YAKEEN NEET 2.0

2026

Basic Maths and Calculus (Mathematical Tools)

Physics

Lecture - 14

By- Manish Raj (MR Sir)

Topics to be covered

1. log continuous
2. Integration
3.
4.

Kitne logo ka backlog hai ??

(a) 50% or less than 50%

(b) 70%.

(c) 80%.

(d) No backlog.

Big update for Yakeen 2.0

for revision & Backlog

Detailed backlog & revision Lecture.

Lecture - 1
4.30 hr

Lecture - 2
3.30 hr

Total 8 hr
(Recorded)

Sanghursh assignment → 2

attached here
Solve it

8-10 question
नहीं होंगे तो
परेशान मत होना
tough है solution
आएगा।

log ⟶ Concept of Power Ko hi log kahte hai.

log

- $\ln x = \log_e x = \log x$ on the Base 'e'
  Natural log.
- $\log x = \log_{10} x = \log x$ on the base 10.

$\log_e x = 2.303 \times \log_{10} x$

↳ MR Rafia

* $\frac{d \log_{10} x}{dx} = \frac{1}{x}$ ✗

* $\frac{d \log_e x}{dx} = \frac{1}{x}$ ✓✓

* $\log_{10} 2 = 0.30$

$\log_{10} 3 \cong 0.48$

MR Rakta

Feel of log (Power)

log ka Concept

Power

Power → $4^3 = 64$

Base, Result

Place of Power & Result is interchanged & Base remains there.

$\log_{(Base)} 64^{4} = 3$ ← Power, Base ka

↳ log 64 on Base 4 is equal to 3.

Concept of Anti-log. (दोनों का Concept)

taking antilog

$4^3 = 64$

@ If $y = \log_e x$ then take anti-log (simple Power ke Concept me likho)

Power

↑ Base

$\Rightarrow e^y = x$

If 5 (Power) $= \log 2^{x}$ then find x.

↳ take (anti log)

$2^5 = x$

$\boxed{x = 32}$ ✓

Rule of Power (Revision)

Rule -1

$\log_y y^y = 1$

$\log_{10} 10^{10} = 1$

$\log_e e^e = 1$

Rule-2

$\log_e (x)^n = n \log_e x$

Rule-4

$\log_{(e)} x^n = \frac{1}{n} \log_e x$

Rule-5

$\log_e (x \cdot y) = \log_e x + \log_e y$

Rule-6

$\log_e \left(\frac{x}{y}\right) = \log_e x - \log_e y$

Rule-7

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

$\log_y x \times \log_x y = 1$

Rule-2

$\log_2 1 = 0$

$\log_e (\sin 90) = \log_e 1 = 0$

$\log_e e^{\tan 45} = 0$

$\log_e (\text{fund} \cdot (\theta + \theta)) = 0$

$\log_{10} 1 = 0$ $\quad \log_e 1 = 0$

$2^0 = 1$

$y^0 = 1$

Ex- $\log_{\text{Base}} 3^{27}$ ⇒ (Rule-3)

$$\log_3 (3)^3 = 3 \log_3 3 = 3 \times 1 = \underline{3}$$

$$\log_3 \left(\frac{1}{27}\right) = \log_3 \left(\frac{1}{3^3}\right) = \log_3 3^{-3}$$

$$= -3 \log_3 3$$

$$= -3$$

$$\frac{1}{3} = 3^{-1}$$

$$\frac{1}{3^3} = 3^{-3}$$

Rule-4

$$\log_{(a)} n^x = \frac{1}{n} \log_e x$$ ✓

अपने विभाग से Solve करें

$4^3 = 64$ ✓

$$\log_{64} 4^y = x \quad (1)$$

using Rule ⇒ 4

$$\log_{(43)} 4^y = \frac{1}{3} \log 4^y = \frac{1}{3}$$

$$64^x = 4$$

$$(4^3)^x = 4$$

$$4^{3x} = 4^1$$

$$3x = 1$$

$$x = 1/3$$ ✓

$$\log_{64}^{16} = ??$$

$$\log_{4^3}(4)^2 = \frac{2}{3}\log 4^4 = \frac{2}{3}$$ Ans

find value of $\log_e 2 = ??$

$\Rightarrow \log_e 2 = 2.303 \log_{10} 2$

$= 2.303 \times 0.30$

$= \underline{0.690}$

MR* Box

$\log_{10} 2 = 0.30$

find $\log_e 3 = ??$

$\log_e 3 = 2.303 \times \log_{10} 3$

$= \underline{2.303 \times 0.48}$

Work done in in thermodynamics

$$W = nRT \log_e\left(\frac{V_2}{V_1}\right) = 2.303\, nRT \log_{10}\left(\frac{V_2}{V_1}\right)$$

Question

Sound me Padhenge

Loudness of sound at a point is 50 dB then find intensity at that point if $L = 10 \log_{10}\left(\frac{I}{I_0}\right)$ dB where $I_0 = 10^{-12}$ w/m²

1. 10^{-7} w/m²
2. 10^{-5} w/m²
3. 10^{8} w/m²
4. 10^{7} w/m²

Loudness $L = 50$ dB ✓

$I = ??$

* given in question

$$L = 10 \log_{10}\left(\frac{I}{I_0}\right) \text{ dB}$$

$$50 \text{ dB} = 10 \log_{10}\left(\frac{I}{I_0}\right) \text{ dB}$$

$$5 = \log_{10}\left(\frac{I}{I_0}\right)$$

Antilog (exit of concept)

$$10^5 = \frac{I}{I_0}$$

$$I = I_0 \times 10^5$$

$$= 10^{-12} \times 10^5$$

$$= 10^{-12+5}$$

$$= 10^{-7}$$

Question

Loudness of sound at a point is 50 dB then find intensity at that point if $L = 10 \log_{10}\left(\frac{I}{I_0}\right)$ dB where $I_0 = 10^{-12}$ w/m²

1. 10^{-7} w/m²
2. 10^{-5} w/m²
3. 10^{8} w/m²
4. 10^{7} w/m²

$L = 50$ dB — (1)

$I = ?$

(given in question)

$$L = 10 \log_{10}\left(\frac{I}{I_0}\right) \text{ dB}$$

$50 = 10 \log_{10}\left(\frac{I}{I_0}\right)$

$5 = \log_{10}\left(\frac{I}{I_0}\right)$

Anti-log (दोनों तरफ)

$10^5 = \frac{I}{I_0}$

$I = I_0 \times 10^5$

$= 10^{-12} \times 10^5$

$= 10^{-12+5} = 10^{-7}$

Question

Loudness of sound at a point is 50 dB then find intensity at that point if $L = 10 \log_{10}\left(\frac{I}{I_0}\right)$ dB where $I_0 = 10^{-12}$ w/m^2

1. 10^{-7} w/m^2
2. 10^{-5} w/m^2
3. 10^{8} w/m^2
4. 10^{7} w/m^2

$L = 10 \log_{10}\left(\frac{I}{I_0}\right)$

$L = 10\left[\log_{10} I - \log_{10} I_0\right]$

$50 = 10\left[\log_{10} I - \log_{10} 10^{-12}\right]$

$5 = \log_{10} I + 12 \log_{10} 10$

$5 = \log_{10} I + 12$

$5 - 12 = -7 = \log_{10} I$

$10^{-7} = I$

Question

If current flowing through wire is $I = 20\ e^{-\lambda t}$ find the time when current becomes 10 Amp. Where λ is 2.303.

$I = 20\ e^{-\lambda t}$ — given in quest.

$I = 10 \rightarrow t = ??$

$10 = 20\ e^{-\lambda t}$

$\frac{1}{2} = e^{-\lambda t}$

$\frac{1}{2} = \frac{1}{e^{\lambda t}}$

$2 = e^{\lambda t}$

Result

$2 = e^{\lambda t}$ (Power), Base

fukiy (log ka concept)

$\log_e 2 = \lambda t$

$\Rightarrow 2.303 \times \log_{10} 2 = \lambda t$

$2.303 \cdot \log_{10} 2 = 2.303 \times t$

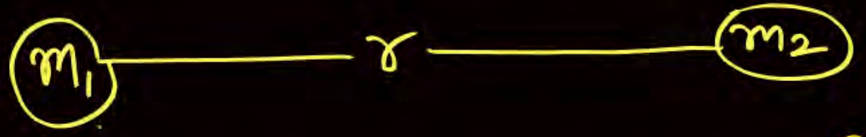
$t = \log_{10} 2 = 0.3$

Question H/W

Loudness at a point is 16 dB where intensity is I then find loudness at a point where Intensity is $I/4$.

where $L = 10 \log_{10}\left(\frac{I}{10}\right)$ dB

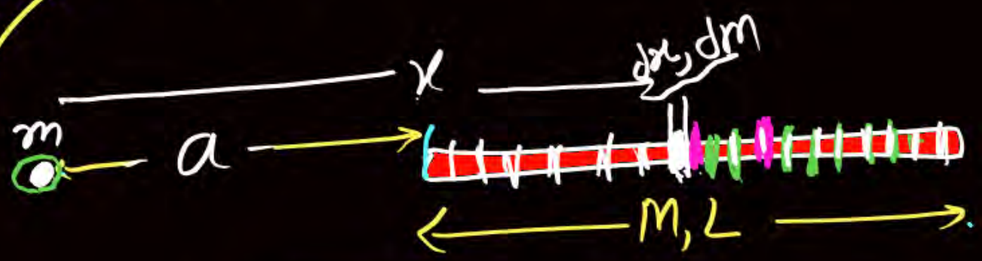
Newtons Law Gravition.



$$F = \frac{G m_1 \times m_2}{r^2}$$ (force B/w Two Point mass)

(Newtons चाचा)

force B/w Rod & Point mass

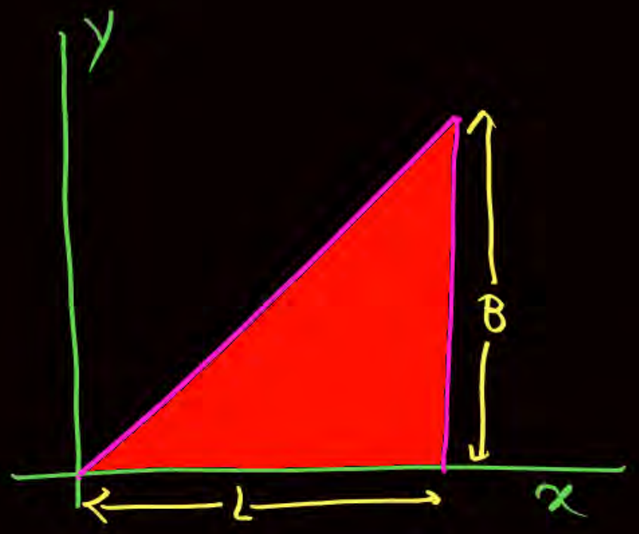


Newtons Law of gravitation is not valid B/w mass & Rod.

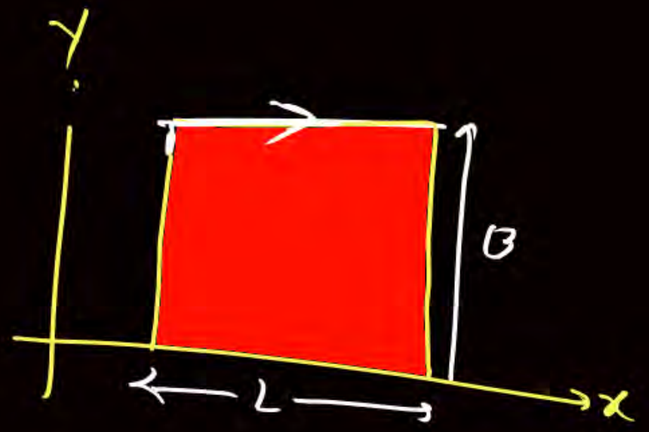
force B/w m & dm

$$dF = \frac{G m\, dm}{x^2}$$

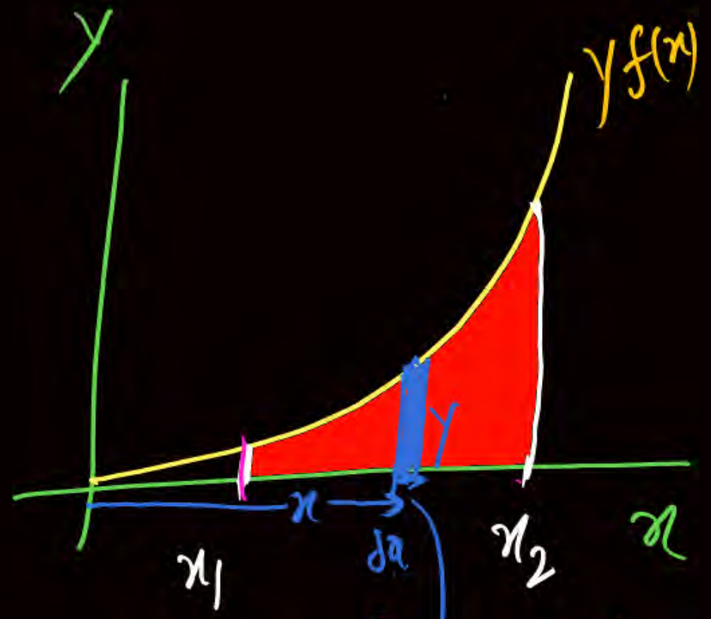
Integration → Method of addition of large infinitly small terms.



Area = $\frac{1}{2} L \times B$



Area under graph (curve) = $L \times B$



Small Area

$$\int dA = \int y\,dx$$

Slope of Graph → diffrentiate → $\frac{dy}{dx}$ = Slope of Point

Area of Graph → $\int y\,dx$ = Integrate of y-w.r.t x

= Area of y-x graph

$$\text{Area} = \int_{x_1}^{x_2} y\,dx$$

= Integrate = Area under curve

Integration Ka operator

$\int y\,dx$ = Integratio of y w.r.t. x

Integration

Indefinite Integrah
No-limit

$\int y\,dx = \text{result} + c$

definite Integration with limit

$\int_{x_1}^{x_2} y\,dx = (\text{result})_{x_1}^{x_2}$

Integration ⟶ Inverse of differentiation

MR Radha

$$\int x^n \, dx = \frac{x^{n+1}}{(n+1)} + C$$

→ Not valid for $n = -1$

Ex $y = x^n$

Ex $y = x^5$

$$\Rightarrow \int x^5 \, dx = \frac{x^{5+1}}{5+1} + C = \frac{x^6}{6} + C$$

differentiate

$$\frac{d\left(\frac{x^6}{6} + C\right)}{dx} = \frac{1}{6}\frac{dx^6}{dx} + \frac{dC}{dx}$$

$$= \frac{1}{6} 6x^5 + 0$$

$$= x^5$$

$y = \sqrt{x}$

$$\int y\,dx = \int \sqrt{x}\,dx = \int x^{1/2}\,dx = \frac{x^{\frac{1}{2}+1}}{\frac{1}{2}+1} = \frac{x^{3/2}}{3/2} = \frac{2}{3}x^{3/2} + C$$

differentiate

$$\frac{2}{3}\frac{dx^{3/2}}{dx} + \frac{dC}{dx}$$

$$= \frac{2}{3} \times \frac{3}{2} x^{3/2-1} + 0$$

$$= x^{1/2} + 0$$

$$= \sqrt{x}\ \checkmark$$

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

$$\int y\,dx = \int \frac{1}{x^2}\,dx = \int x^{-2}\,dx = \frac{x^{-2+1}}{-2+1} = \frac{x^{-1}}{-1} = -\frac{1}{x^1} + c$$

$$= -\frac{1}{x} + c$$

(#) $$\int \frac{1}{x^3}\,dx = \int x^{-3}\,dx = \frac{x^{-3+1}}{-3+1} + c$$

$$= \frac{x^{-2}}{-2} + c = -\frac{1}{2x^2} + c$$

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

\# $$\int \frac{1}{x}\,dx = \int x^{-1}\,dx = \frac{x^{-1+1}}{-1+1} = \frac{x^0}{0} = \text{infinit / undefine}$$

Wrong

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

Not valid for $(n = -1)$

$$\frac{d \log_e x}{dx} = \frac{1}{x}$$

Integrate

$$\int \frac{1}{x}\,dx = \ln x = \log_e x$$

(differentiate)

$(\log_e x)$

$$\int \sin\theta \, d\theta = -\cos\theta$$

differentiate

$$\frac{d\tan\theta}{d\theta} = \sec^2\theta$$

* $$\int \cos\theta \, d\theta = \sin\theta$$

diff^{n}

$$\frac{d\sin\theta}{d\theta} = \cos\theta$$

✡ $$\int \sec^2\theta = \tan\theta + C$$

\# $$\int e^x \, dx = e^x$$

diff^{n}

Integration of constant Ex→ $y = 1$.

$$\int y\,dx = \int 1\,dx = \int x^0\,dx = \frac{x^{0+1}}{0+1} = \frac{x^1}{1} = x$$

$$\int dx = x$$

$$\int dy = y$$

$$\int dA = A$$

$$\int d(\text{Ramlu}) = \text{Ramlu}$$

$$\int d(xy) = xy \Longleftarrow$$

$$\int d(\text{PoPu mama}) = \text{PoPu mama}$$

If Some constant is multiplied with variable

$$y = 5x^2$$

$$\int y\,dx = \int 5x^2\,dx = 5\int x^2\,dx = 5\,\frac{x^{2+1}}{2+1} = \frac{5x^3}{3} \checkmark$$

④ If $y = 6$ integrate

$$\int y\,dx = \int 6\,dx = 6\int dx = 6x \checkmark$$

addition Rule of Integration / subtraction Rule (Same as in diff^n)

$$y = e^x + \sin x - x^2 + 4$$

$$\int y\,dx = \int (e^x + \sin x - x^2 + 4)\,dx = \int e^x dx + \int \sin x\,dx - \int x^2 dx + \int 4\,dx$$

$$= e^x - \cos x - \frac{x^3}{3} + 4x$$

Question

If $y = 5$ then integrate if from $x_1 = 2$ to $x_2 = 1$.

$$\int y\,dx = \int_{x_1=2}^{x_2=1} 5\,dx = 5\int_{2}^{1} dx = 5(x)_{x_1=2}^{x_2=1}$$

$$= 5(1-2)$$

$$= 5(-1)$$

$$= -5$$

$$\int_{x_1}^{x_2} y\,dx$$

$$\int_{y_1}^{y_2} x\,dy = ??$$

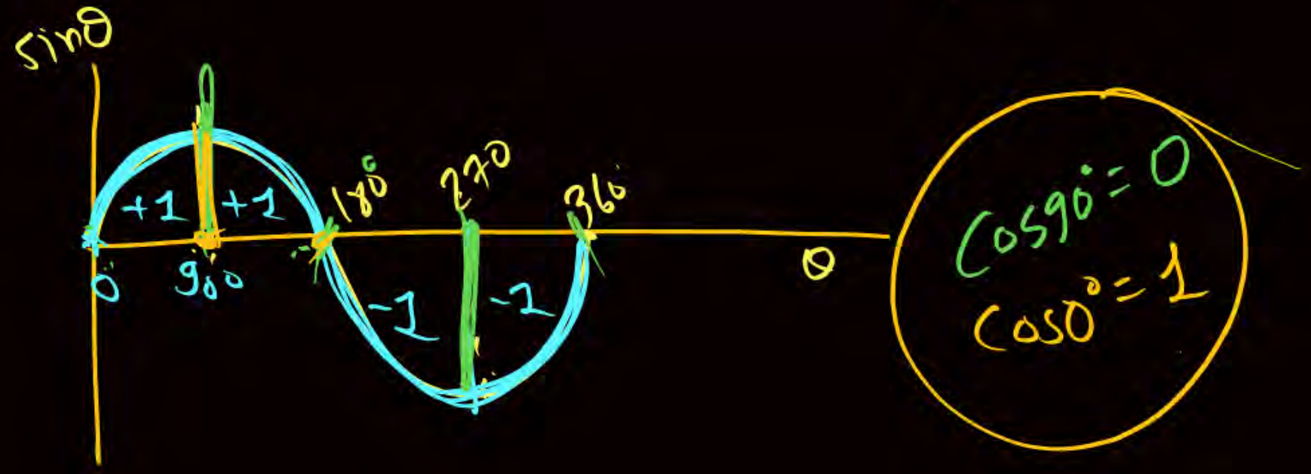
feel hai ...

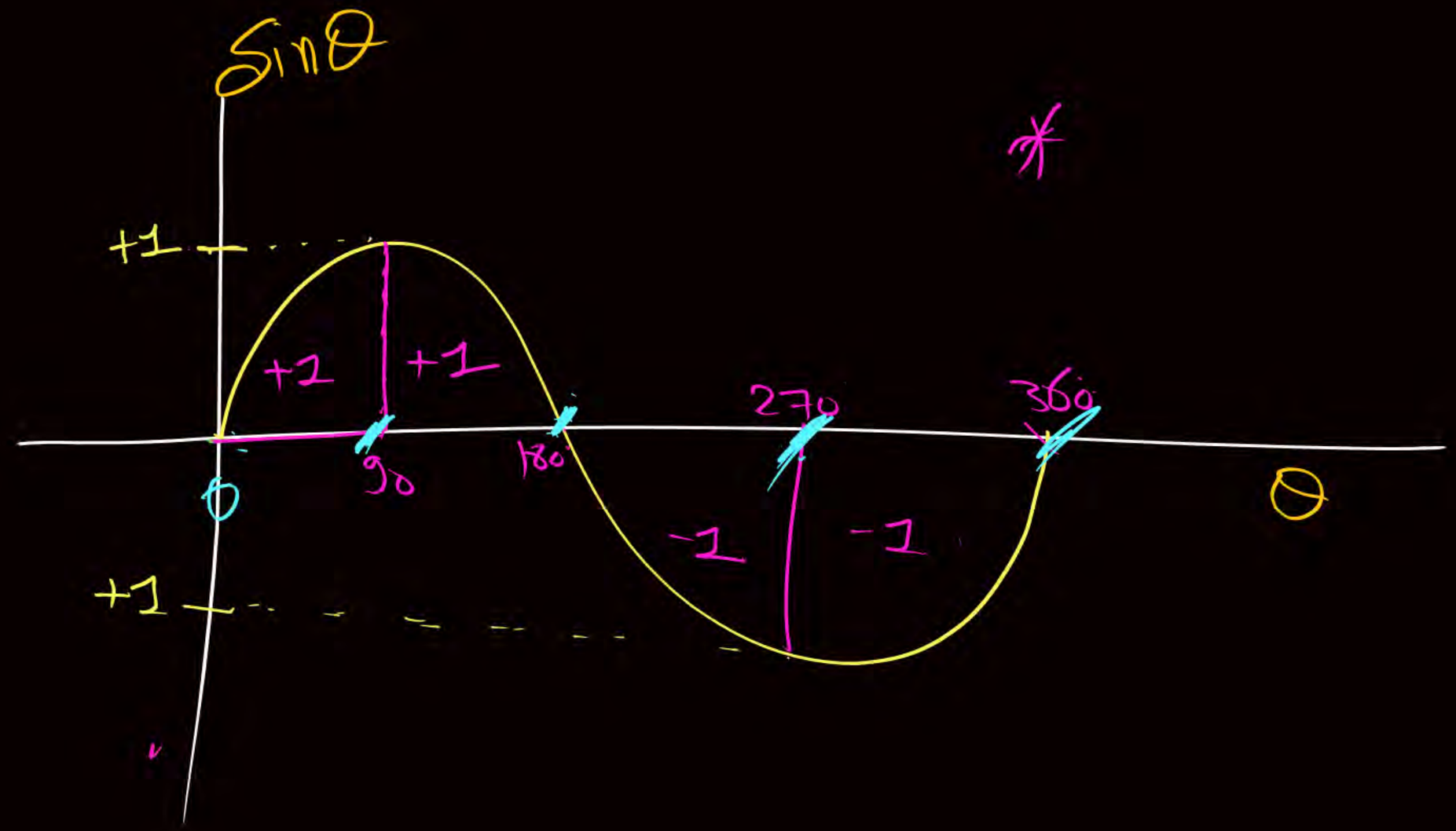
$y = \sin\theta$ integral for $\theta_1 = 0°$ to $\theta_2 = 90°$

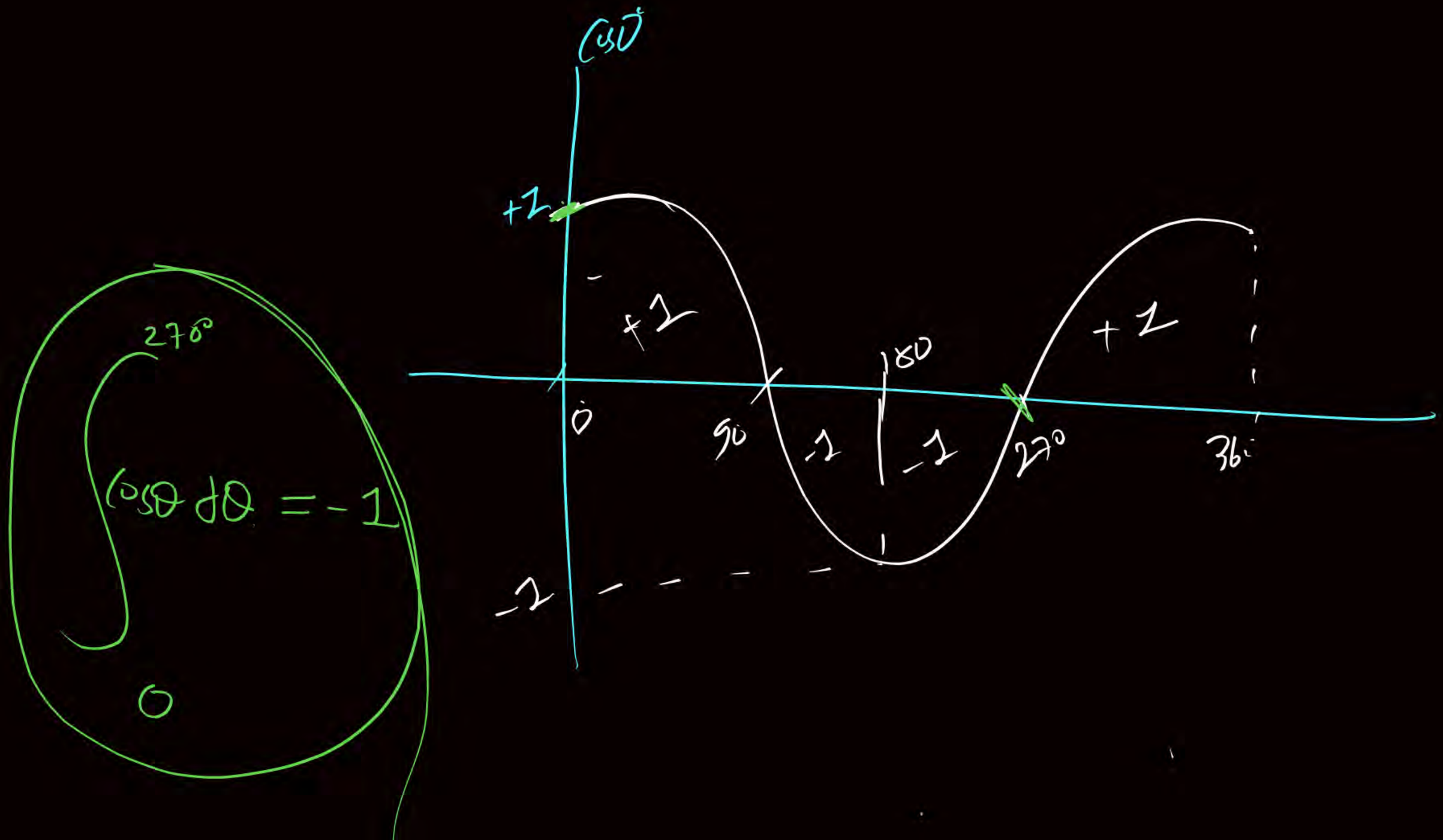
$$\int_{0°}^{90°} \sin\theta \, d\theta = \Big[-\cos\theta\Big]_{\theta_1=0°}^{\theta_2=90°} = -\left[\cos 90° - \cos 0°\right] = -\left[0 - 1\right]$$

$$= +1$$

* $\int_{0°}^{90°} \sin\theta \, d\theta$ → Area of $\sin\theta$/0 gr.




Sin θ
+1
+2
+1
0
90
180
270
360
θ
-1
-1
+1


cosθ
+2
+2
+2
0
90
180
270
360
-2
-1
-1
-2
270°
∫ cosθ dθ = -1
0

$$\int_0^{180} \sin\theta \, d\theta = 2$$

$$\int_{90}^{270} \sin\theta \, d\theta = 0$$

$$\int_{90}^{360} \sin\theta \, d\theta = -1$$

$$\int_{90}^{180} \sin\theta \, d\theta = +1$$

$$\int_{180}^{360} \sin\theta \, d\theta \, d\theta = -2$$

Question

If $y = x^2 + 2$ then find integration from $x_1 = 1$ to $x_2 = 3$.

H/w

Question

$$\int_0^{\pi/2} \sin\theta \, d\theta$$

$$\int_0^{\pi} \sin\theta \, d\theta$$

n/w

Question

$$\int_0^{\pi} \cos\theta d\theta =$$

$$\int_{\pi}^{2\pi} \cos\theta d\theta =$$

Question

$$\int_0^1 e^x dx =$$

$$\int_{-\pi}^{2\pi} \sin\theta d\theta =$$

H/W

Question

$$\int_{\pi/2}^{3\pi/2} \cos\theta \; d\theta =$$

H/w

Question

$$\int_{-\pi}^{+\pi} \sin\theta \; d\theta =$$

H/W

Question

$$\int_0^{2\pi} \sin\theta \; d\theta =$$

H/W

Question

$$\int_{-\pi/2}^{+\pi/2} \cos\theta \; d\theta =$$

H/W

Question

$$\int_0^1 e^x \, dx =$$

H/w

Question

$$\int_0^{\pi/2} (\sin x + \cos x)\, dx =$$

H/W

Question

$$\int_0^{\pi} (\sin x + \cos x)\, dx =$$

H/W

Question

$$\int \frac{Kq_1 q_2}{r^2} dr$$

Find value of this integration where K, q_1 and q_2 are constant.

H/w

Sangharsh assignment

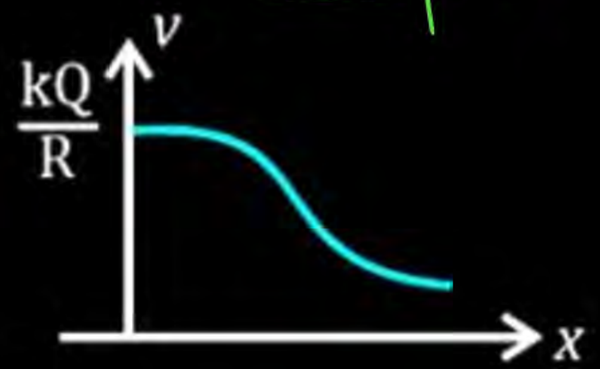
Question

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* → Put value of:
$x_1 = 0$, → find Y_1
$x_2 = 1$, for
$x <<< Radius$

If $x >>> Radius(R)$
Find V

1



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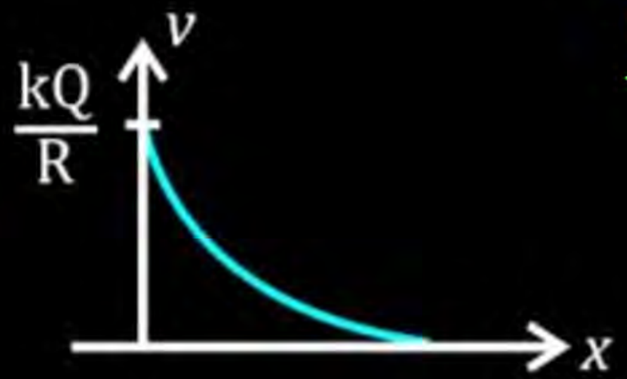

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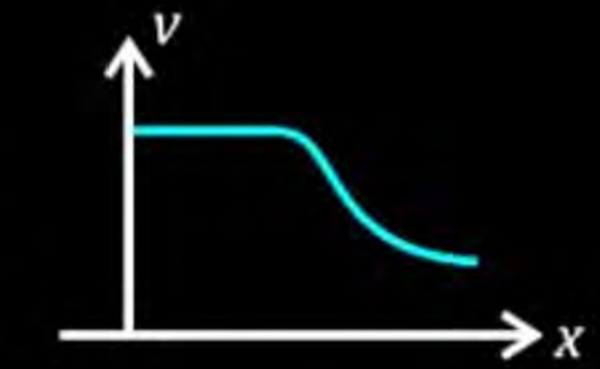

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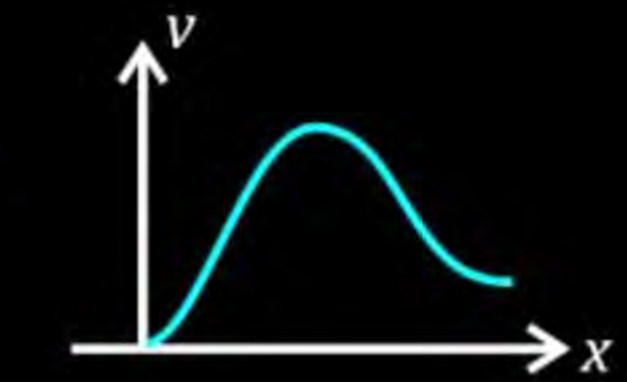
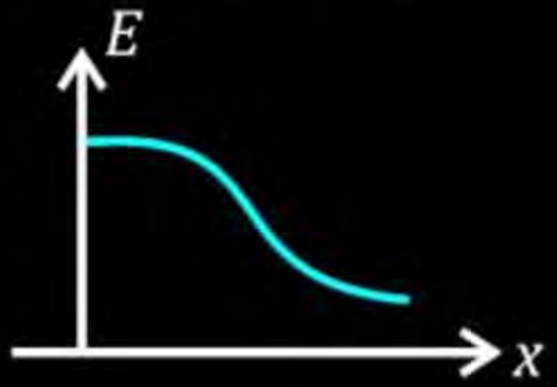


Question

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

1



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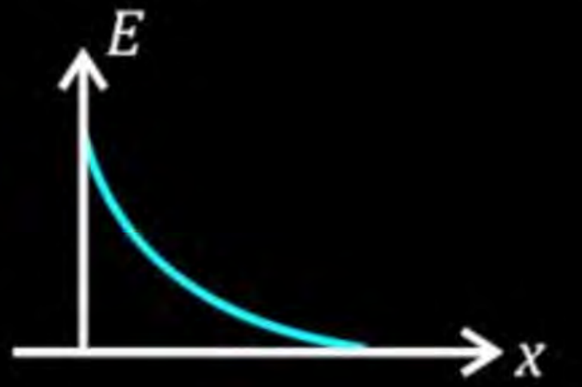

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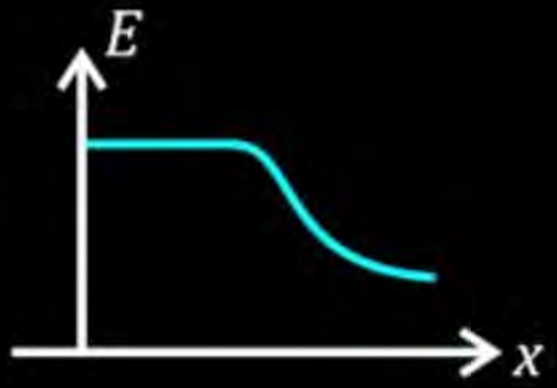

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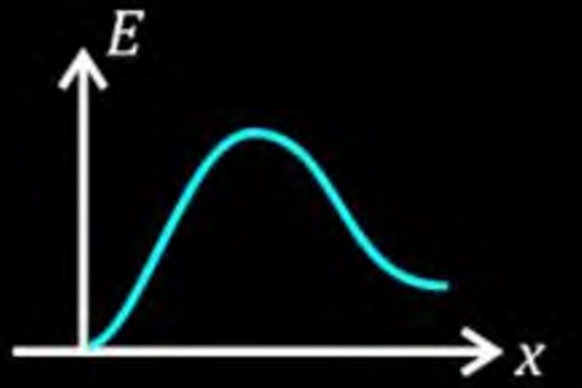
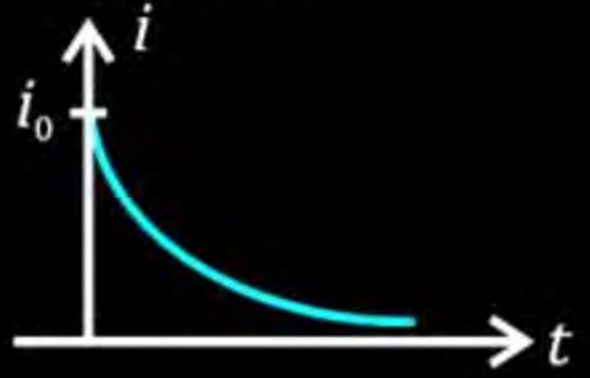


Question

case-1 $t=0 \rightarrow$ find I
case-2 $t=\infty \rightarrow$ find I
case-3 time ↑ then reflect on I

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

1


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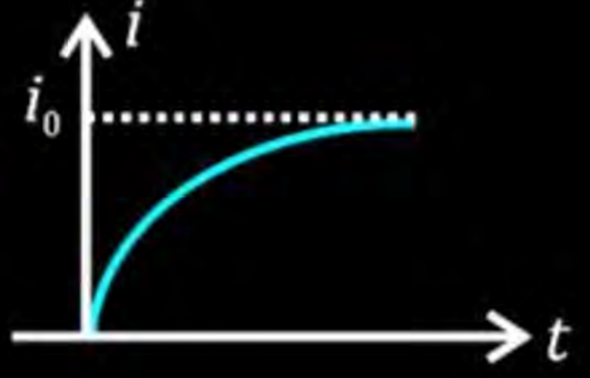
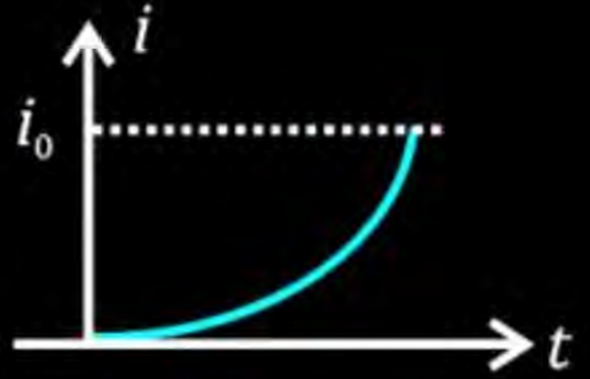


3


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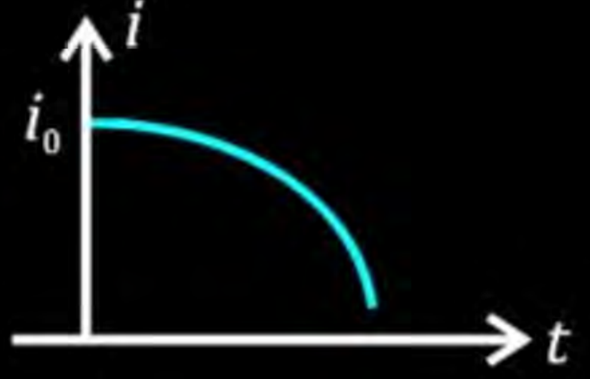
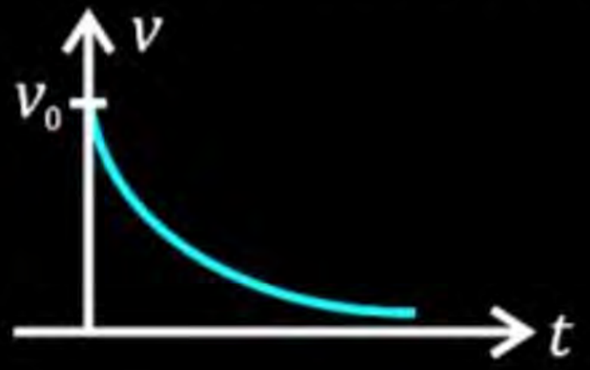


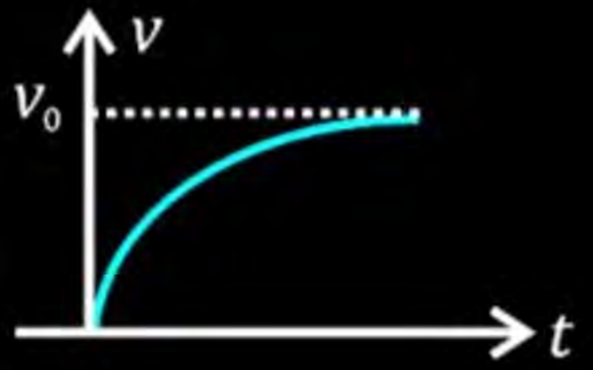
Question

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



2



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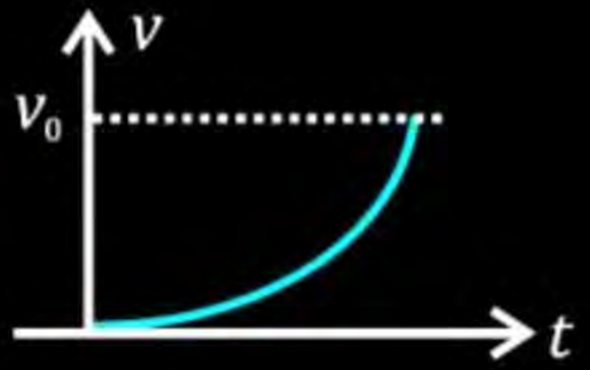

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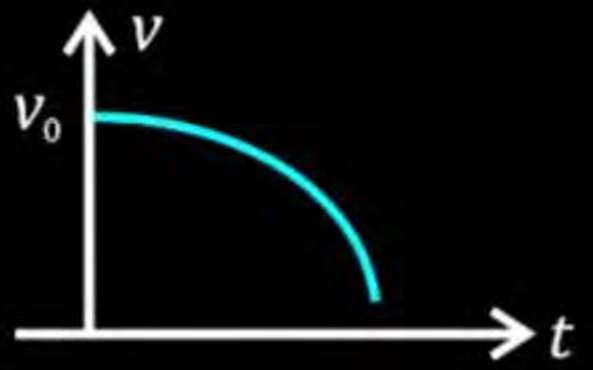
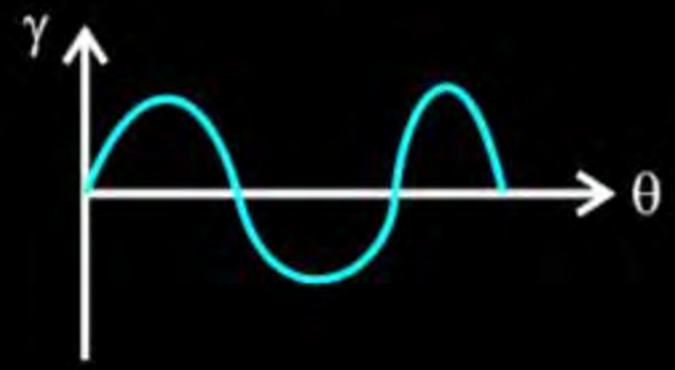


Question

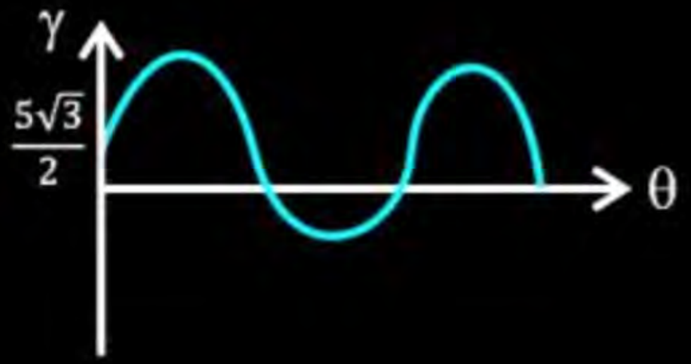
Which of the following represents correctly for γ vs θ for the function $\gamma = 5 \sin(\theta + 30°)$

1

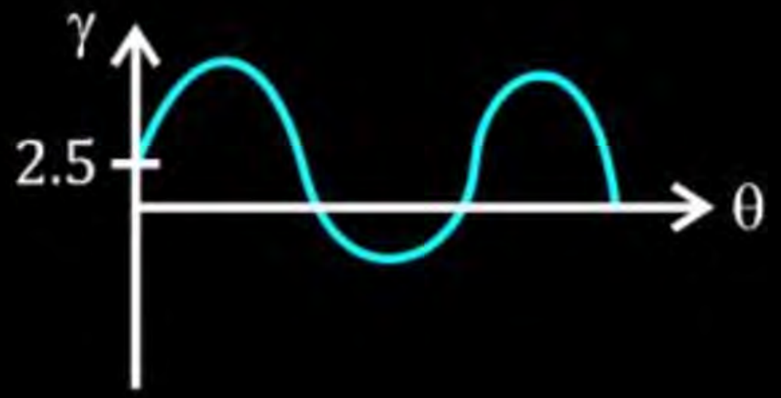


2

3

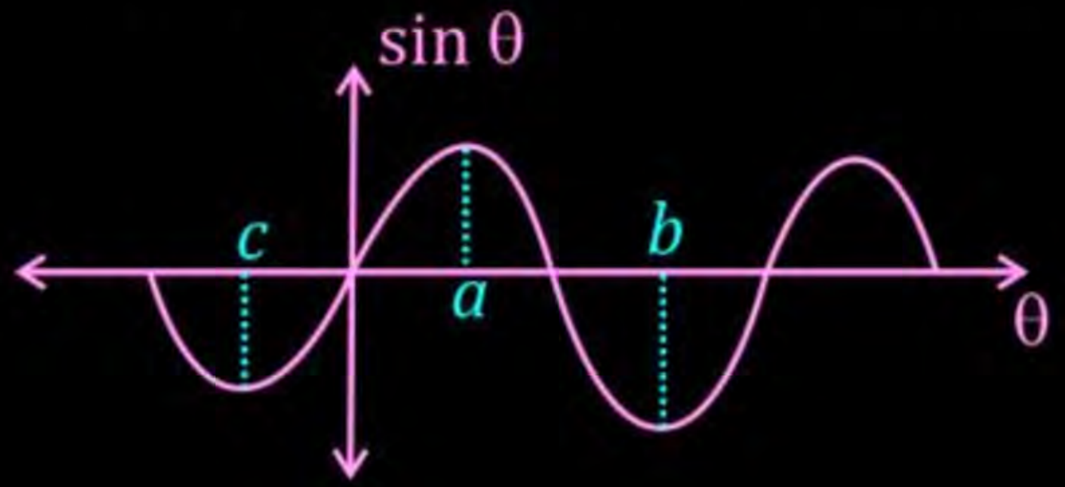


4



Question

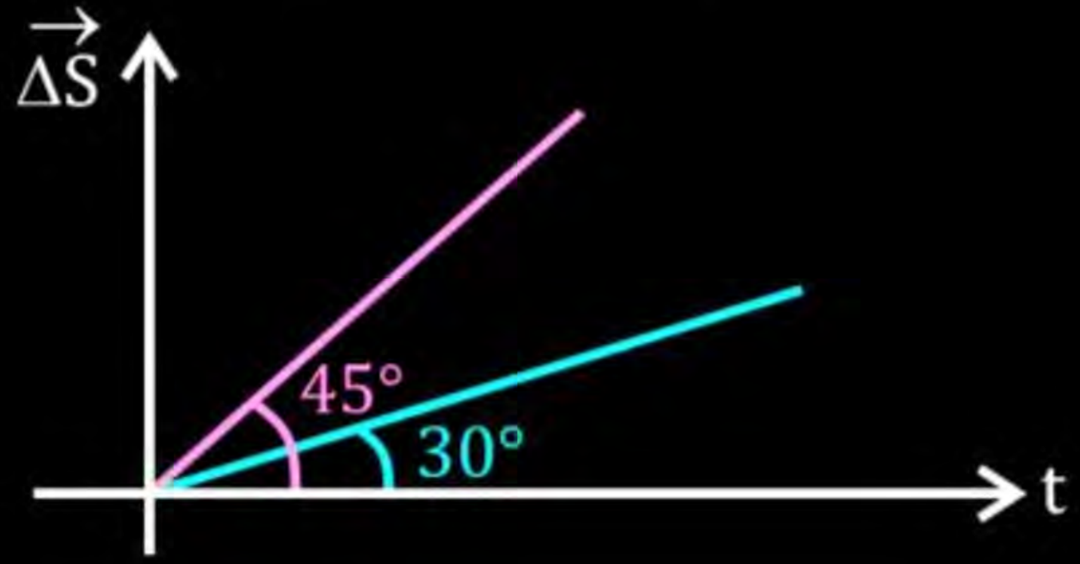
$\sin\theta$ vs θ graph is given below find value of a, b and c



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

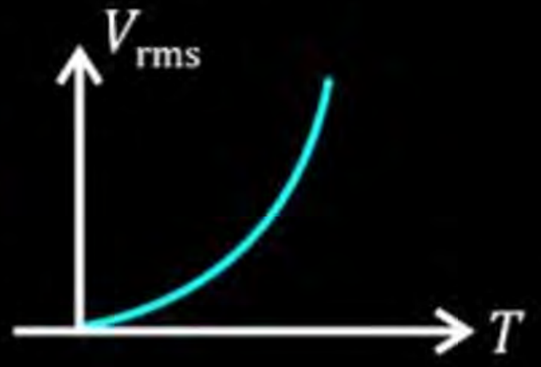
1. $1:\sqrt{3}$
2. $\sqrt{3}:1$
3. $1:1$
4. $1:2$



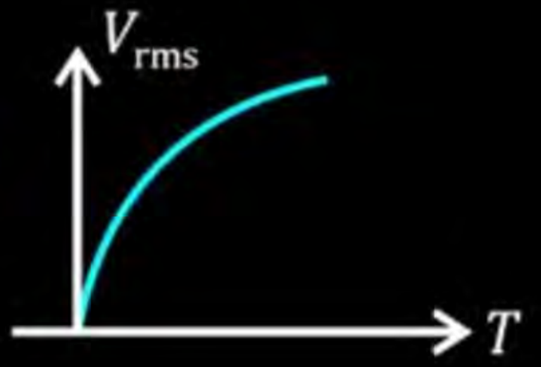
Question

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

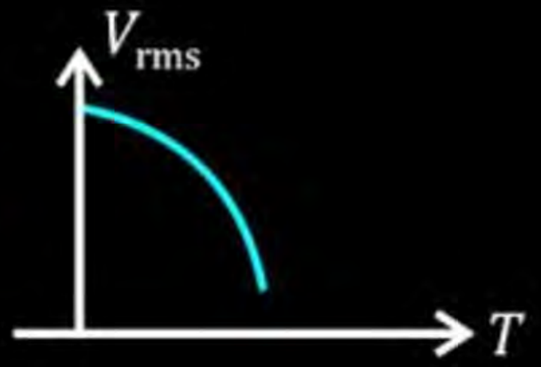
1



2



3



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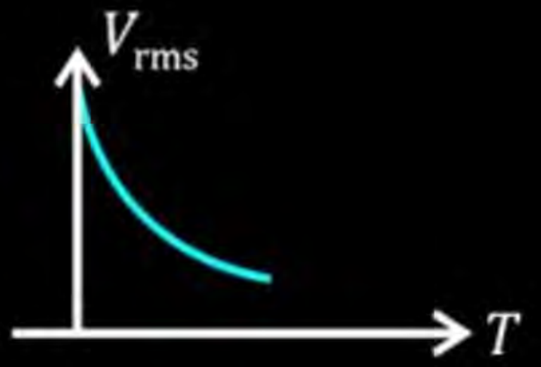
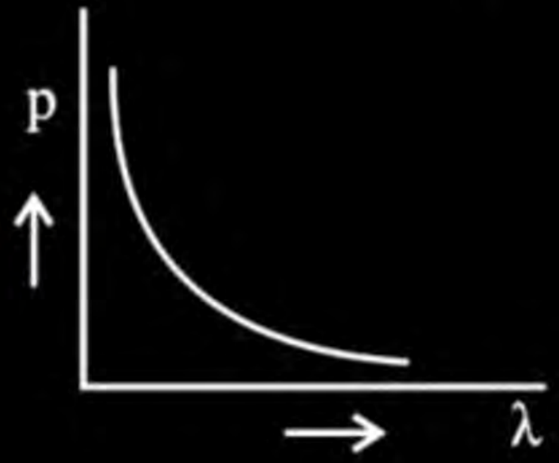
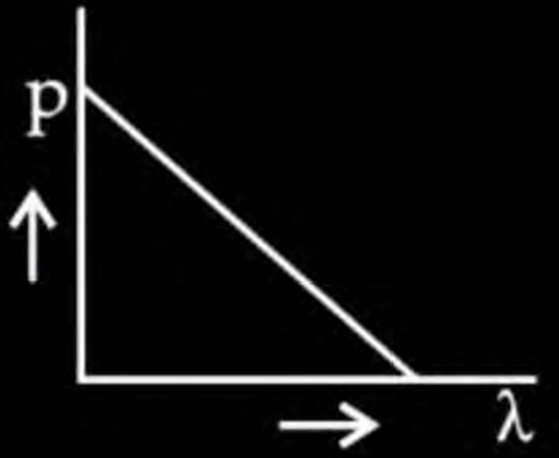
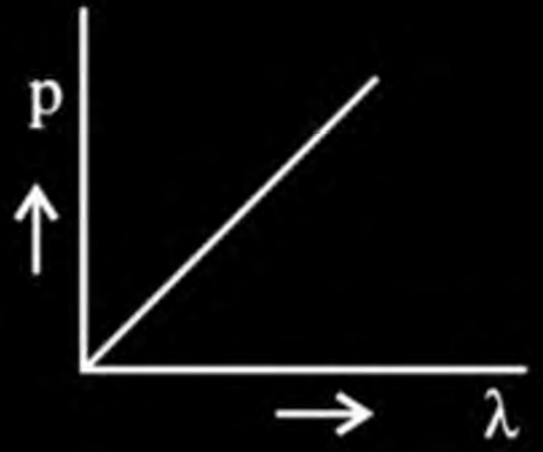


Question

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

1. 

2. 

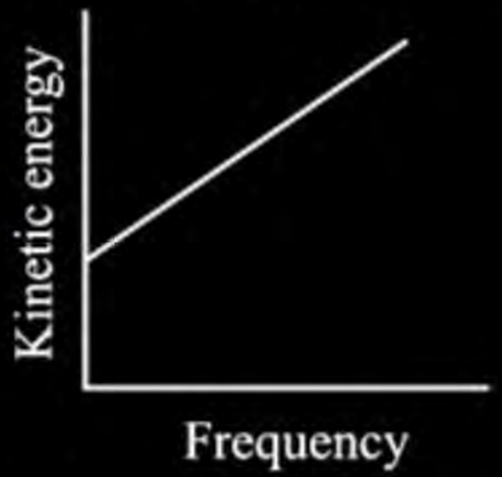
3. 

4. 

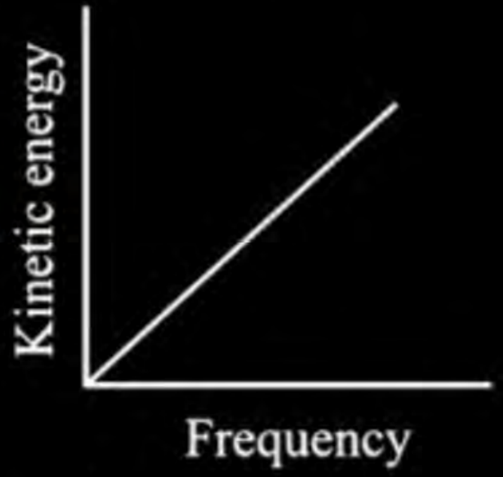
Question

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 **(2004)**

1



2



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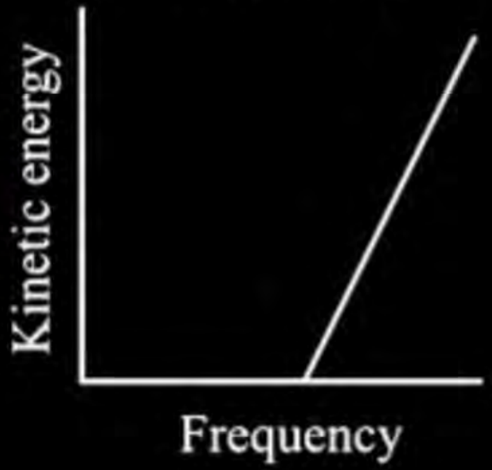
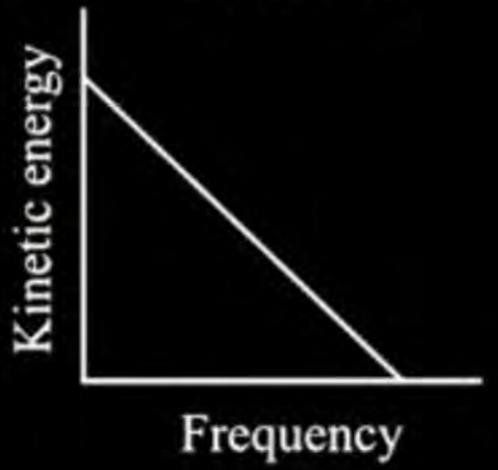


4



Question

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. 

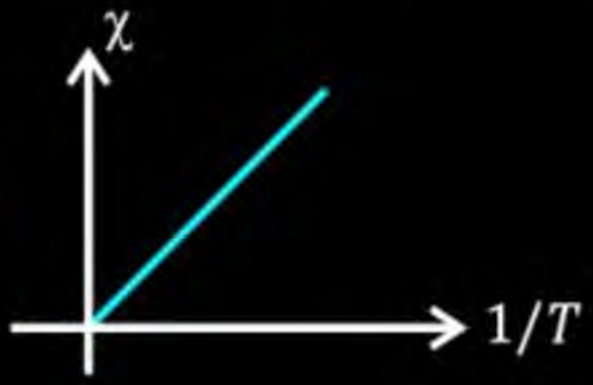
3. 

4. 

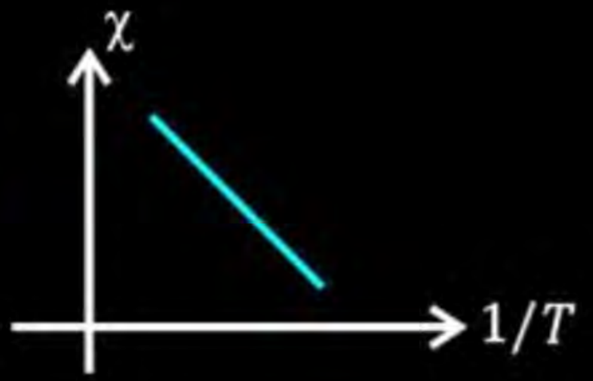
Question

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.

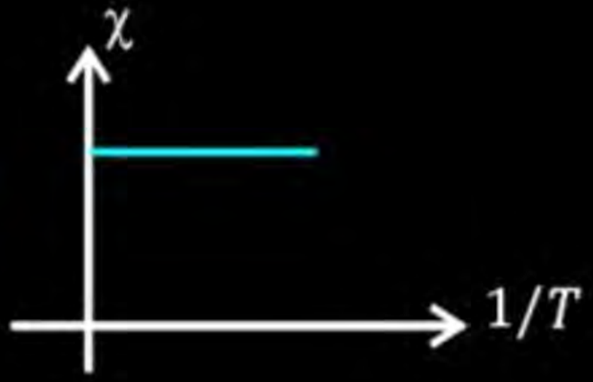
1



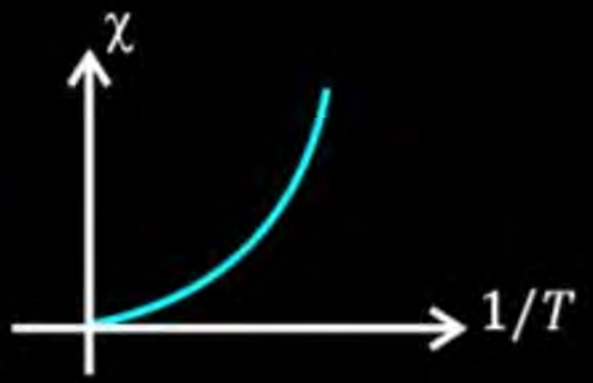
2



3



4

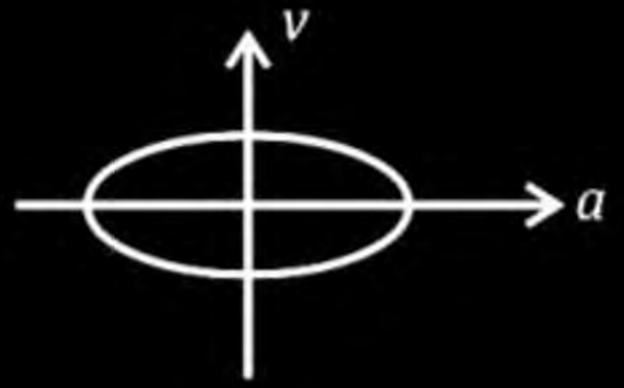


Question

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:

$$\frac{a^2}{(A\omega^2)^2} + \frac{v^2}{(A\omega)^2} = 1$$

1



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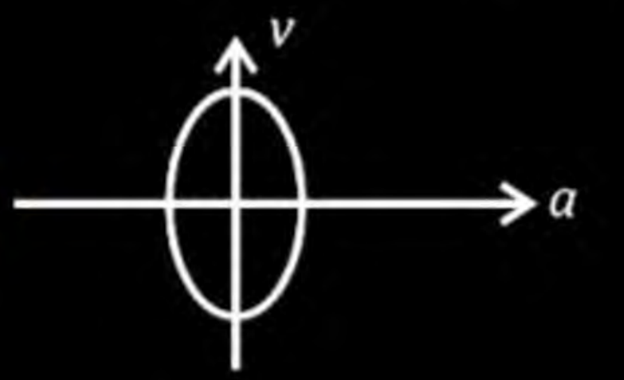
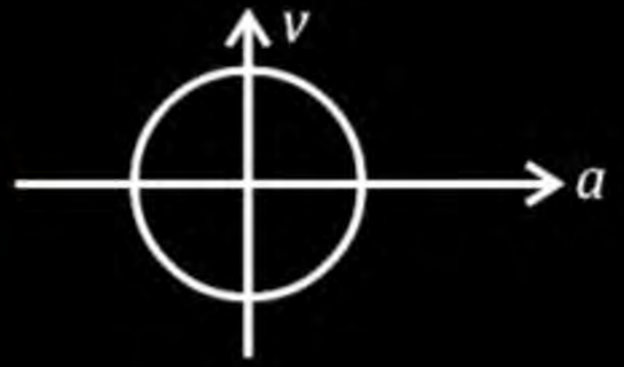


3



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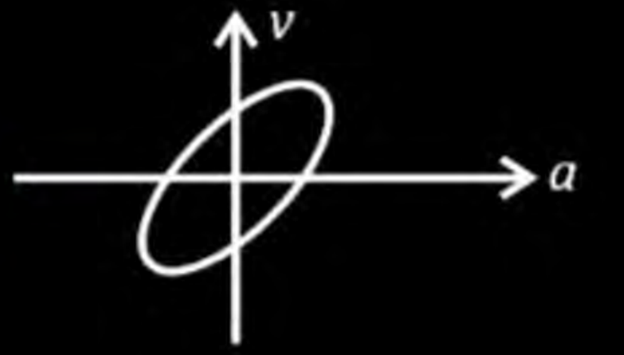

Question

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

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

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

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. $x^2 + y^2 = 154$

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. $\frac{x}{8}$

Question

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

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. $-\frac{1}{4}$

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

THANK YOU