YAKEEN NEET 2.0

2026

Basic Maths and Calculus (Mathematical Tools)

Physics

Assignment Solution 03

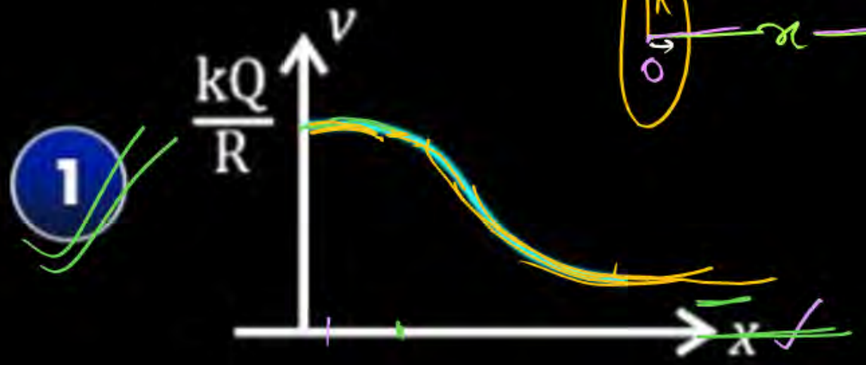
By- Manish Raj (MR Sir)

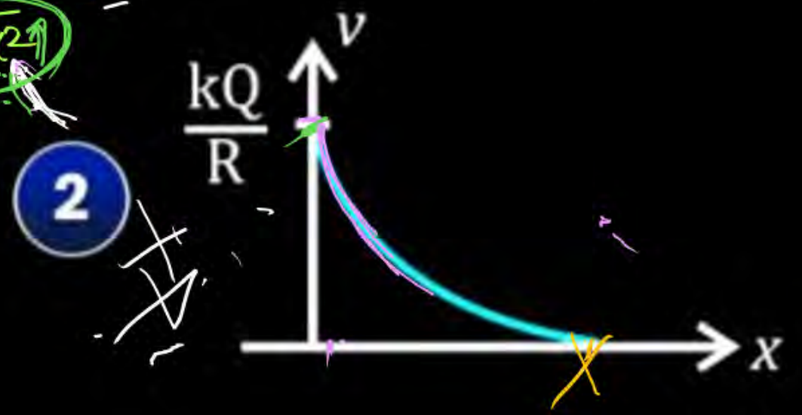
Sangharsh assignment - 03

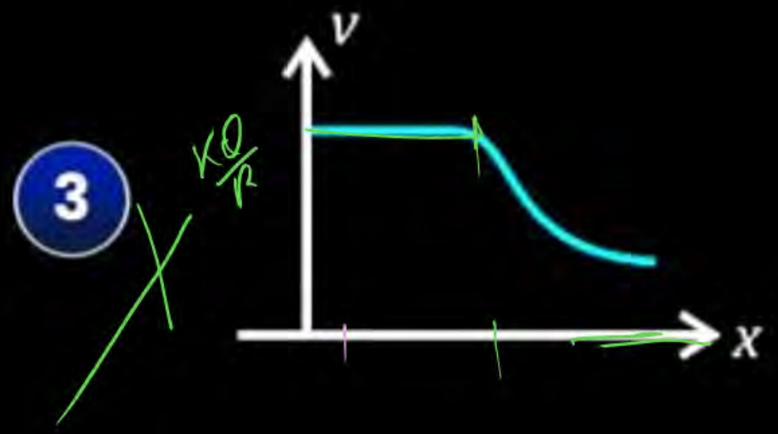
Solution

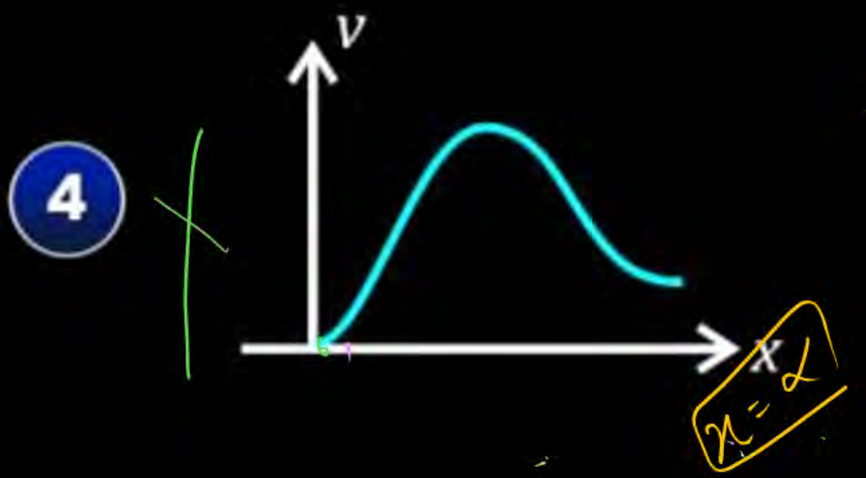
Question

The electric potential due to a uniformly charged ring at axial point can be given by formula $V = \frac{kQ}{\sqrt{R^2+x^2}}$, which of the following is correct V vs x graph









mR*
If x = 0
$\{V = \frac{KQ}{R}\}$ ✓
If (x <<<< R)
$V = \frac{KQ}{R}$

If x >>> R
R = 10m
x = 50m
$V = \frac{KQ}{x}$
$V \propto \frac{1}{x}$

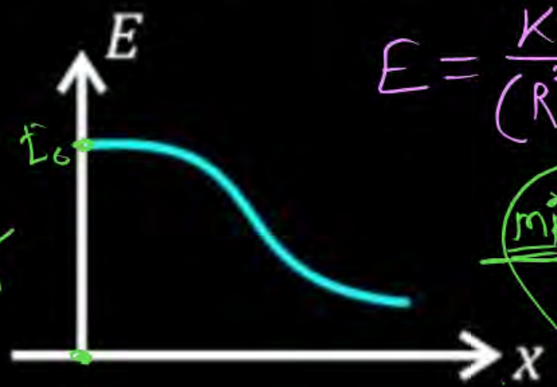
Question

$V = \frac{KQ}{\sqrt{R^2+x^2}}$

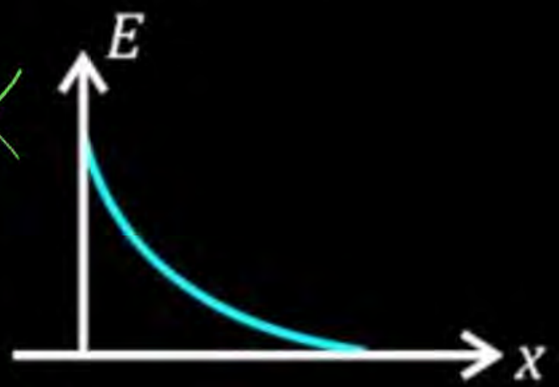
The electric field due to a uniformly charged ring at axial point can be given by formula $E = \frac{kQx}{(R^2+x^2)^{3/2}}$, which of the following is correct E vs x graph

$E = \frac{KQx}{(R^2+x^2)^{3/2}}$

1



2

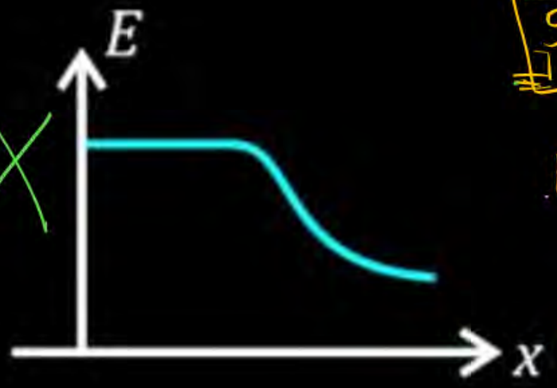


If $x = 0$

$E = \frac{KQ \times 0}{(R^2+0)^{3/2}} = 0$

Assign → 4

3



If $x >>> R$

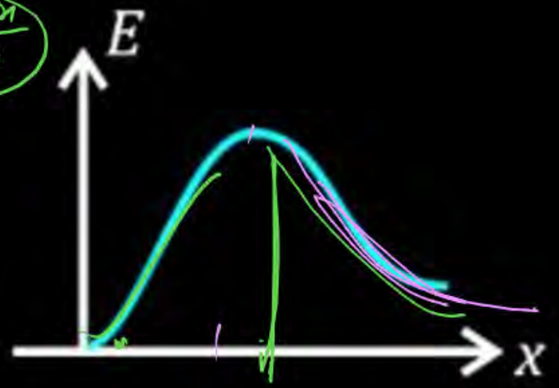
$E = \frac{KQx}{(x^2)^{3/2}} = \frac{KQ}{x^2}$

($x = \infty$, $E = 0$)

$x <<< R$

$E = \frac{KQx}{R^3}$

4



$$E = \frac{KQx}{(R^2 + x^2)^{3/2}}$$

If $x = 0$

$E = 0$

$x \ll\ll\ll R$

$$E = \frac{KQx}{R^3}$$

$E \propto x$

$x \gg\gg\gg R$

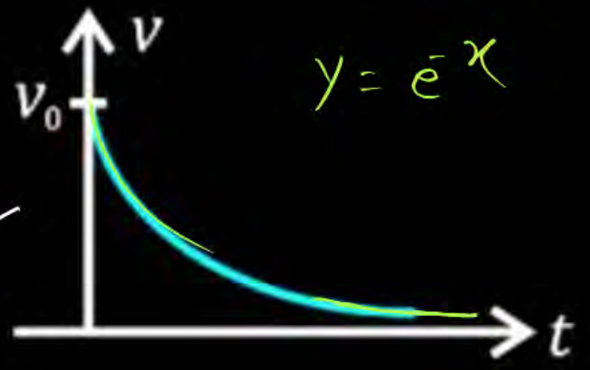
$$E = \frac{KQ}{x^2}$$

Question

$e^0 = 1$
$e^{\alpha} = \alpha$
$e^{-\alpha} = 0$

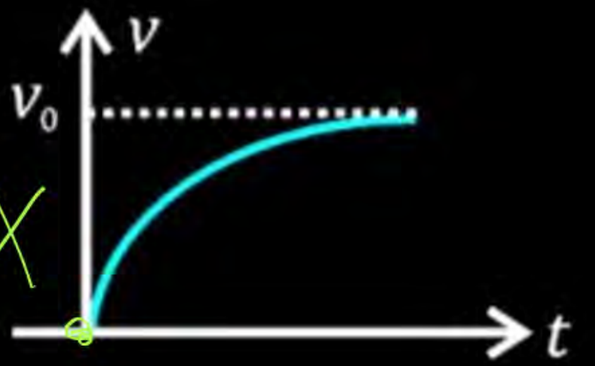
Voltage of a discharging capacitor in RC circuit can be given as $V = V_0 e^{-t/}$, which of the following is correct V vs t graph

1



$y = e^{-x}$

2



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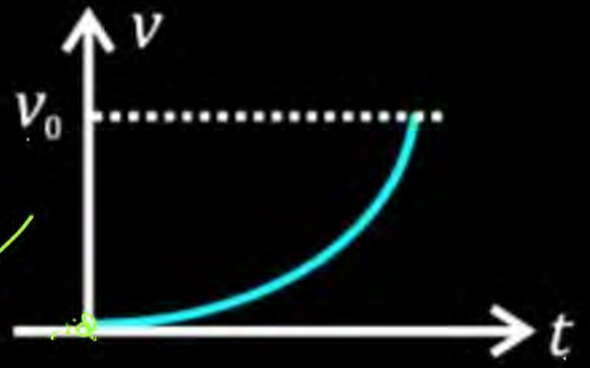
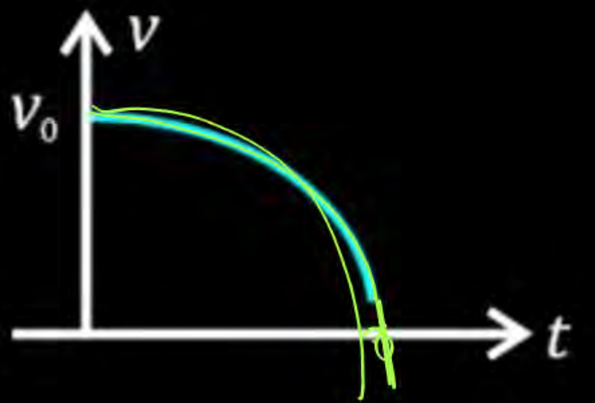
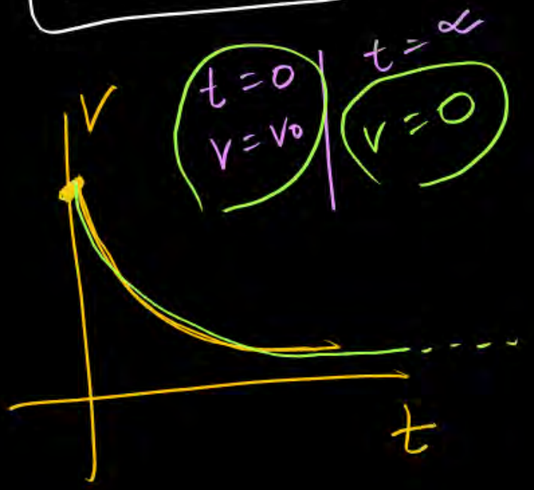


4



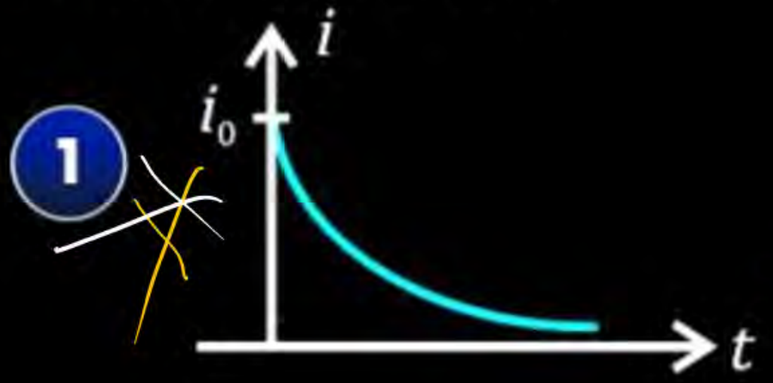
$V = V_0 e^{-t/2}$

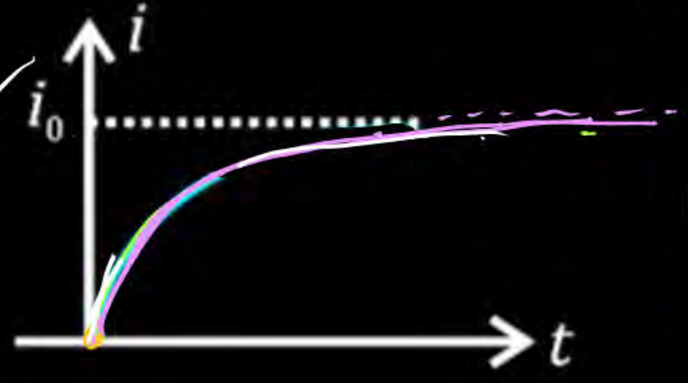
$v \propto e^{-t}$



Question

Current through a charging capacitor in RC circuit can be given by formula $i = i_0\left(1 - e^{-t/2}\right)$ where i is current and t is time, which of the following is correct i vs t graph





$I = I_0\left(1 - e^{-t/2}\right)$

if $2 = 1$

$I = I_0\left(1 - e^{-t}\right)$

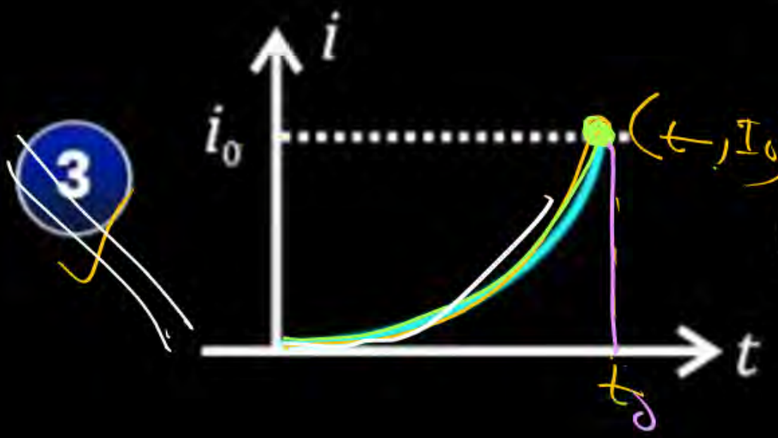
↓ diff^n wrt time

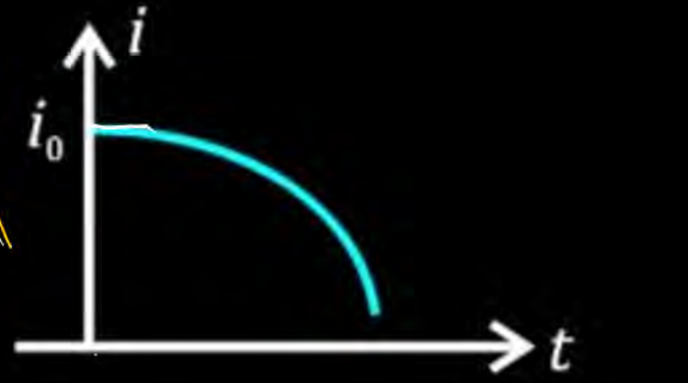
$\frac{dI}{dt} = I_0\left(0 + e^{-t}\right)$

$\frac{dI}{dt} = I_0 e^{-t}$ = slope

$t = 0$ | $I = 0$

$t = \infty$ (infinite) | $I = I_0\left(1 - e^{-\infty}\right)$ | $I = I_0$ at $t = \infty$





Question

Which of the following represents correctly for γ vs θ for the function

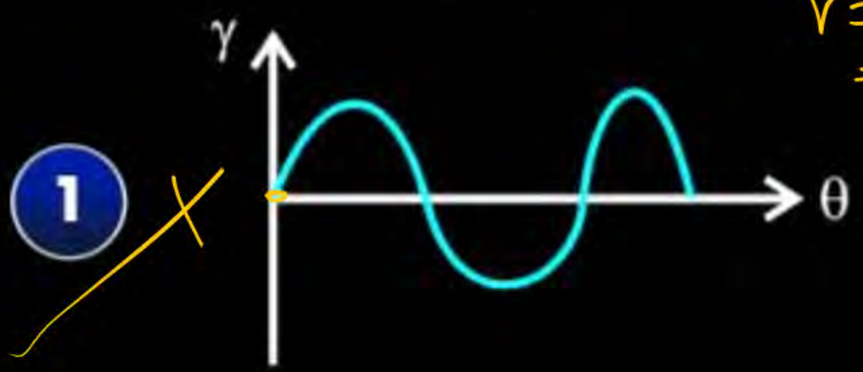
$\gamma = 5 \sin(\theta + 30°)$

$m R^*$ $\theta = 0$

$\gamma = 5 \sin(30)$

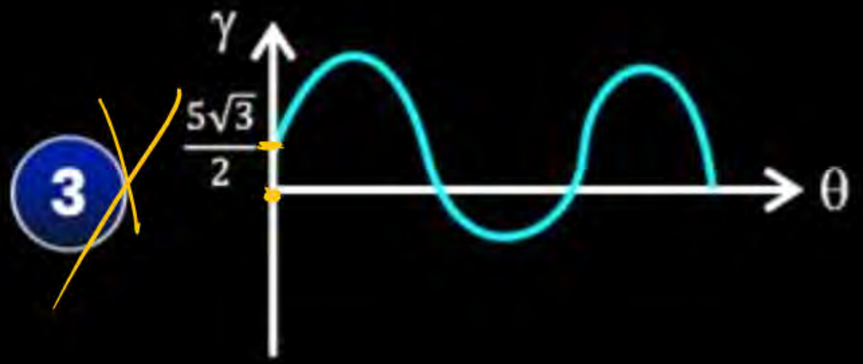
$= 5 \times \frac{1}{2} = \frac{5}{2}$

1

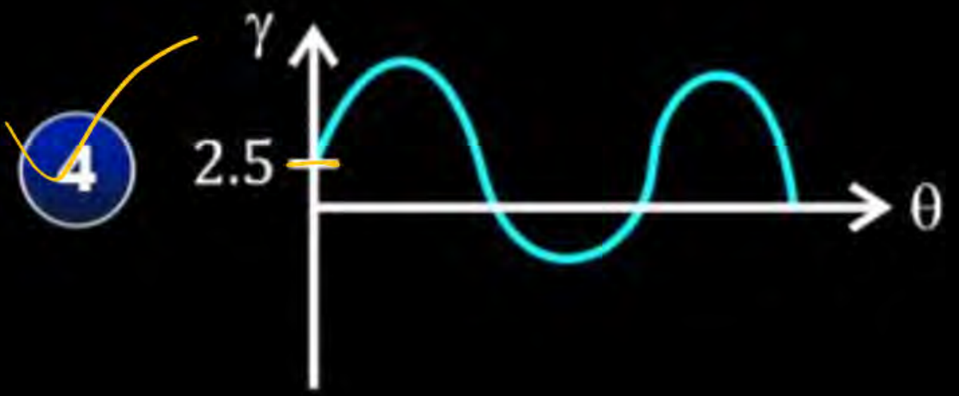


2

3

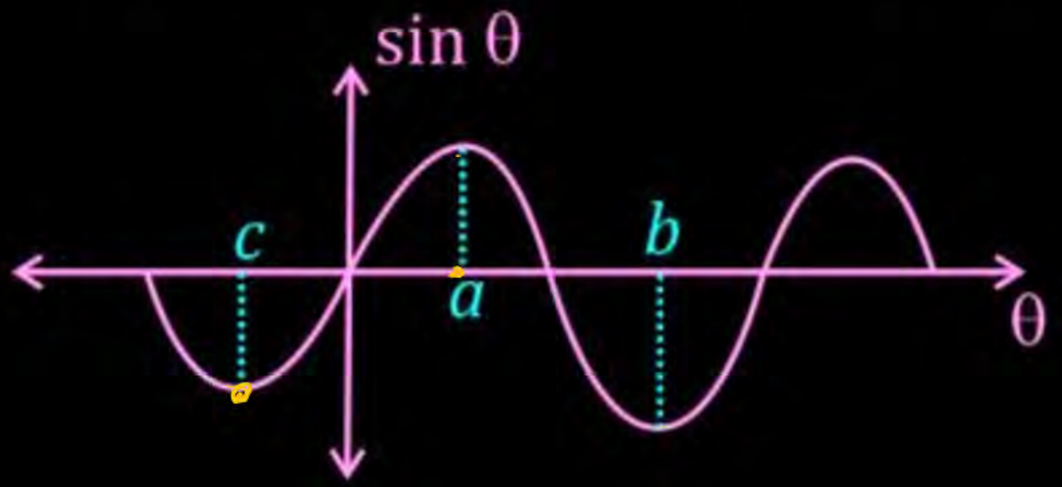


4



Question

$\sin\theta$ vs θ graph is given below find value of a, b and c



$a = \pi/2$

$b = \frac{3\pi}{2} = 2\pi$

$c = -\pi/2$

Question

Displacement time graphs of two moving particles make angles of 30° and 45° with the x-axis as shown in figure, ratio of their respective velocity is

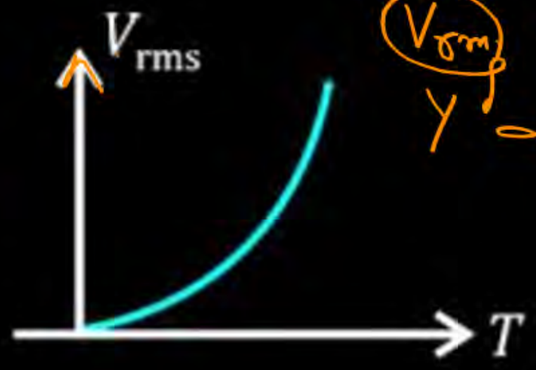
1. $1:\sqrt{3}$
2. $\sqrt{3}:1$
3. $1:1$
4. $1:2$

$\frac{v_1}{v_2} = \frac{\tan 30}{\tan 45} = \frac{1}{\sqrt{3}\times 1}$

Question

Which of the following is correct rms speed vs temperature graph. If they are related as $V_{rms} = \sqrt{\frac{3RT}{M}}$

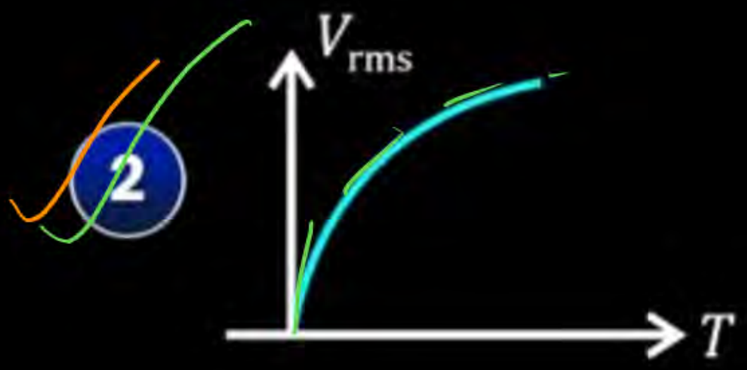
1



$V_{rms} \propto \sqrt{T}$

$Y \propto \sqrt{x}$

2



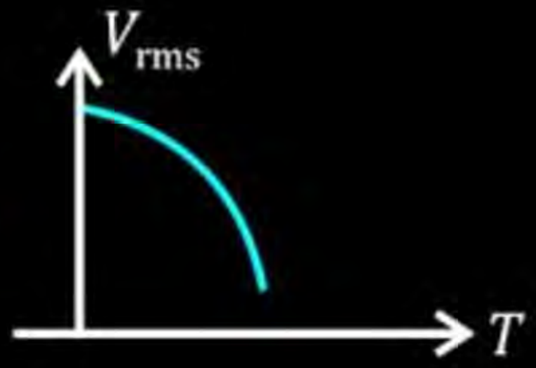
$V = K\sqrt{T}$

$\frac{dv}{dt} = K\frac{1}{2}t^{\frac{1}{2}-1}$

$= K\frac{1}{2}t^{-1/2}$

$\frac{dv}{dt} = \frac{K}{2\sqrt{t}}$

3



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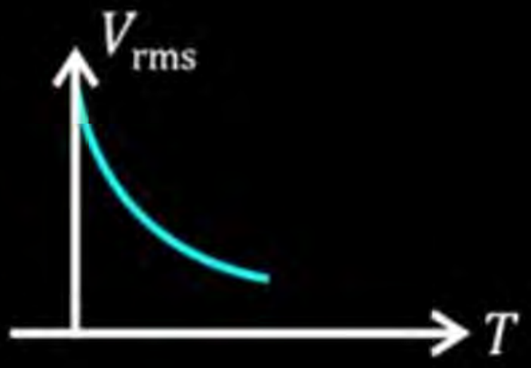


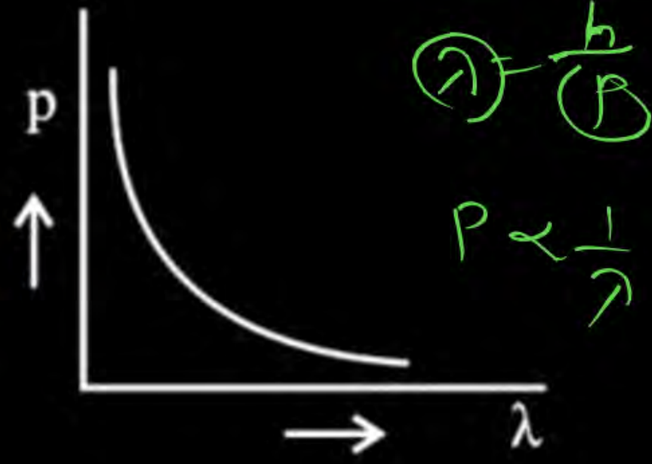
Question

Which of the following figures represent the variation of particle momentum and the associated de-Broglie wavelength? **(2015)**

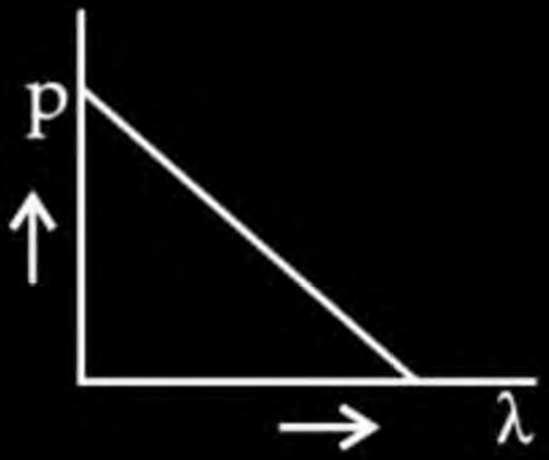
$\lambda = \frac{h}{p}$

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

1



2



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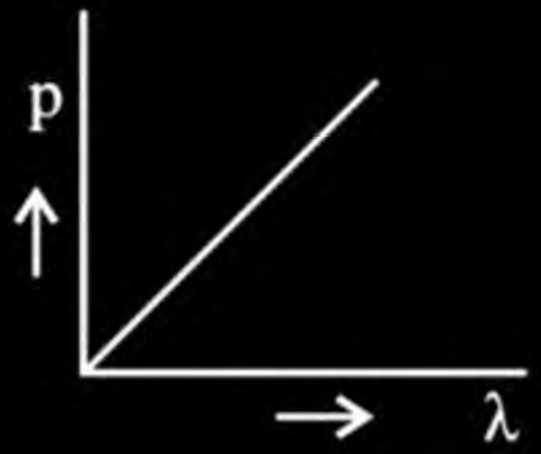

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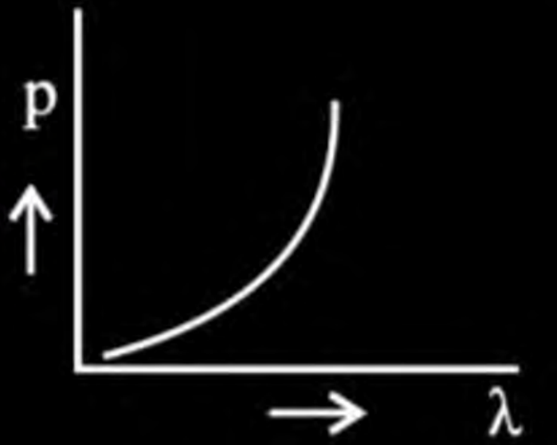
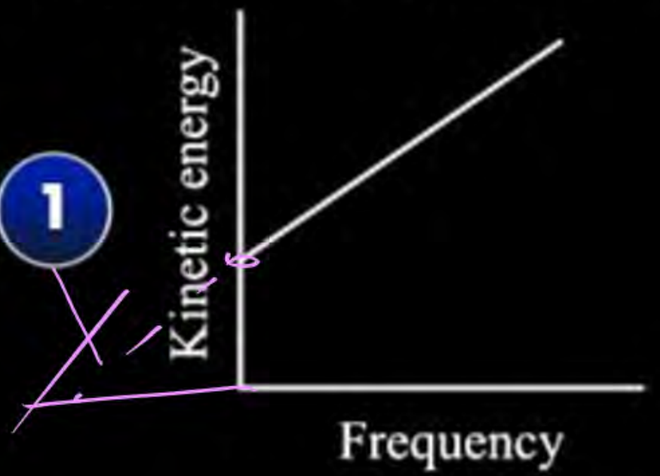


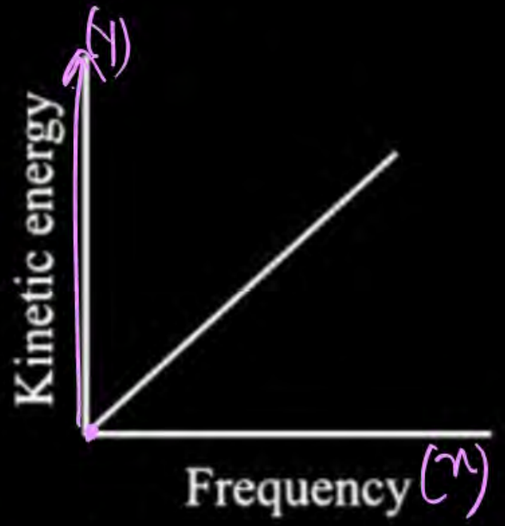
Question

According the Einstein's photoelectric equation, the graph between the kinetic energy of photoelectrons ejected and the frequency of incident radiation is, if they are related as K.E = E – ϕ (E=hf) **(2004)**

1



2



$K.E = E - \phi$

$K.E = hf - \phi$

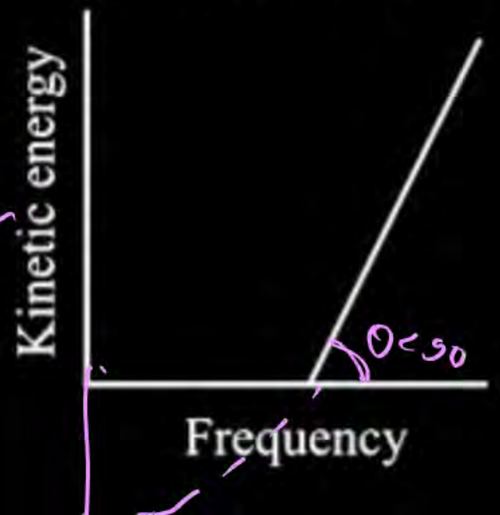
$y = hx - \phi$

(y) (x)

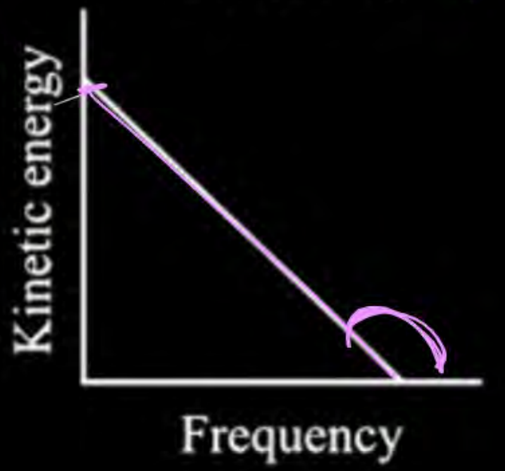
Straight.

$y = mx + c$

3



4



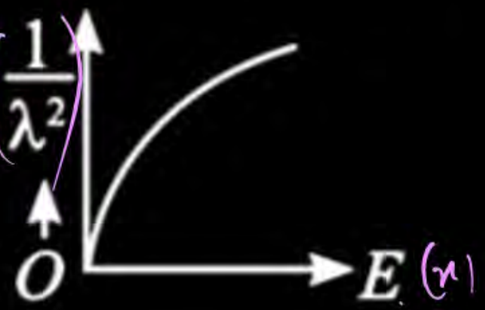
Question

JEE-2023

The graph which shows the variation of $\frac{1}{\lambda^2}$ and its kinetic energy, E is (where λ is de Broglie wavelength of a free particle) and they are related as $E = \frac{h^2}{2m\lambda^2}$

1

2

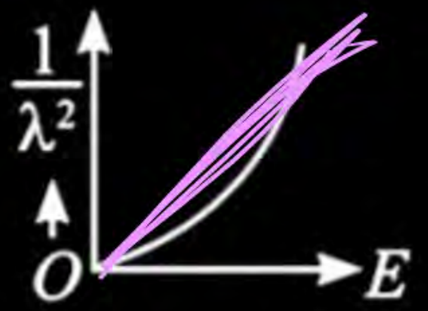


$E = \frac{h^2}{2m\lambda^2}$

$E = \frac{K}{\lambda^2}$

$E = Y$

3

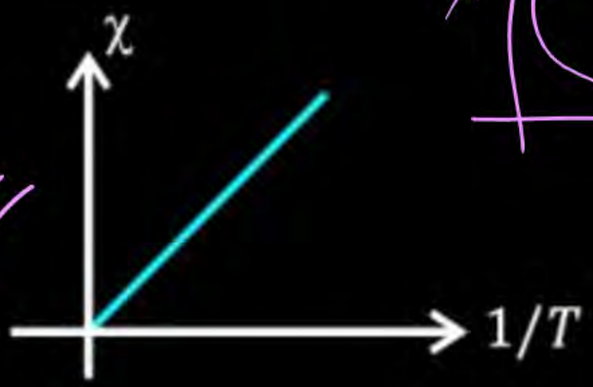


4

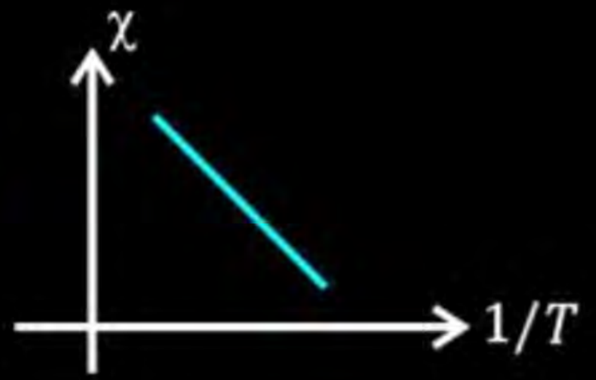
Question

The variation of susceptibility χ with absolute temperature T for a paramagnetic material is related by $\chi \propto \frac{1}{T}$, then which of the following is correct graph.

1

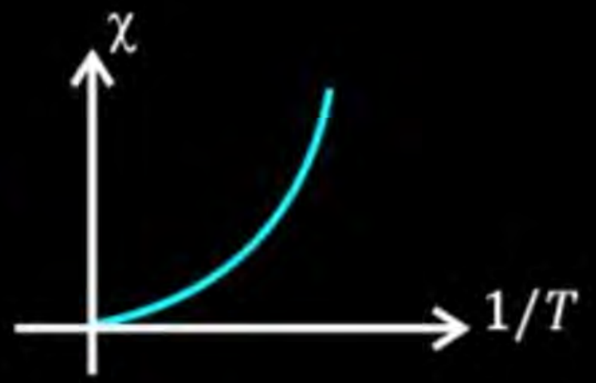


2



3

4



Question

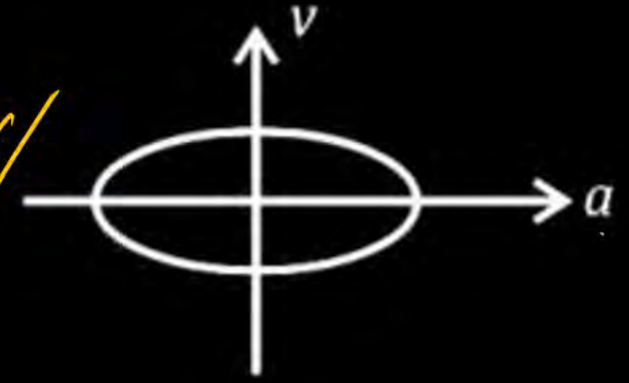
In SHM a particle started from mean position and its acceleration and velocity can be given as $A\omega^2 \sin \omega t$ and $A\omega \cos \omega t$ then correct graph between v and a will be:

$a =$ $\quad v =$

given in question $\Rightarrow$ $\dfrac{a^2}{(A\omega^2)^2} + \dfrac{v^2}{(A\omega)^2} = 1$

↳ ellip.

1



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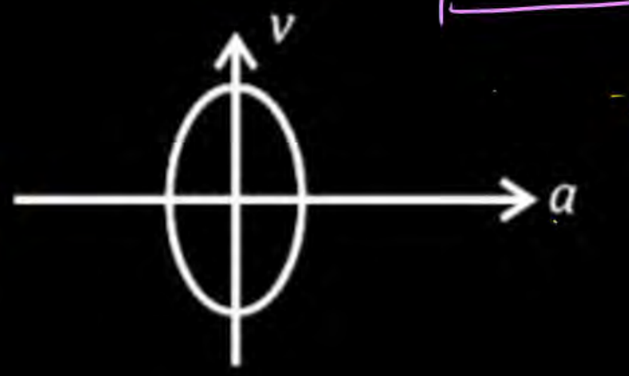
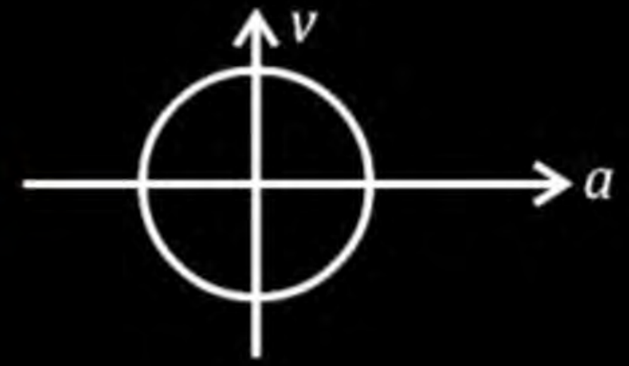


$\dfrac{y^2}{a^2} + \dfrac{x^2}{b^2} = 1$

3



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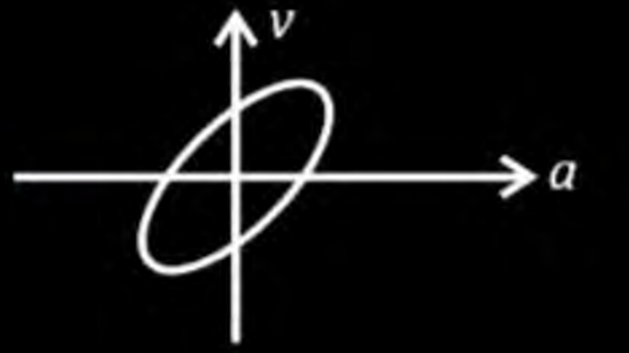
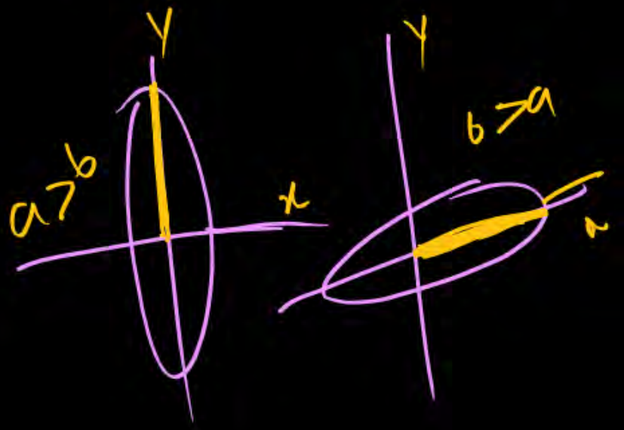




Question

$x = a\sin t, y = a\cos t$ find $\frac{dy}{dx}$

$\frac{dx}{dt} = a\cos t$

1. $\tan t$
2. $\cot t$
3. $-\frac{t}{\cot t}$
4. $-\frac{t}{\tan t}$

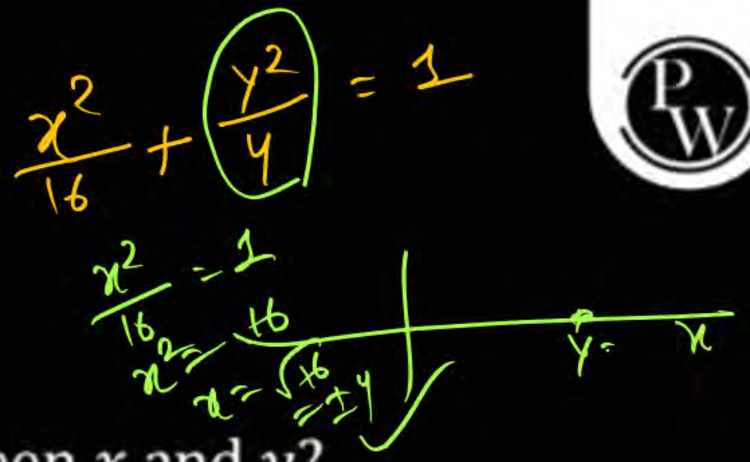
Question

You are given the equation of a curve:

$$\frac{x^2}{16}+\frac{y^2}{4}=1$$

Which of the following correctly represents the graph between x and y?

1. An ellipse centered at origin with major axis along x-axis and x-intercepts at ± 4
2. An ellipse centered at origin with major axis along y-axis and y-intercepts at ± 4
3. A parabola opening along x-axis
4. A circle of radius 4 centered at origin



Question

Two ellipses are given:

Ellipse A: $\frac{x^2}{16} + \frac{y^2}{4} = 1$

Ellipse B: $\frac{x^2}{4} + \frac{y^2}{1} = 1$

Which ellipse has a greater area?

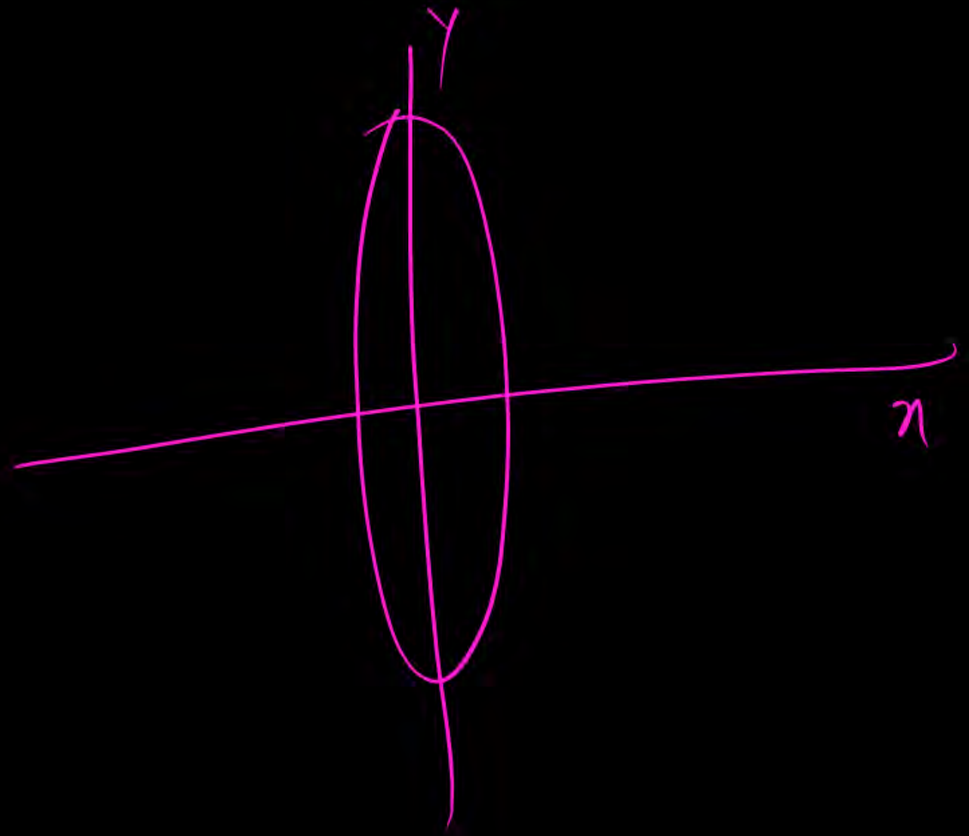
1. Ellipse A
2. Ellipse B
3. Both have same area
4. Can't be determined from given data

$A_E = \pi a b$

Question

Which equation will produce an ellipse that appears taller than it is wide?

1. $\frac{x^2}{9}+\frac{y^2}{25}=1$
2. $\frac{x^2}{25}+\frac{y^2}{9}=1$
3. $\frac{x^2}{16}+\frac{y^2}{16}=1$
4. $\frac{x^2}{36}+\frac{y^2}{36}=1$



Question

The equation $(x-3)^2+(y+4)^2=25$ represents a circle with:

1. Center: (3, 4), Radius: 5
2. Center: (–3, –4), Radius: 25
3. Center: (3, –4), Radius: 5
4. Center: (–3, 4), Radius: 5

$(x-a)^2+(y-b)^2=R^2$

Centre (a,b) Radius $=R$

Question

If the area of a circle represented by $x^2 + y^2 = r^2$ is 49π, what is the correct equation of the circle?

1. $x^2 + y^2 = 49$
2. $x^2 + y^2 = 7$
3. $x^2 + y^2 = 14$
4. $x^2 + y^2 = 154$

$\pi r^2 = 49\pi$

$r^2 = 49$

Question

For the parabola $x^2 = 8y$, find the slope of the tangent at point (x, y).

1. $\frac{4}{x}$
2. $\frac{x}{4}$
3. $\frac{8}{x}$
4. $\frac{x}{8}$

$x^2 = 8y$

$y = \frac{x^2}{8}$

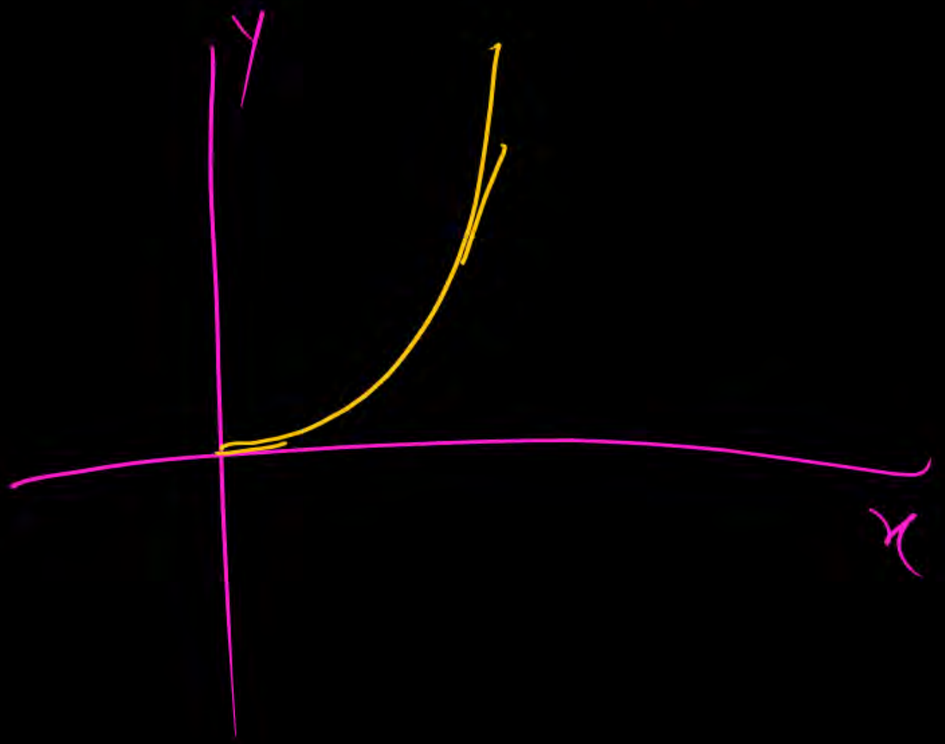
$\frac{dy}{dx} = \frac{2x}{8} = \frac{x}{4}$

Question

In the parabola $x^2 = 4ay$, what happens to the slope of the tangent as the point moves higher (i.e., y increases)?

$y = \frac{x^2}{4a}$

1. Slope increases
2. Slope decreases
3. Slope remains constant
4. Slope tends to zero



Question

Find the slope of the tangent to $y = \frac{1}{x^2+1}$ at $x = 1$.

1. -1
2. $\frac{-2}{(x^2+1)^2}$
3. $-\frac{1}{2}$ ✓
4. $-\frac{1}{4}$

$y = \frac{1}{x^2+1}$ → use divn.

$\frac{dy}{dx} = \frac{0 - 1(2x+0)}{(x^2+1)^2} = \frac{-2x}{(x^2+1)^2}$

$\left|\frac{dy}{dx}\right|_{x=1} = \frac{-2}{4} = -\frac{1}{2}$

Question

For $f(x) = x^3 - 3x$, the function has:

1. One max and one min point
2. No extreme values
3. Two maxima
4. One minimum only

$f = x^3 - 3x$

$\frac{df}{dx} = 0 = 3x^2 - 3$

$3 = 3x^2$

$1 = x^2$

$x = \pm 1$

$|f|_{x=1} = (1)^3 - 3\times 1$

$= 1 - 3 = -2$ min

$|f|_{x=-1} = -1 - 3(-1)$

$= -1 + 3$

$= 2$ ✓

$\frac{df}{dx} = 3x^2 - 3$

$\frac{d^2f}{dx^2} = 6x$

Thank you