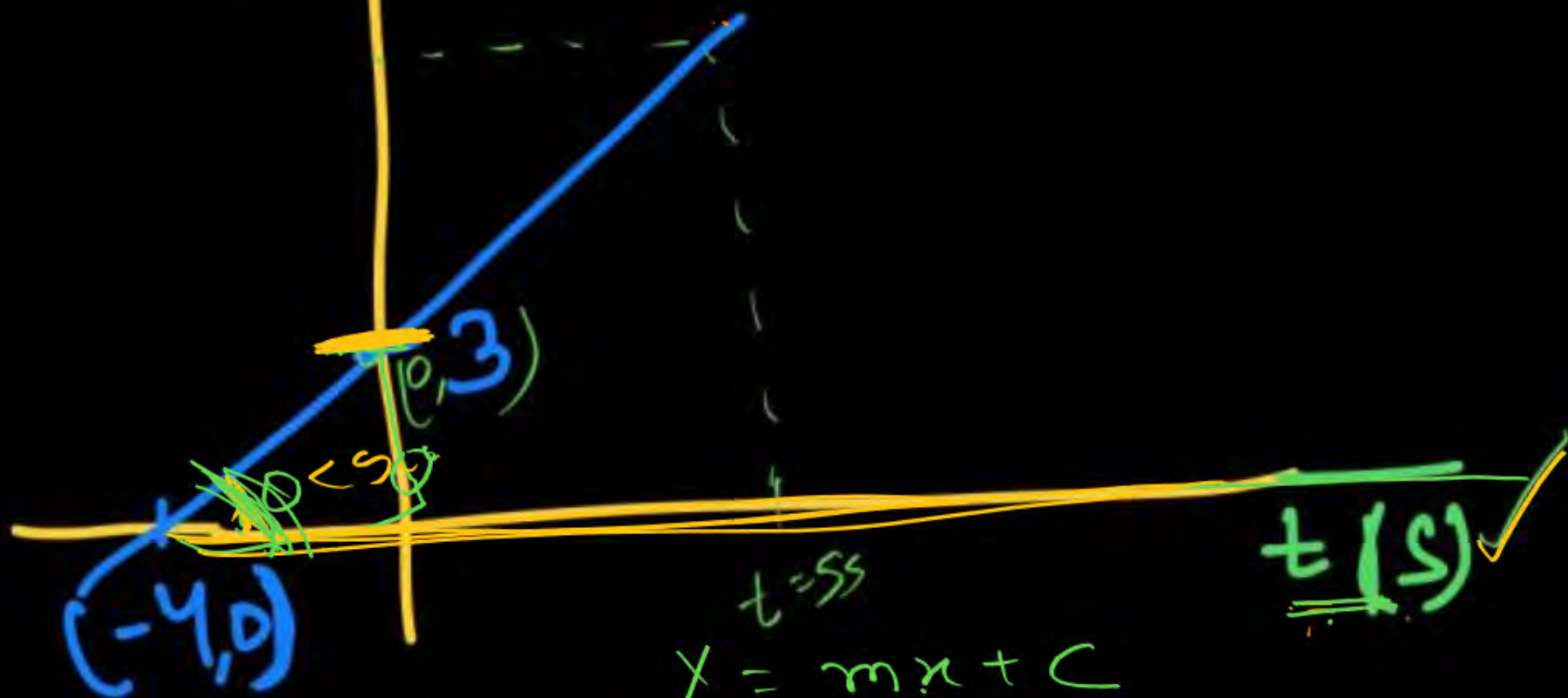
$4y + 5x - 20 = 0$

$4y = -5x + 20$
 $y = -\frac{5}{4}x + 5$
 $y = mx + c$



$$F = \text{force (N)} \checkmark$$

find value of force
at $t = 5 \text{ sec}$



$$y = mx + c$$
$$f = mt + c$$

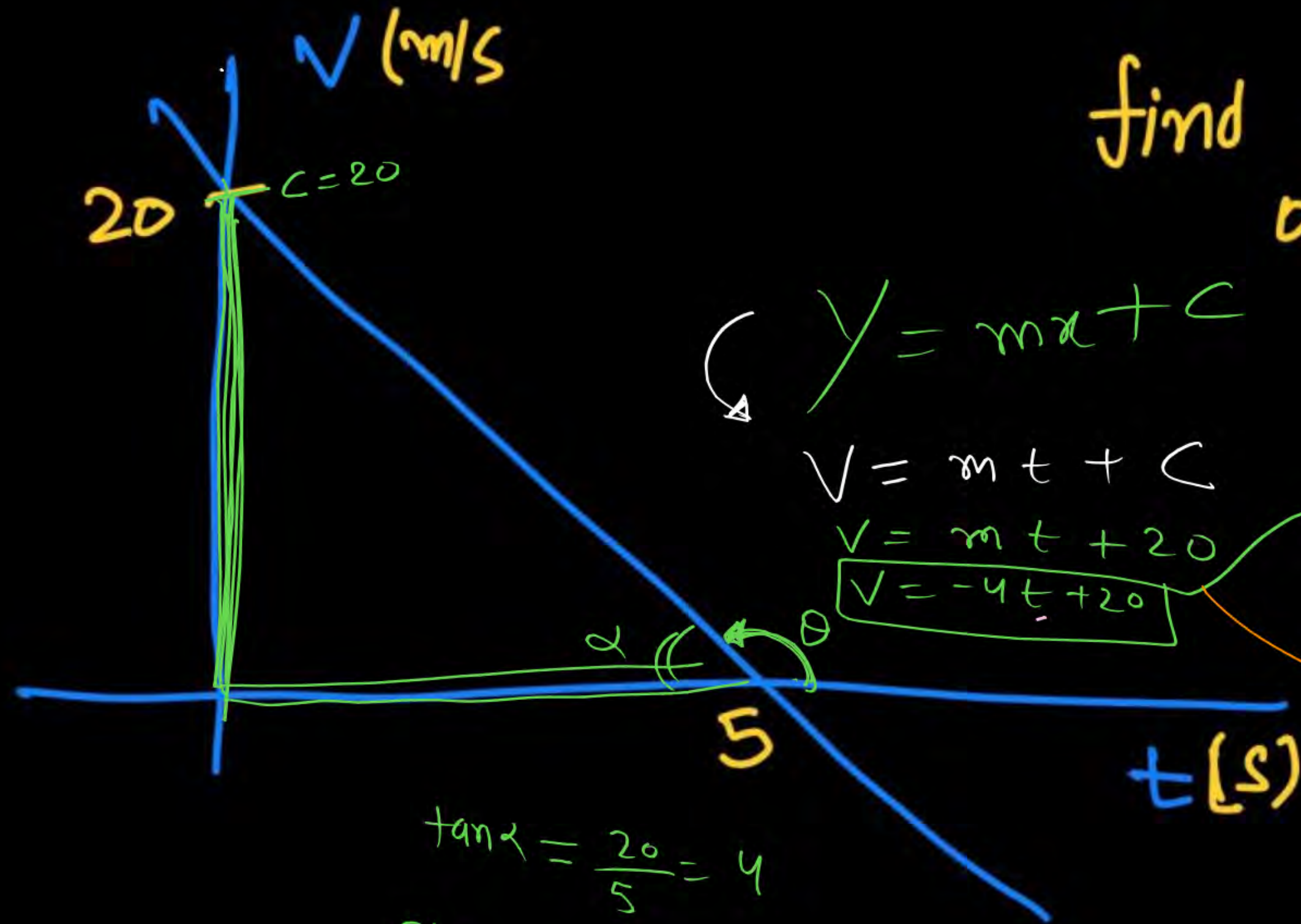
$$\tan \theta = \frac{3}{4} = m$$

$$F = \frac{3}{4}t + 3$$

$$F_{\text{at } t=5 \text{ sec}} = \frac{3}{4} \times 5 + 3 = \frac{15}{4} + 3 = \frac{15+12}{4} = \frac{27}{4} \text{ N}$$

$$y = mx + c$$
$$F = mt + c$$

~~11/2~~



find velocity of object at $t = \underline{3\text{sec}}$, $t = \underline{8\text{sec}}$

$$y = mx + c$$

$$v = mt + C$$

$$v = mt + 20$$

$$v = -4t + 20$$

$$\begin{aligned} v_{t=3\text{sec}} &= -4(3) + 20 \\ &= -12 + 20 \\ &= +8 \text{ m/s} \checkmark \end{aligned}$$

$$\begin{aligned} v_{t=8} &= -4(8) + 20 \\ \text{H/W} &= -32 + 20 \\ &= -12 \text{ m/s} \end{aligned}$$

$$\tan \alpha = \frac{20}{5} = 4$$

$$\text{Slop} = \tan \theta = -\tan \alpha = -4$$

$$\text{gf } \frac{C-0}{100-0} = \frac{K-273}{373-273}$$

then using this relation

JEE main (2025)

Draw Graph b/w C & K.

Solⁿ →

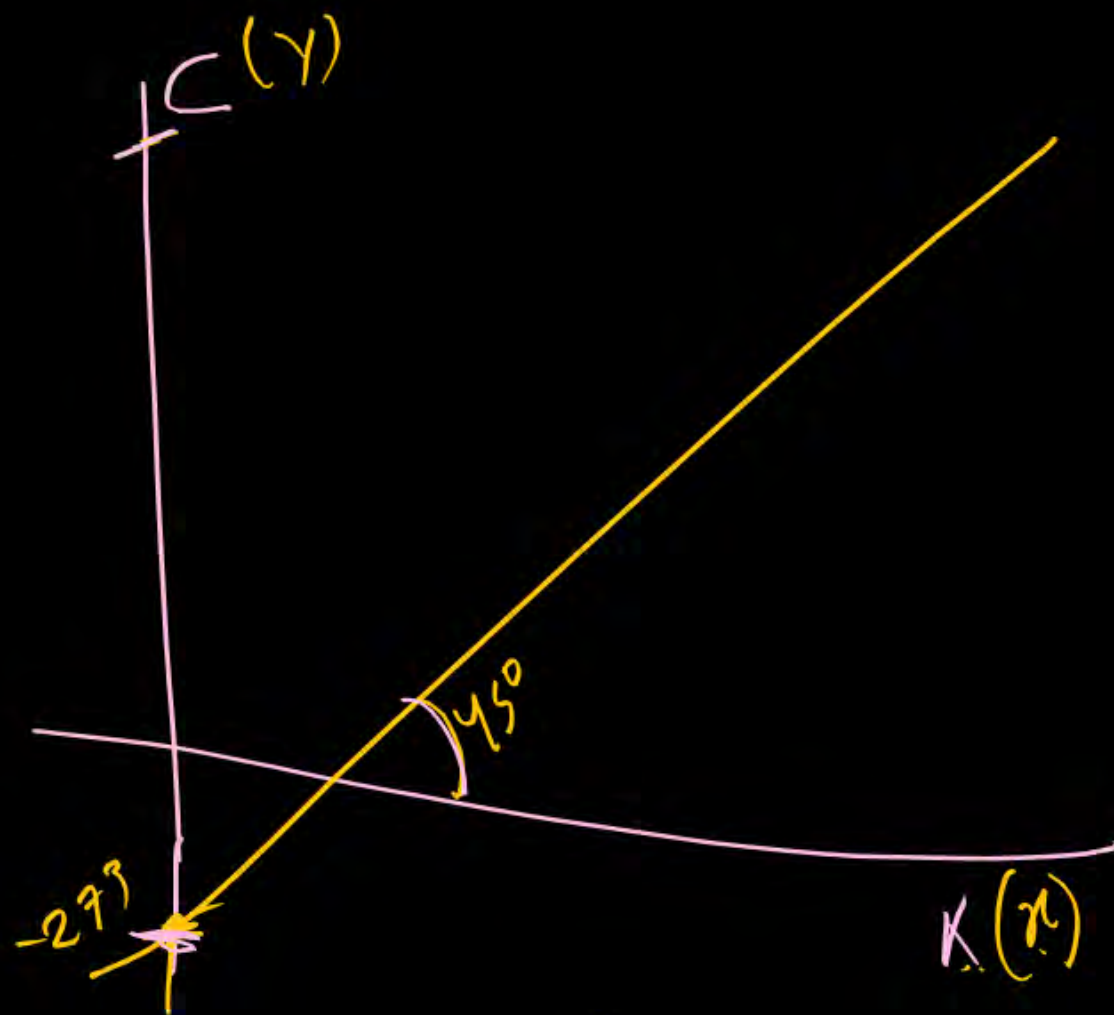
$$\frac{C}{100} = \frac{K-273}{100}$$

$$C = K - 273$$

$$y = mx + c$$

$$m = \tan \theta = 1$$

$$\theta = 45^\circ$$

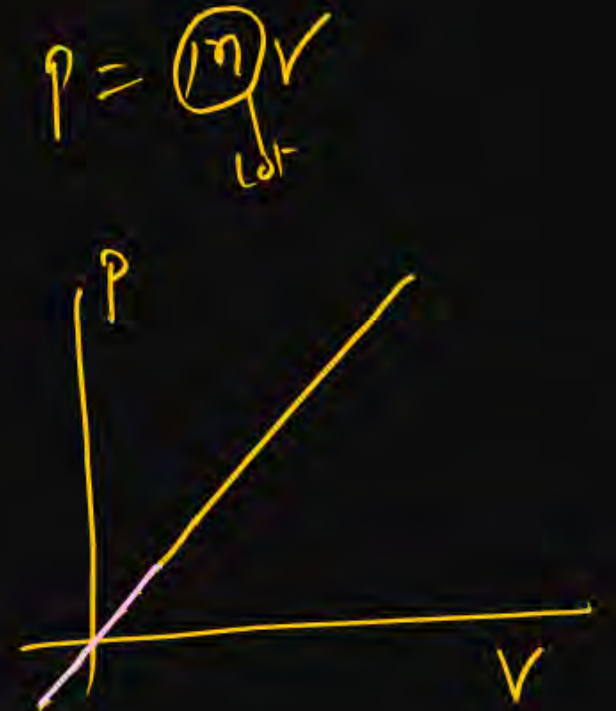
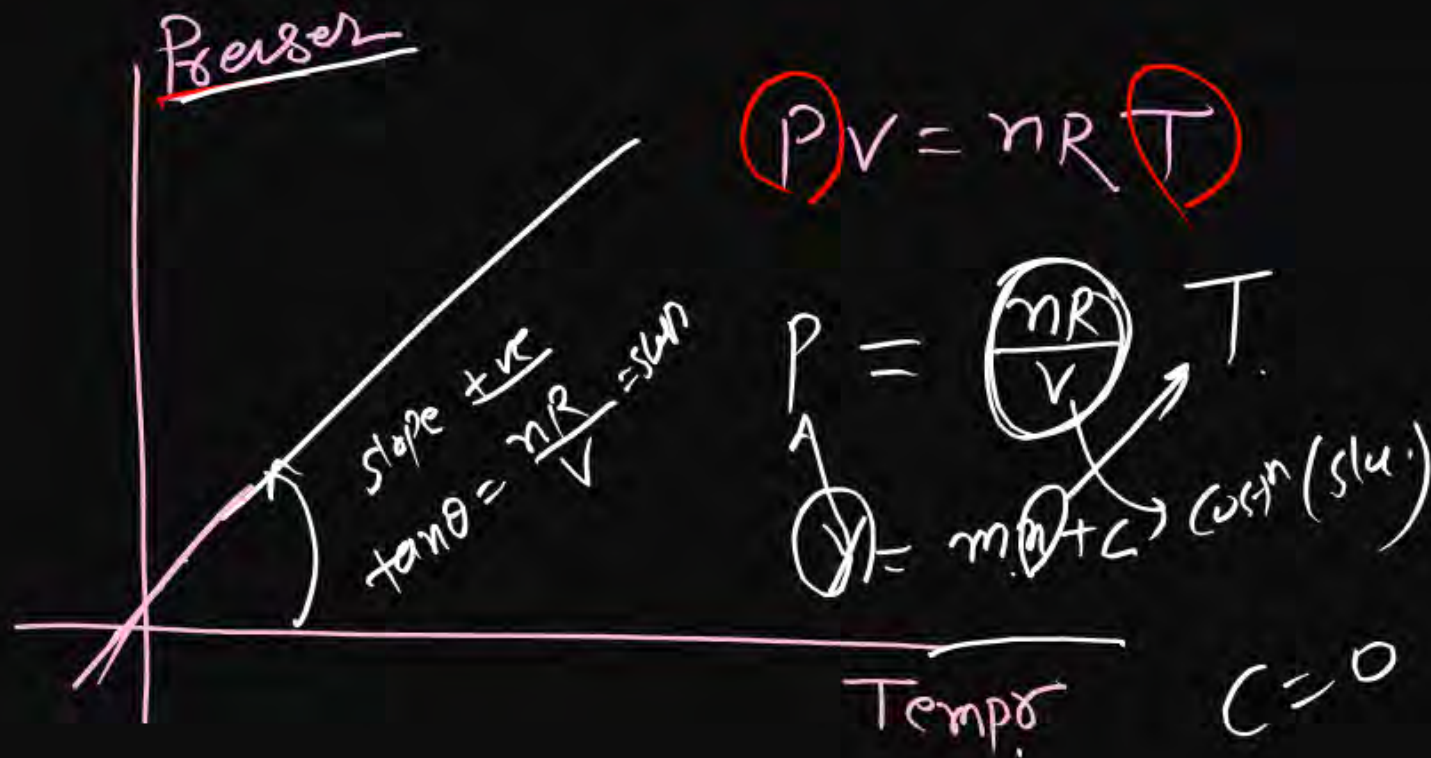


Question

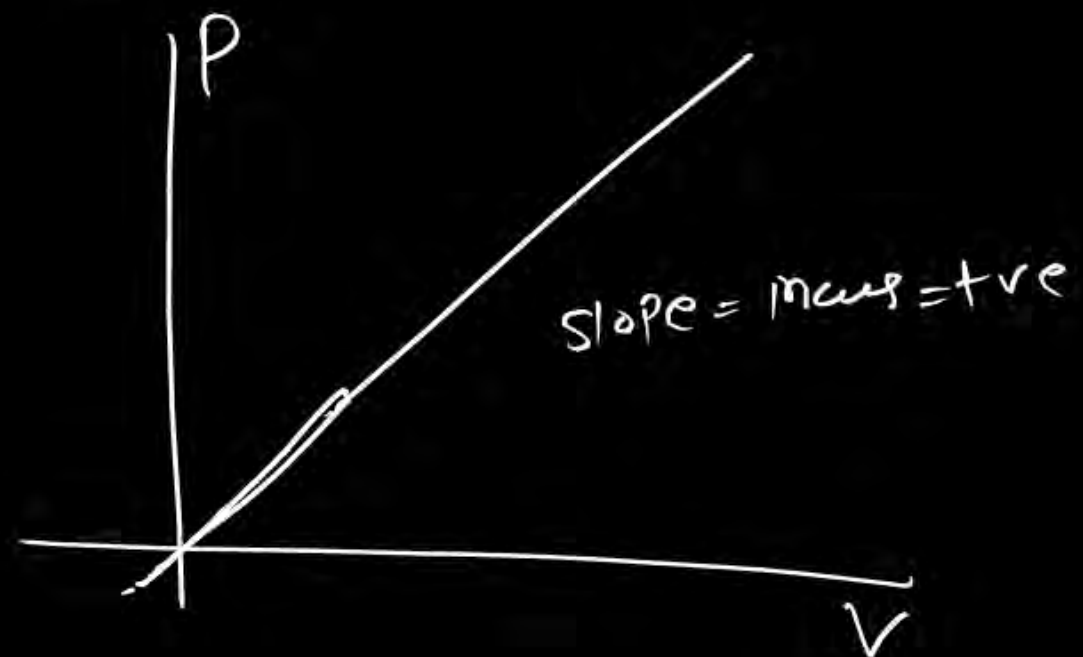


$$\# \boxed{PV = nRT}$$

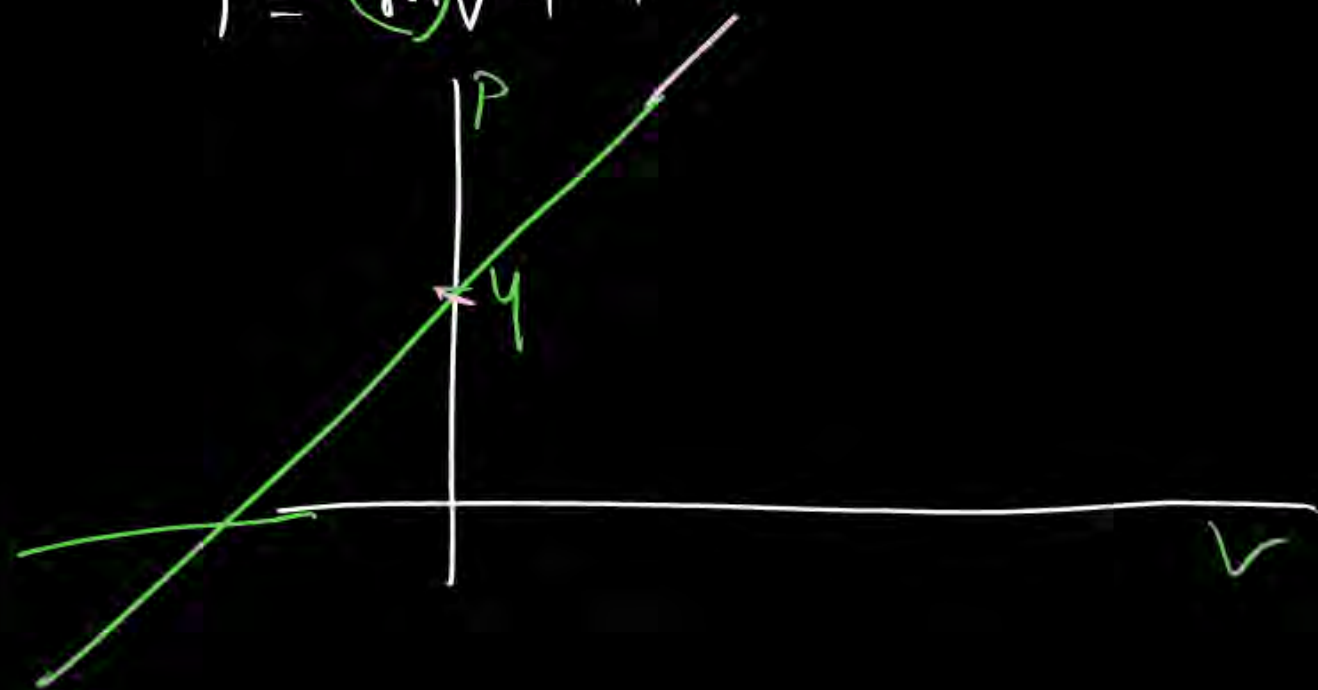
Draw graph between pressure / temperature for constant volume.



$$p = mv$$



$$p = \textcircled{m}v + 4$$



Question

H/W
Not for all
(Level up)



Draw graph between stopping potential V_0 and energy of photon for given equation
 $E = \phi + eV_0$.

$$y = |x|$$

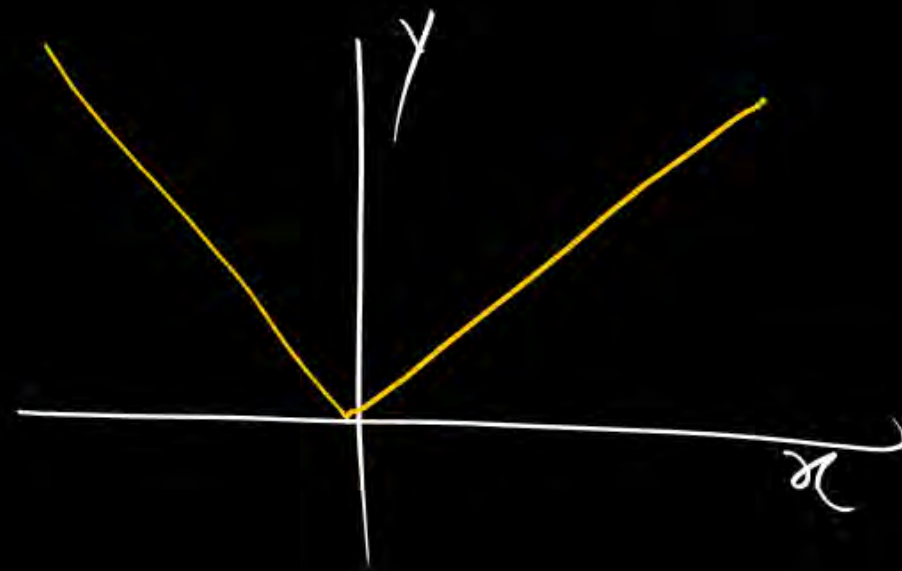
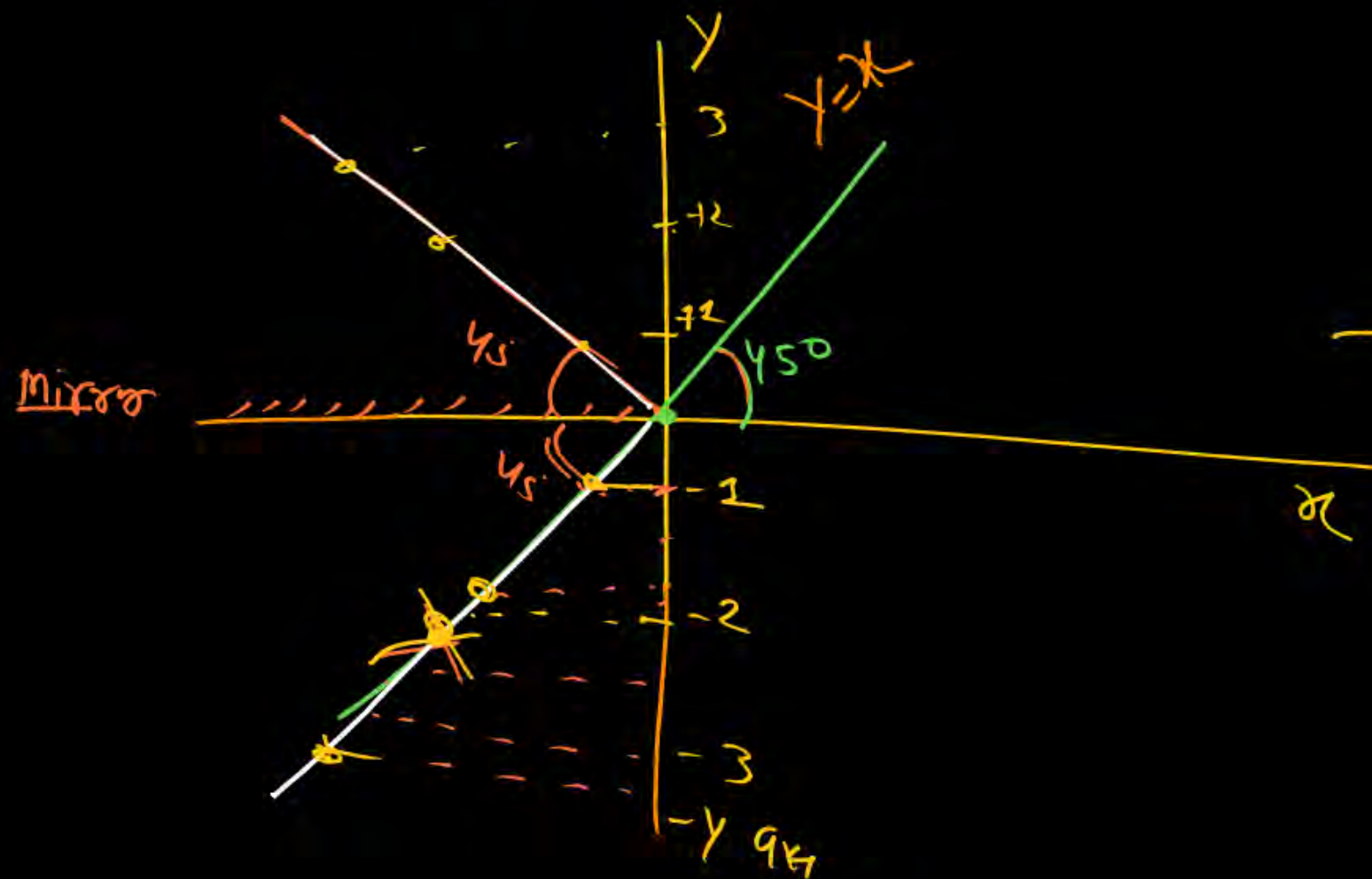
y can't be -ve for any value of x

Step: 1 \rightarrow mod ko remove karo \rightarrow Draw graph

$$y = x \quad (y = mx + c)$$

Step-2

y ke -ve value ko mod laye ke +ve le lo \rightarrow x -axis ko mirror man kar y ke -ve value to Image bana lo



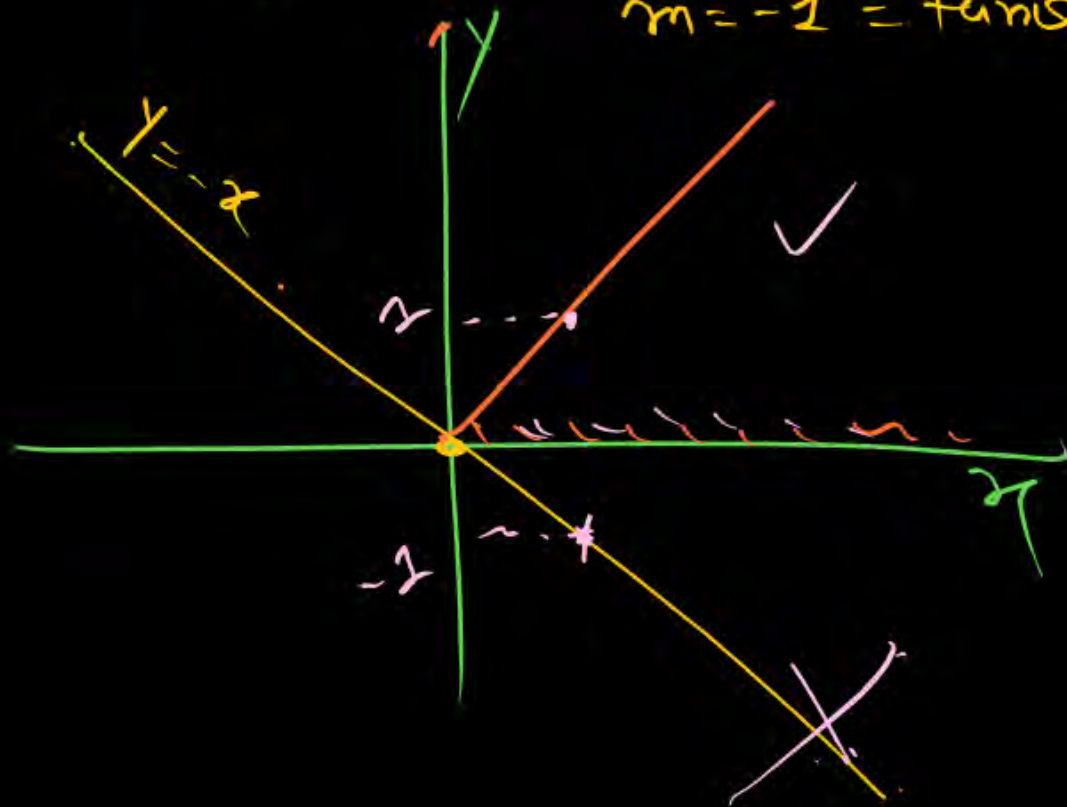
$$y = |-x|$$

Draw graph B/w y & x

Step \rightarrow 1 Mod hadda ke graph

$$\# y = -x$$

$$m = -1 = \tan 135^\circ$$



Q2)

$$y = |x - 2|$$

$$\xrightarrow{\text{if } x=0} y = |0 - 2| = |-2| = +2$$

Draw graph y & x

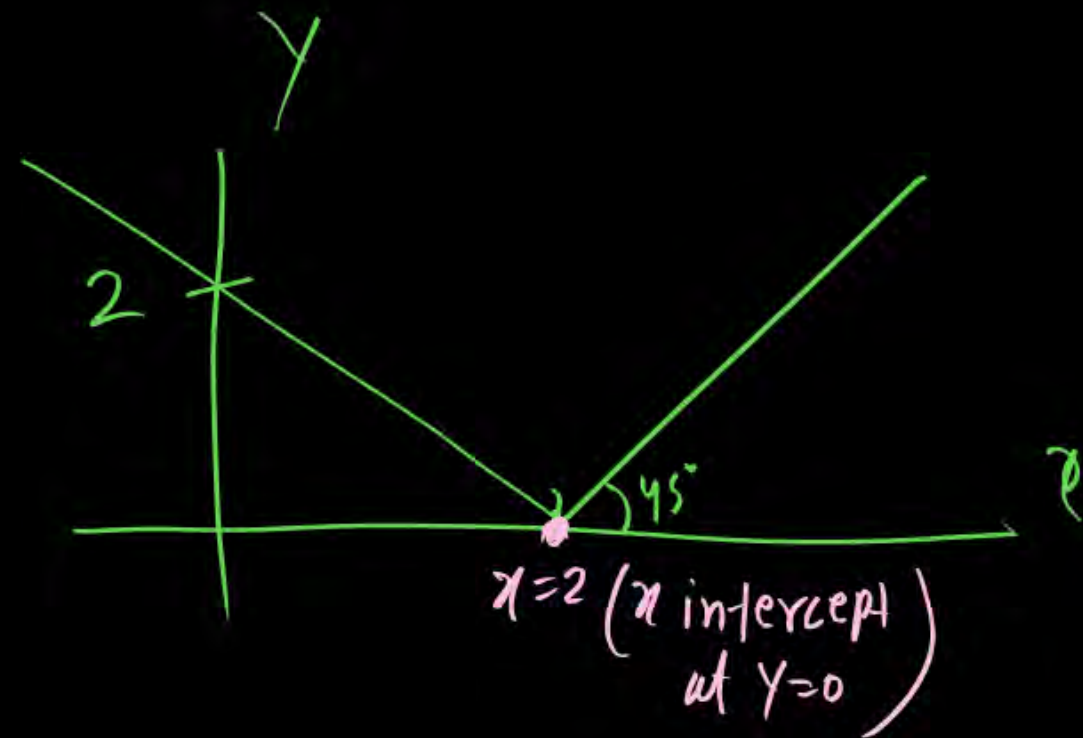
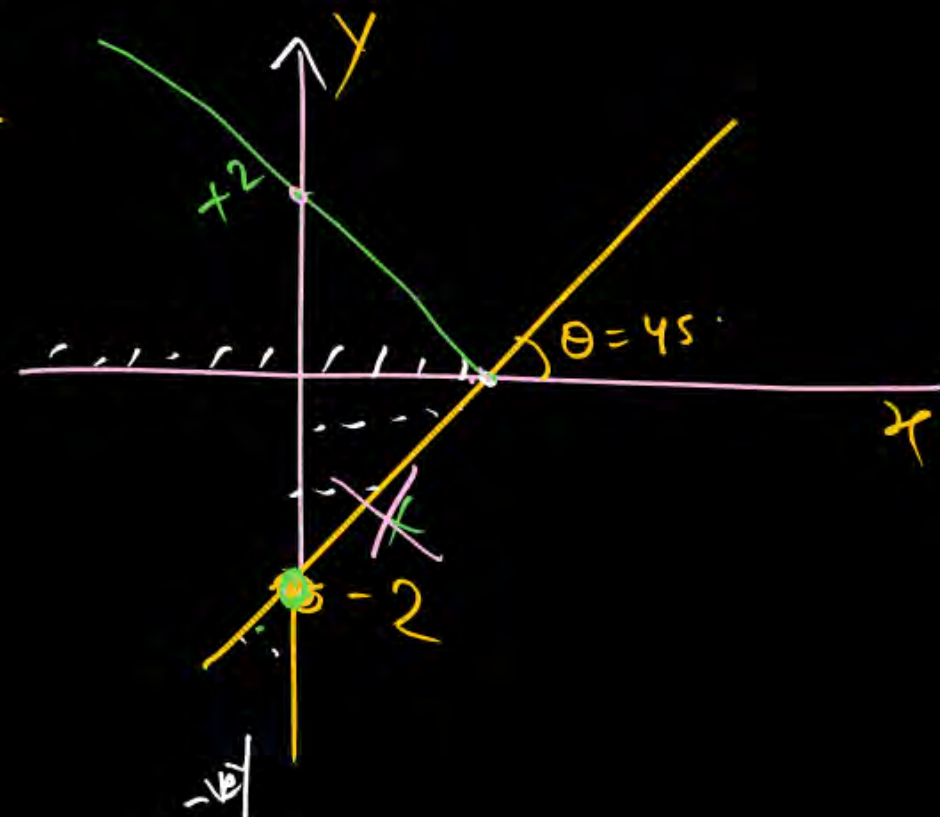
Solⁿ

Step-1

remove mod & Draw graph

$$y = x - 2$$

$$\begin{cases} m = +1 \\ c = -2 \end{cases}$$



H/w

$$(x+4) + (y-3) + 5 = 0$$

$$x+4+y-3+5=0$$

$$x+y+6=0$$

$$y = -x - 6$$

$$y = mx + c$$

$$v = at$$

$$p = mv$$

$$K.E = \frac{1}{2} m v^2 \rightarrow \text{cur}$$

$$F = ma$$

$$s = \frac{1}{2} at^2$$



PHD on straight line



8-102

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mixe → sc.

graph → eqn
eqn → graph
mod →
ph →

$y \propto x$ (directly proportional)
linear dependency

Rectangular hyperbola

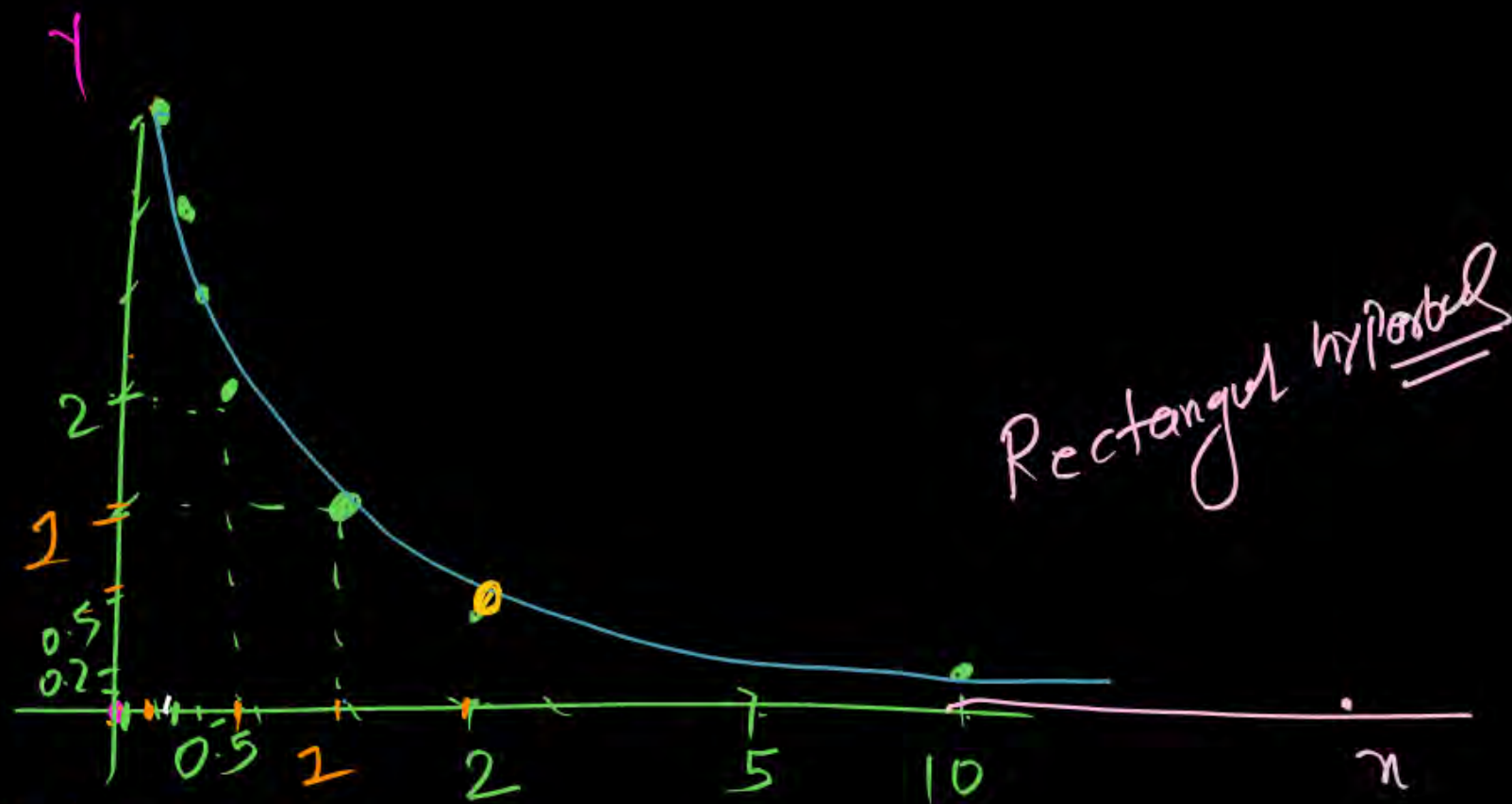
$y \propto \frac{1}{x}$ (Inversely Proportional)

$$y = \frac{1}{x}$$

Step-1 Put different value of x (Ex $x = -1, 0, 5, 2$) & find y at that x

Step-2 → Locate coordinate of that (x, y)

Step-3 → Connect all coordinate with curve/line



#

y	x
∞ infinite	0
100	0.01
10	0.1
2	0.5
1	1
0.2	5
0.1	10
0	∞

$$y = \frac{1}{0} = \infty$$

$$y = \frac{1}{0.01} = \frac{1}{\frac{1}{100}} = 100$$

$$y = \frac{1}{0.1} = \frac{1}{\frac{1}{10}} = 10$$

$$y = \frac{1}{0.5} = \frac{1}{\frac{1}{2}} = 2$$

Question

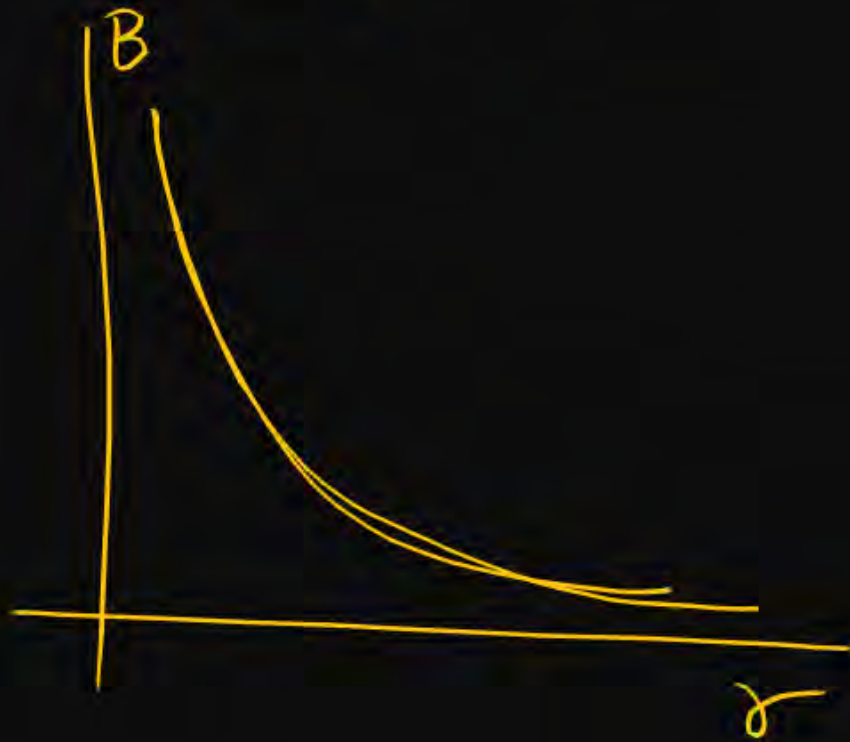
draw graph B/w B & r

$$B = \frac{\mu_0 I}{2\pi r}$$

magnetic
field

$$B = \frac{C + \eta}{r}$$

$$\boxed{B \propto \frac{1}{r}} \quad r \propto \frac{1}{B}$$



de-Broglie wavelength & momentum

[IIT-2024]

$$\lambda = \frac{h}{p} \quad (h = c + \hbar)$$

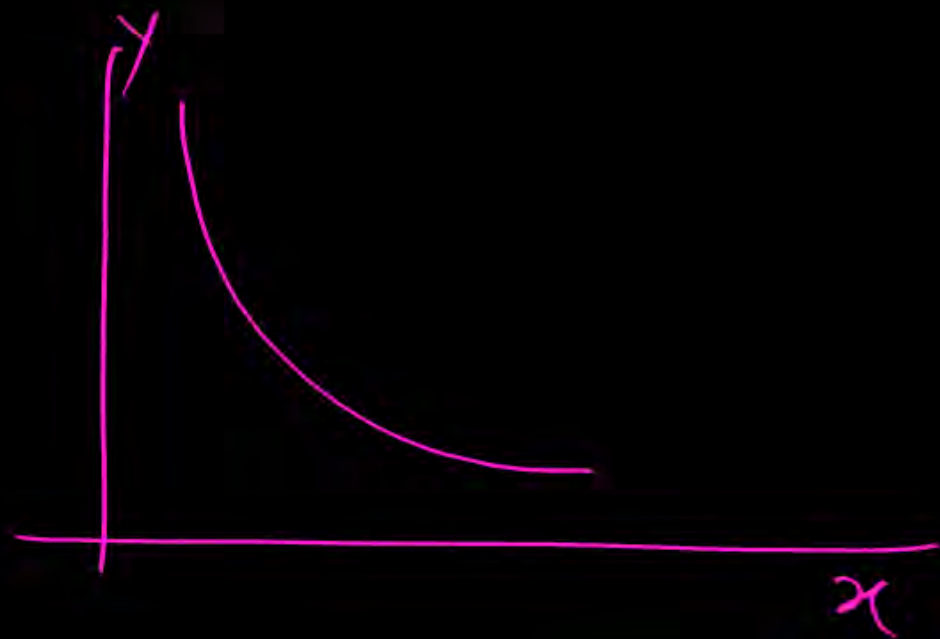
$$\gamma \propto \frac{1}{\lambda}$$

λ (wavelength)



p (Momentum)

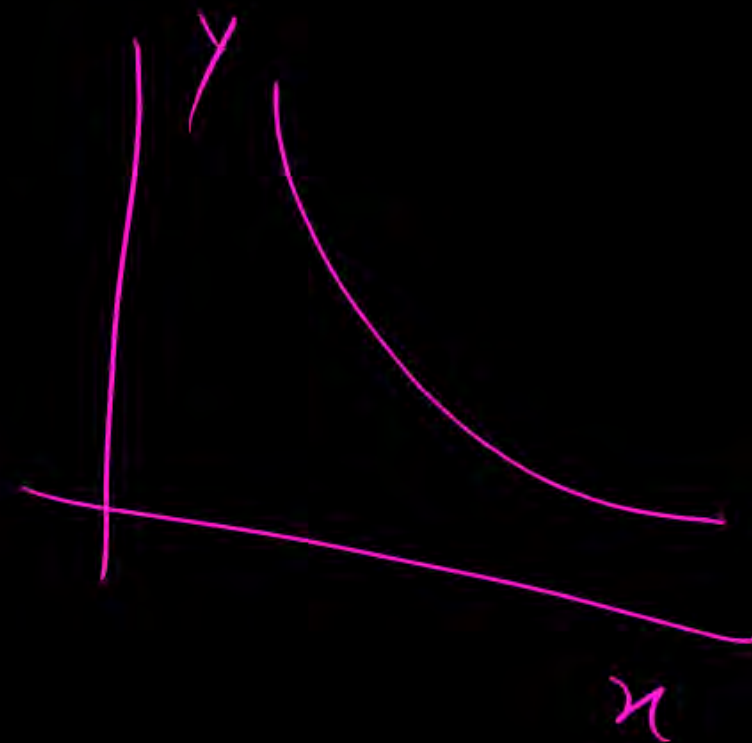
$$y = \frac{1}{x^2}$$



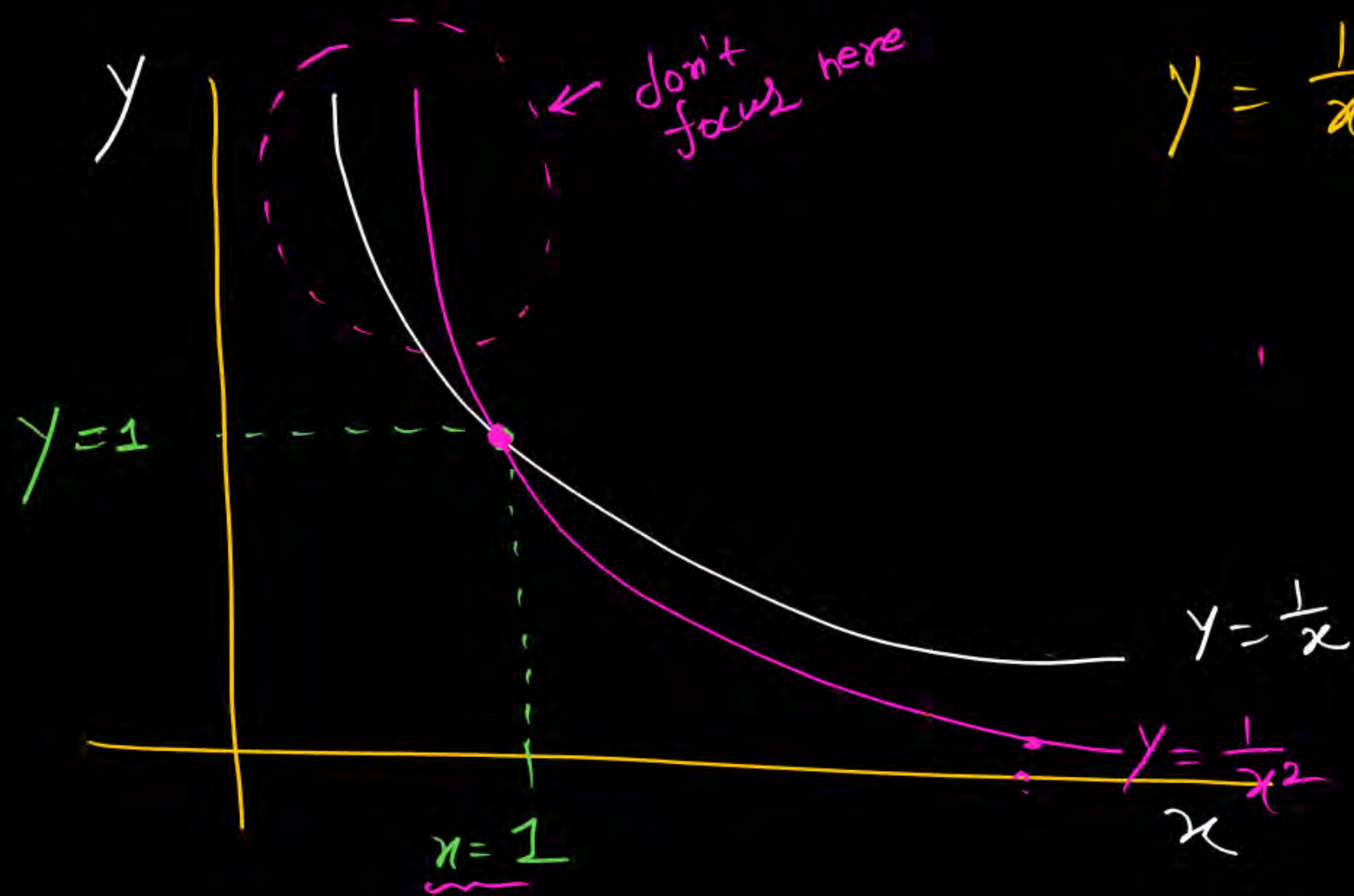
$$y = \frac{1}{\sqrt{x}}$$



$$y = \frac{1}{x^3}$$



all graph here are like Rectangular hyper bola



$$y = \frac{1}{x}$$

$$y = \frac{1}{x^2}$$

if $x=1$ then $y=1$ in both equations

$$y = \frac{1}{x} = \frac{1}{10} = 0.1$$

$$y = \frac{1}{x^2} = \frac{1}{(10)^2} = \frac{1}{100} = 0.01$$

JEE Adv.

$$E_{\text{point charge}} = \frac{kQ}{r^2}$$

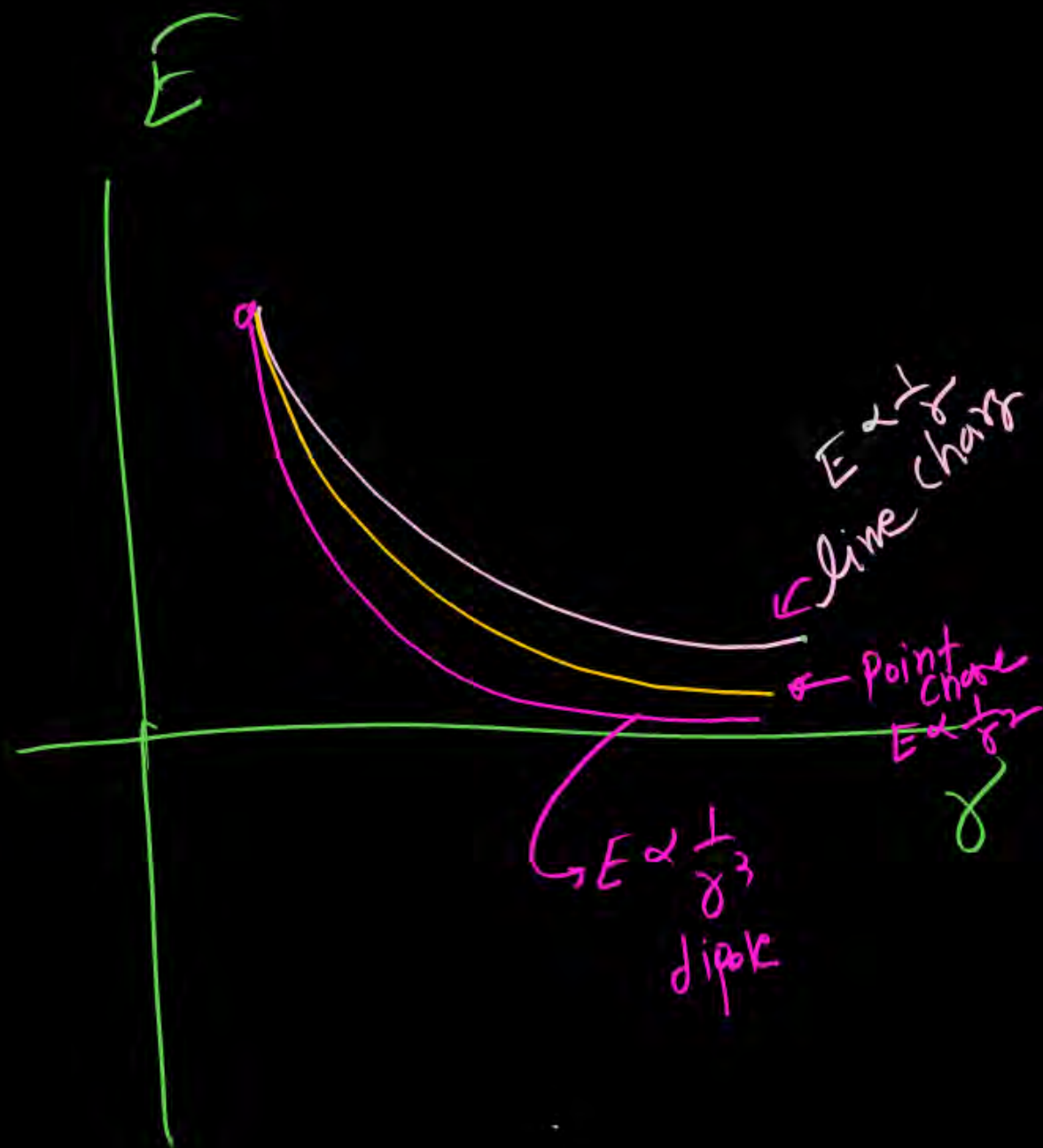
$$\Rightarrow E \propto \frac{1}{r^2}$$

$$E_{\text{dipole}} = \frac{2kP}{r^3}$$

$$\Rightarrow E \propto \frac{1}{r^3}$$

$$E_{\text{line charge}} = \frac{2k\lambda}{r}$$

$$\Rightarrow E \propto \frac{1}{r}$$

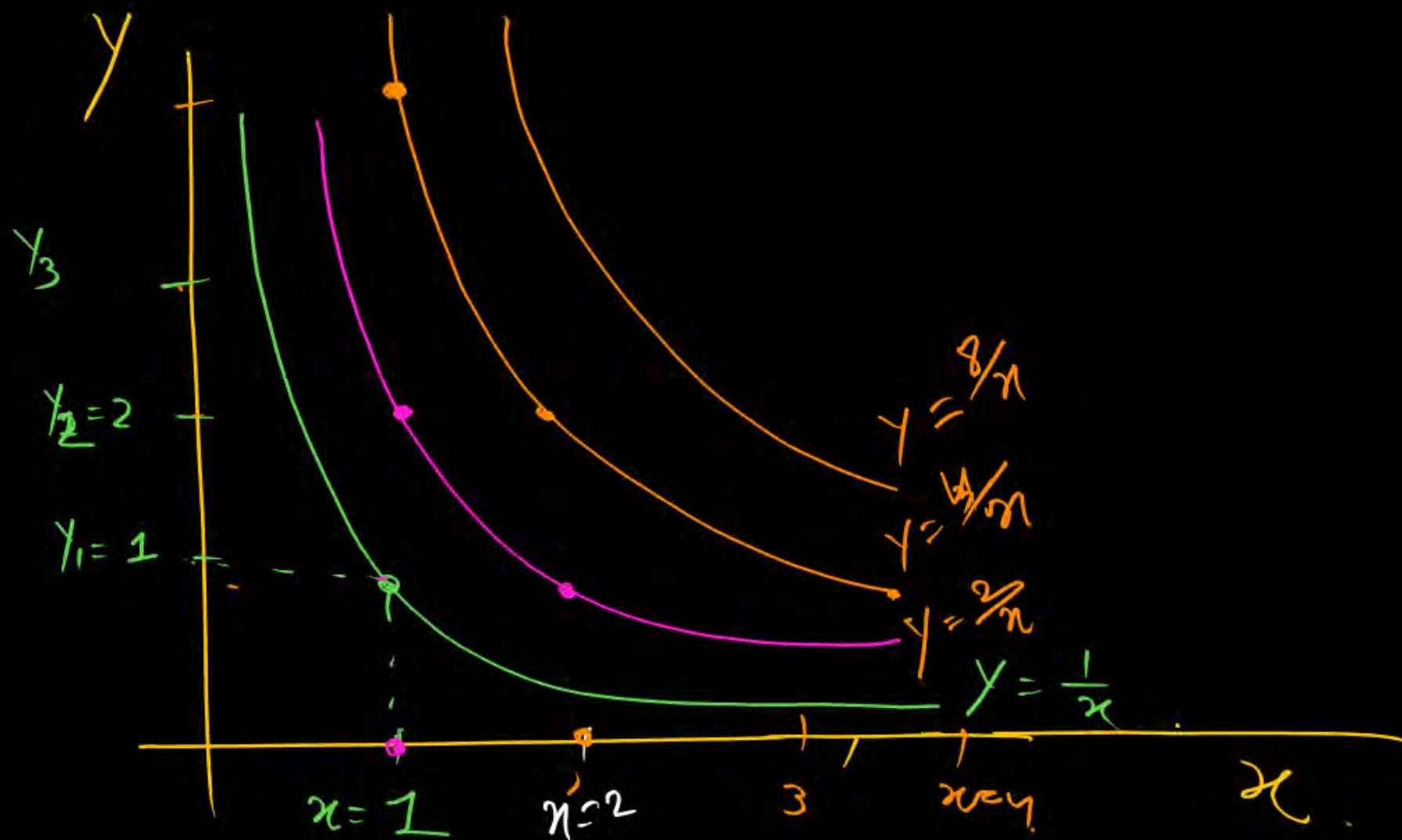


$$y_1 = \frac{1}{x}$$

$$y_2 = \frac{2}{x}$$

$$y_3 = \frac{4}{x}$$

$$y_4 = \frac{8}{x}$$



Thermodynamics

Isothermal process

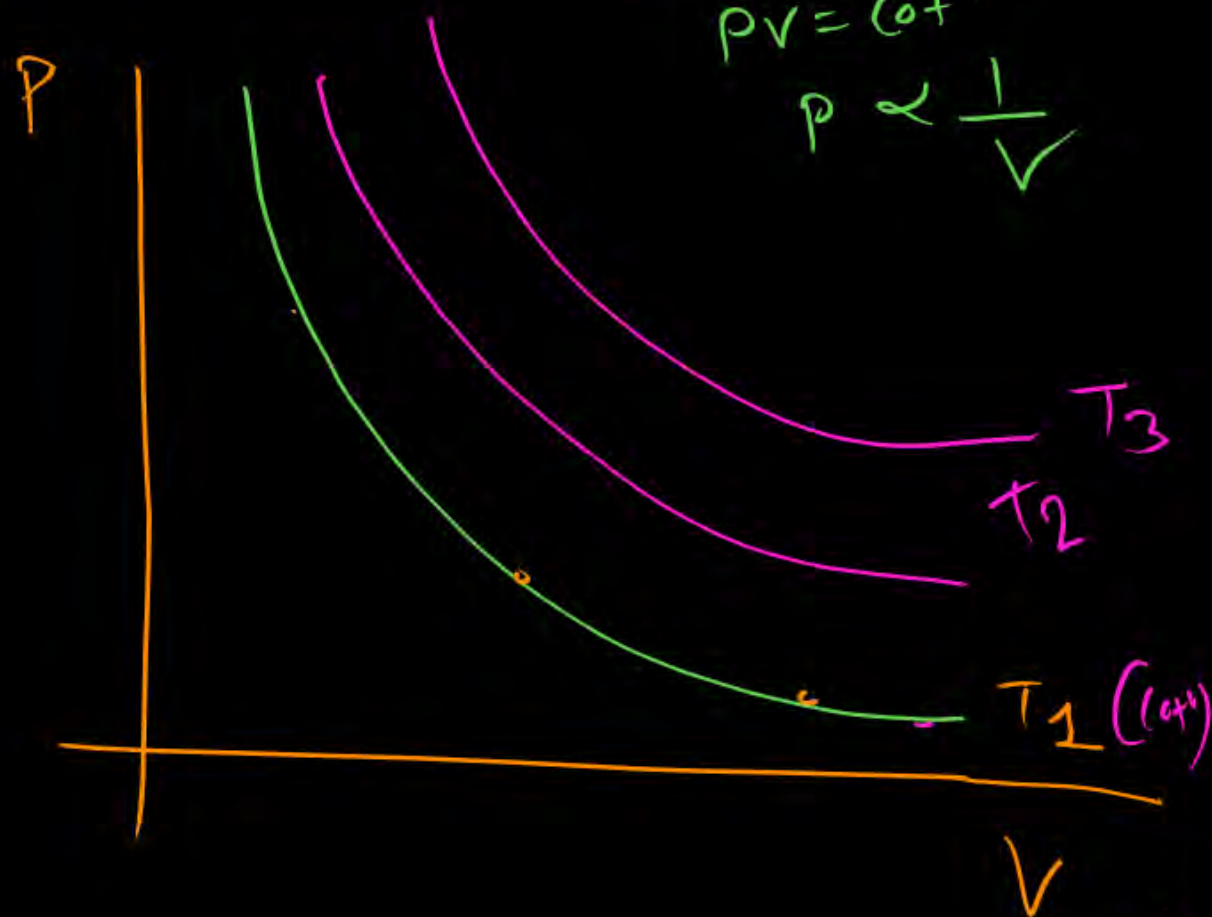
Temp^r constⁿ

$$PV = \boxed{nRT_1} = \text{const}$$

$$PV = \text{const}$$
$$P \propto \frac{1}{V}$$

$$PV = \frac{nRT_1}{V}$$

Not for and
we will study
in thermodynamics



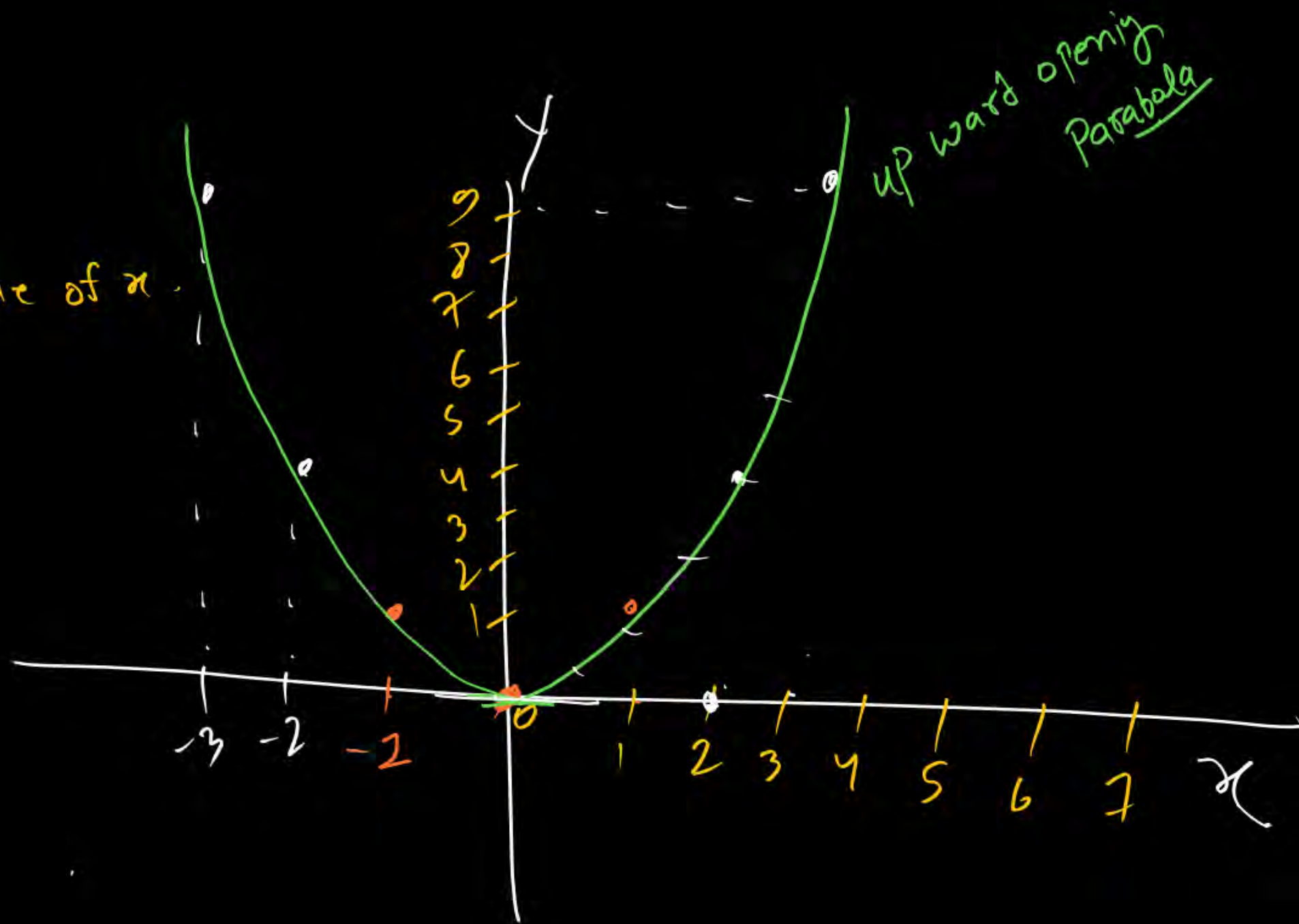
$$T_3 > T_2 > T_1$$

Parabola

$$y = x^2$$

→ y is always positive for any value of x.

y	x
0	0
1	1
4	2
9	3
16	4
1	-1
4	-2
9	-3



Concept of slope

slope = $m = \tan \theta = \frac{\Delta y}{\Delta x}$

↪ slope at a point $m = \left(\frac{dy}{dx} \right)_x$

eqⁿ of straight line

$$y = mx + c$$

diffⁿ w.r.t. x

$$\frac{dy}{dx} = \frac{d(mx+c)}{dx}$$

$$= m \frac{dx}{dx} + \frac{dc}{dx} \rightarrow 0$$

$$\boxed{\frac{dy}{dx} = m}$$

Slope ↗ ans

Ex $y = 4x$

$$\frac{dy}{dx} = \frac{d4x}{dx} = 4 \frac{dx}{dx}$$

Slope = $\boxed{\left(\frac{dy}{dx} \right) = 4} = \underline{\underline{ans}}$

$y = x^2$

$$\frac{dy}{dx} = \frac{dx^2}{dx}$$

Slope = $2x$

MRX Box Differentiation

$y = x^n$

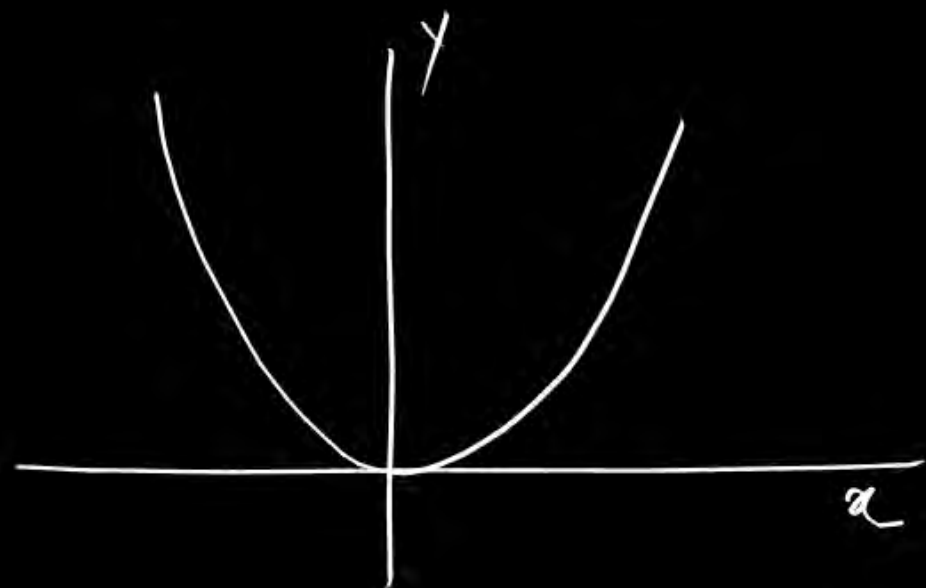
$$\frac{dx^n}{dx} = nx^{n-1}$$

$$\boxed{\frac{dx^2}{dx} = 2x^{2-1} = 2x}$$

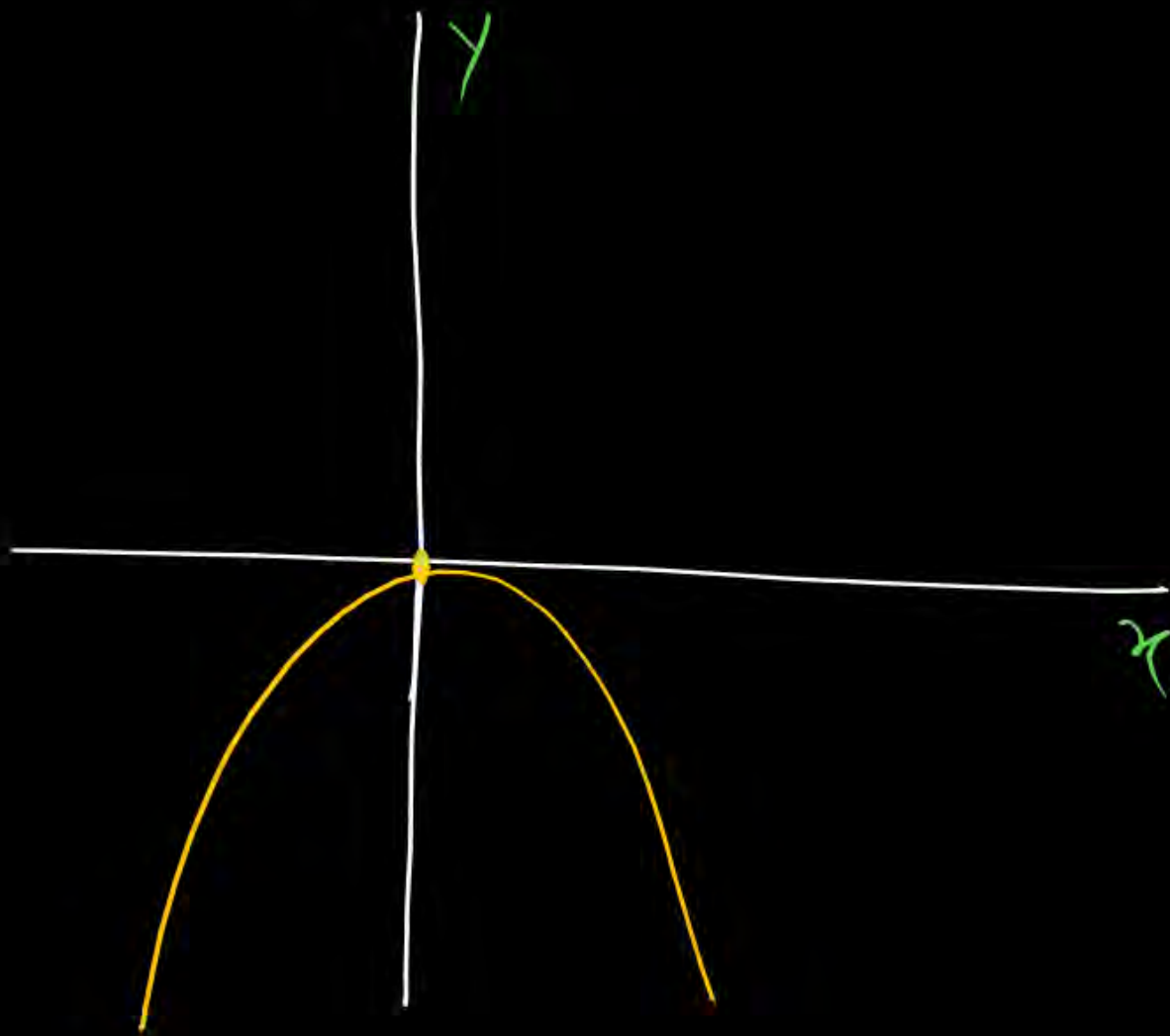
$\frac{dx^1}{dx} = 1x^{1-1} = 1x^0$

$$\boxed{\frac{dx}{dx} = 1}$$

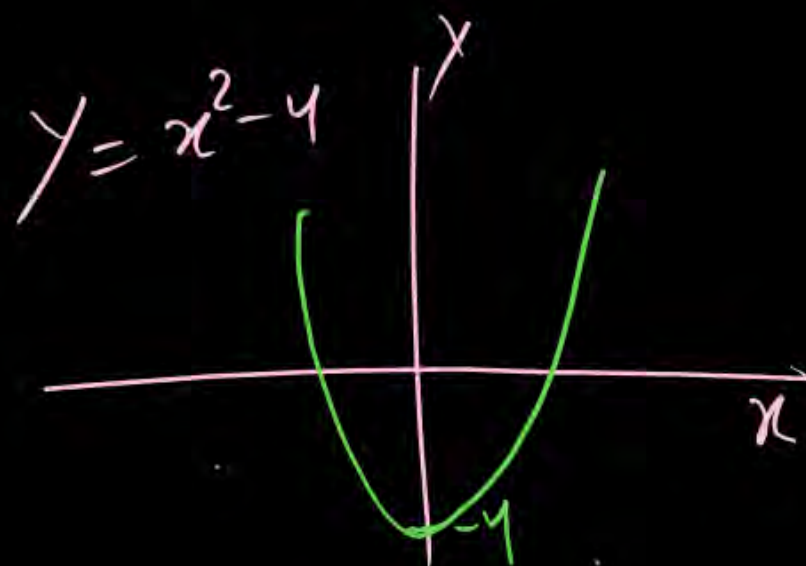
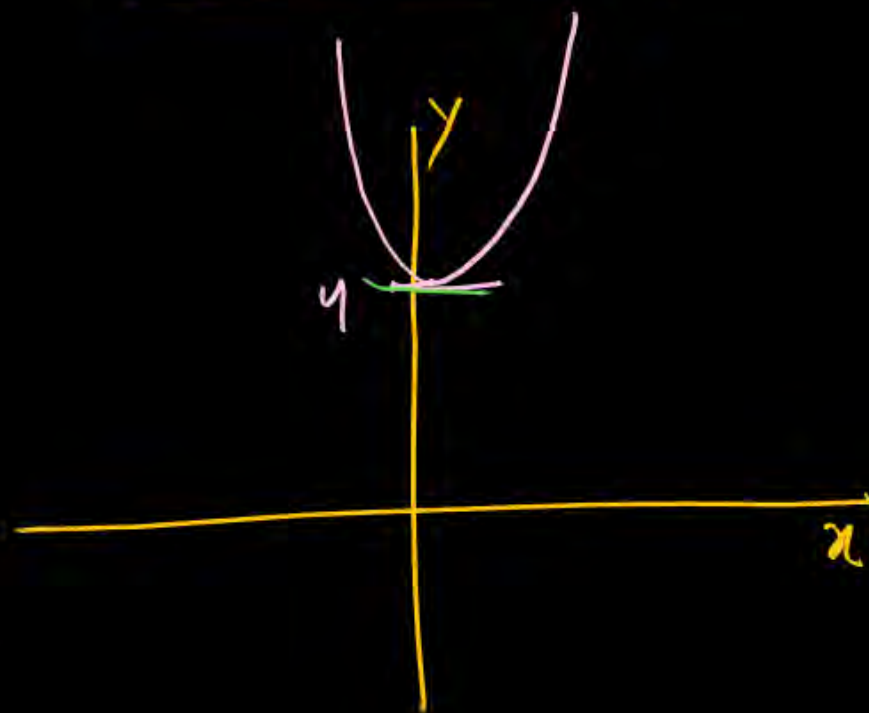
$$y = x^2$$



$$y = -(x^2)$$

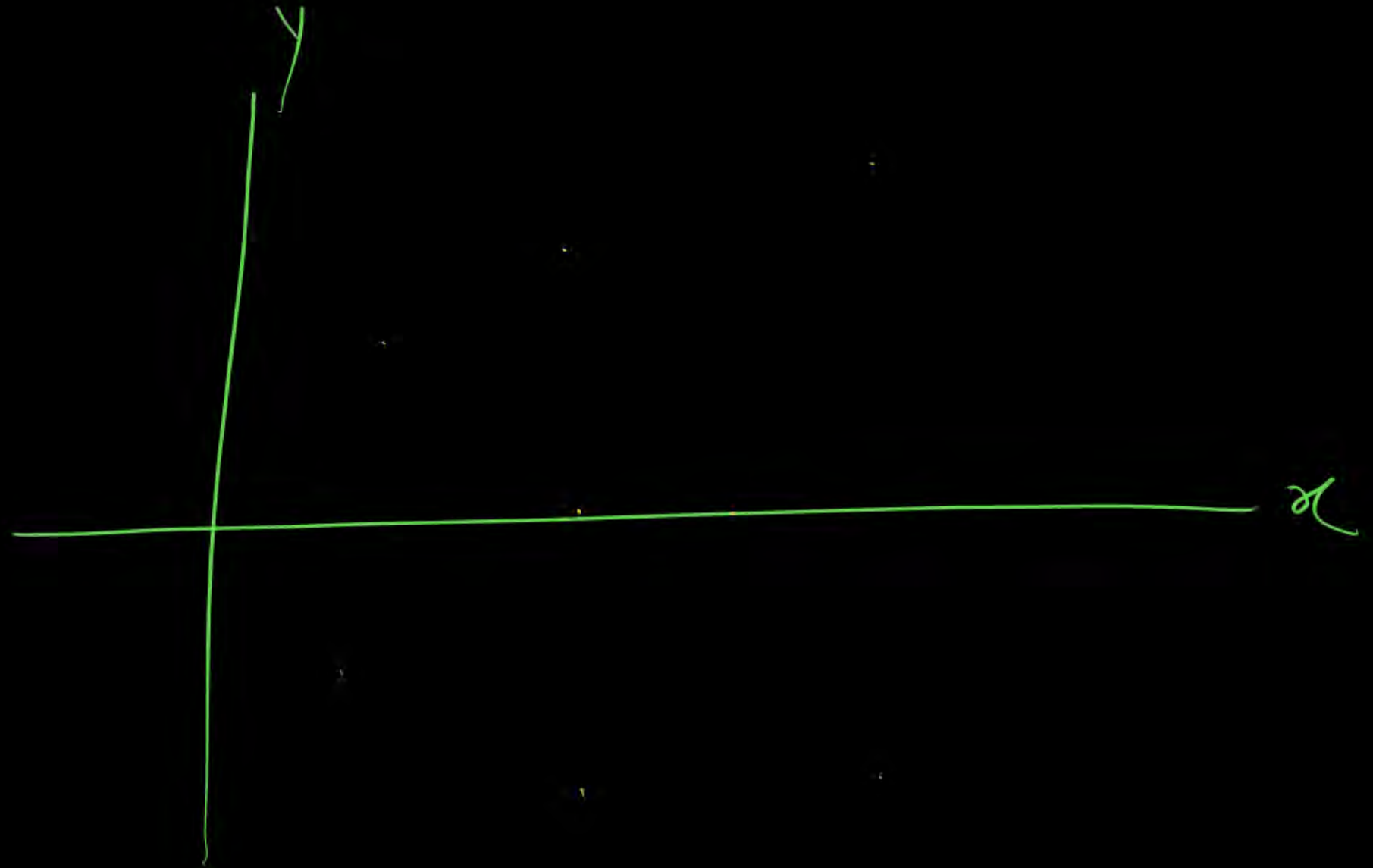


$$y = x^2 + 4$$



$y = \sqrt{x}$

y	x
	0
	1
	4
	9
	16



$\sqrt{4} = \pm 2$

hint
Ex



H/W

THANK
YOU