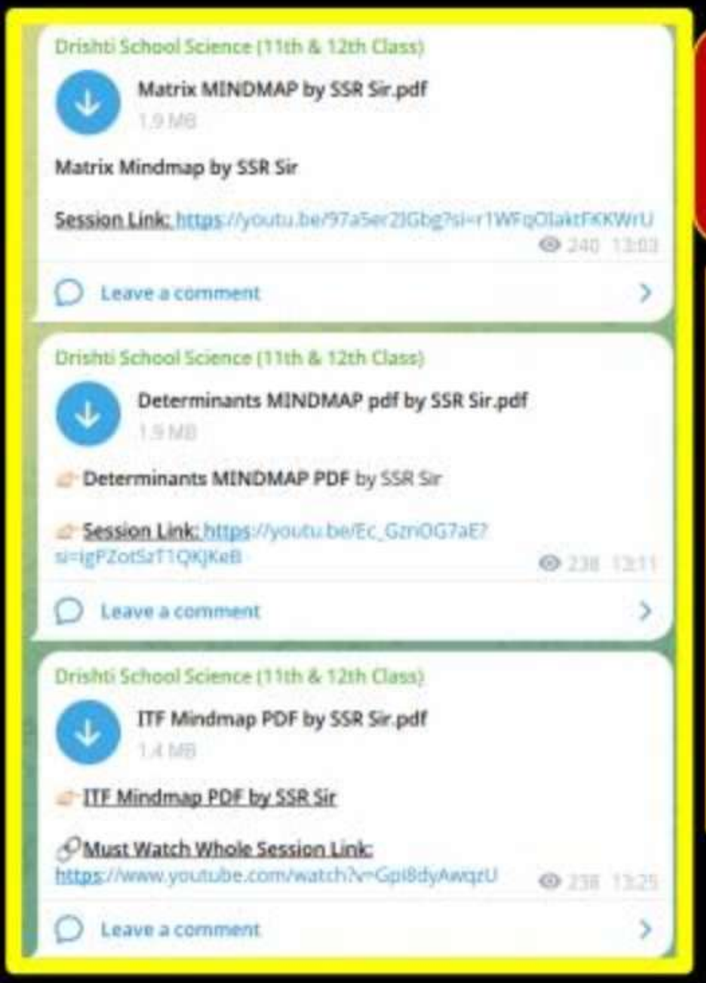
Application of Integral

ONE SHOT

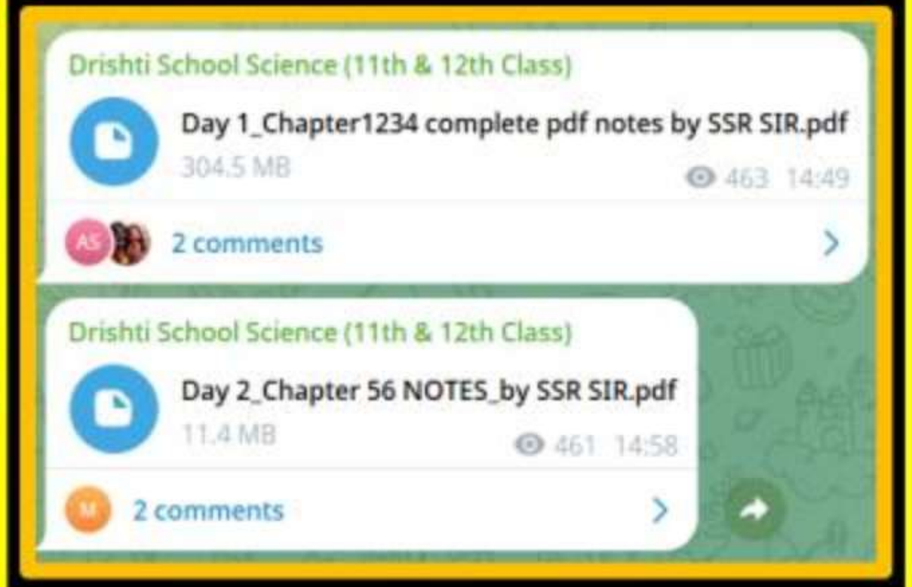
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Topics to be covered

~ Board
CUET: Concept + Ratta

1. Basic
2. Area Above and Below to X axis
3. Area WRT x axis
4. Area WRT y Axis
5. Area left & Right of Y axis
6. Area enclosed BW Two curve
7. Area enclosed by a Line & Curve
8. Some Important Direct Techniques to Find area
9. Area enclosed by Closed curve
10. HUDDA Concept

Question

The region bounded by the curve $x^2 + (y-2)^2 = 4$, $y^2 = x$ and x-axis is correctly represented as :

Circle

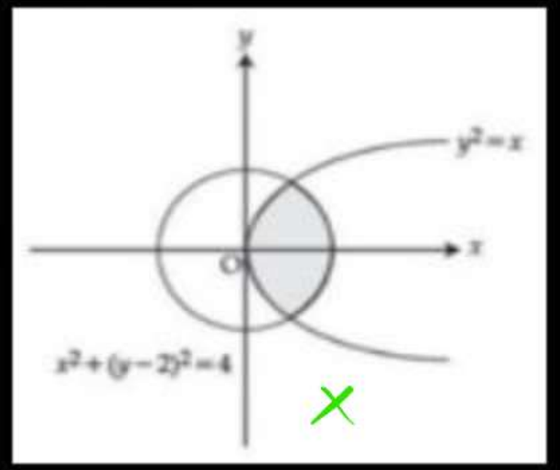
$(x-0)^2 + (y-2)^2 = 2^2$

$(x-h)^2 + (y-k)^2 = r^2$

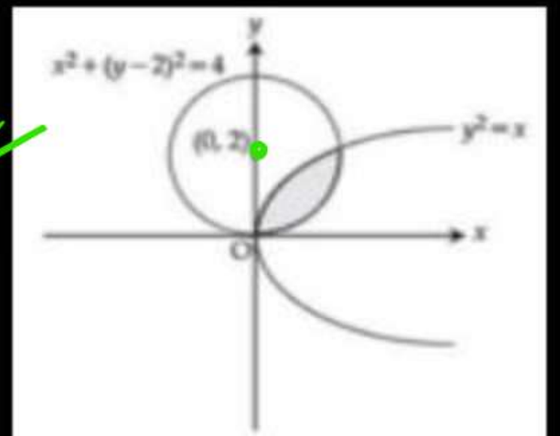
$[(h,k) = (0,2)$
Rad: 2 Unit$]$

$y^2 = x$
$y^2 = 4ax$

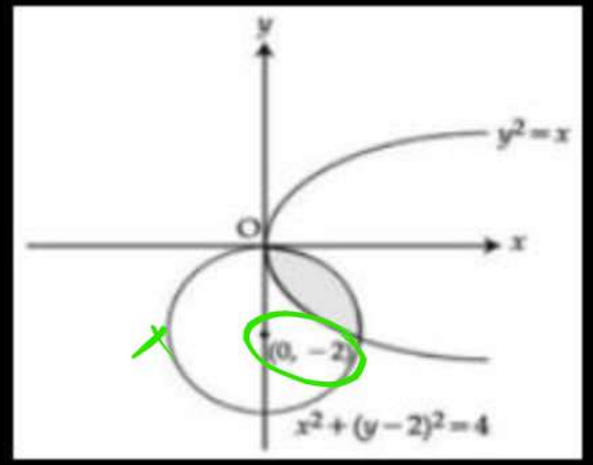
A



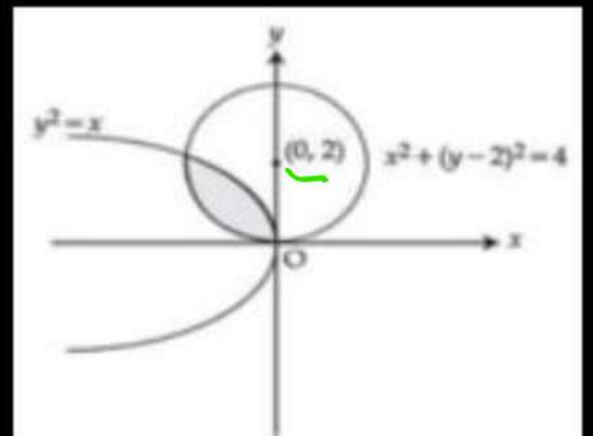
B



C



D





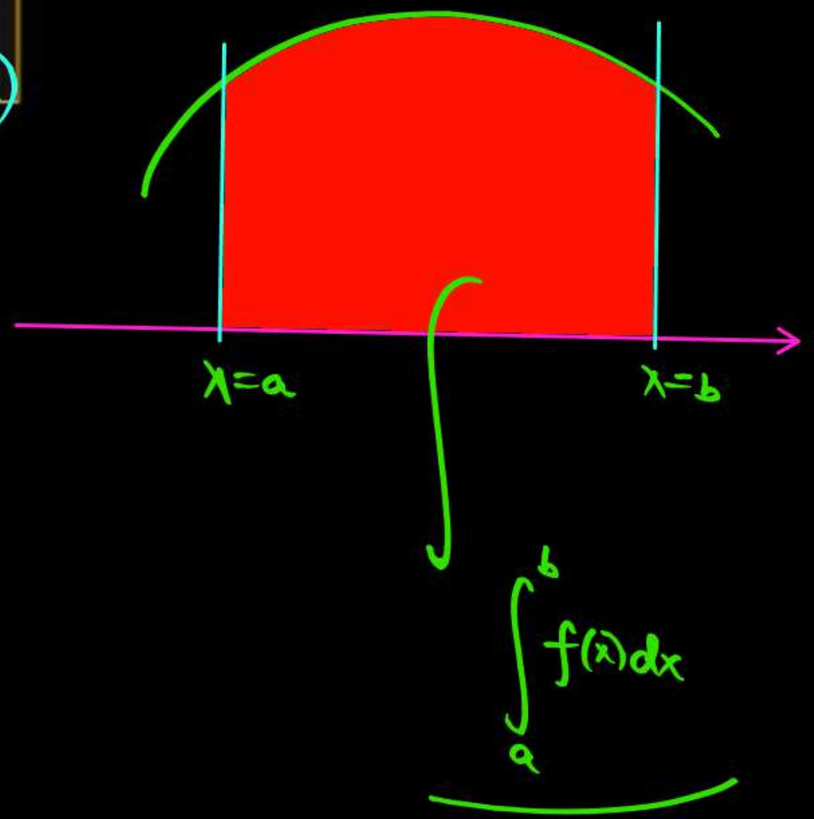
Basics of Definite Integrals

- **Formula:**

$$\int_a^b f(x)\,dx = [F(x)]_a^b = F(b) - F(a)$$

(Upper - Lower)

Absolute Area Under The Curve



#

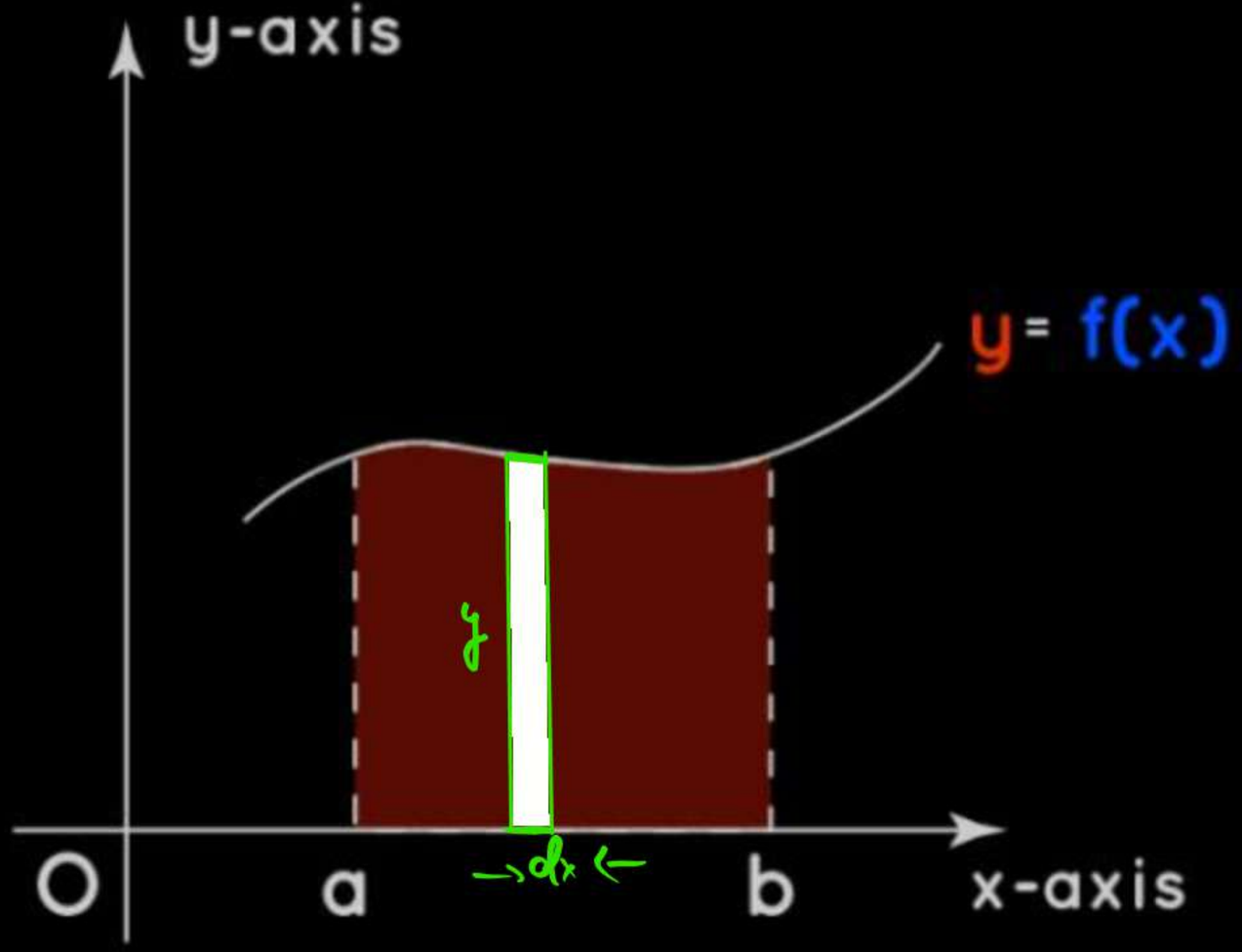
$$\int \sqrt{a^2 - x^2}\, dx \Rightarrow \frac{x}{2}\sqrt{a^2 - x^2} + \frac{a^2}{2}\sin^{-1}\left(x|a\right)$$



Area under the Curve WRT X axis

Area of the Smaller Portion = $y \cdot dx$

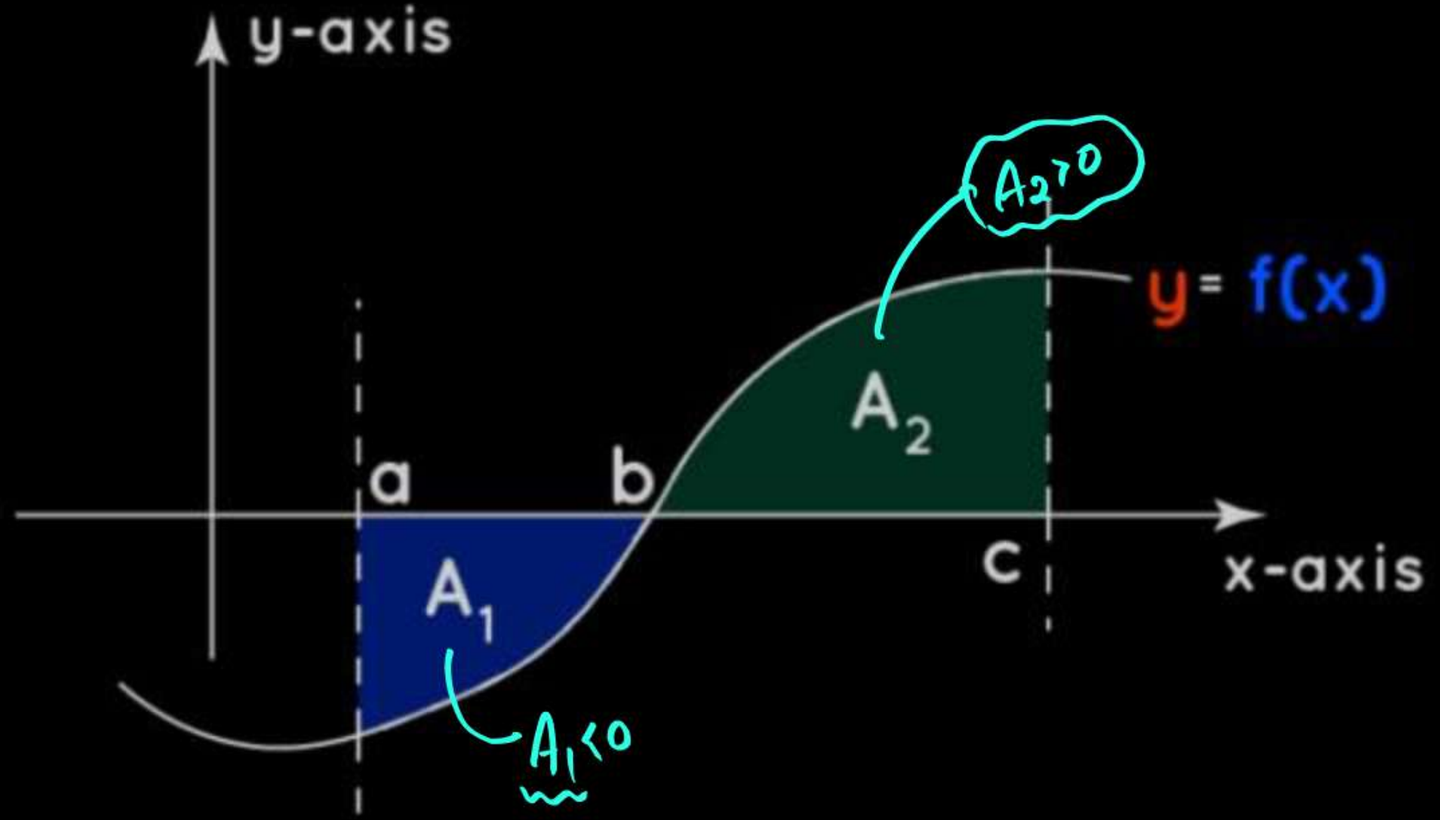
$$\text{AREA} = \int_a^b y \cdot dx$$





Area Above & Below to X axis

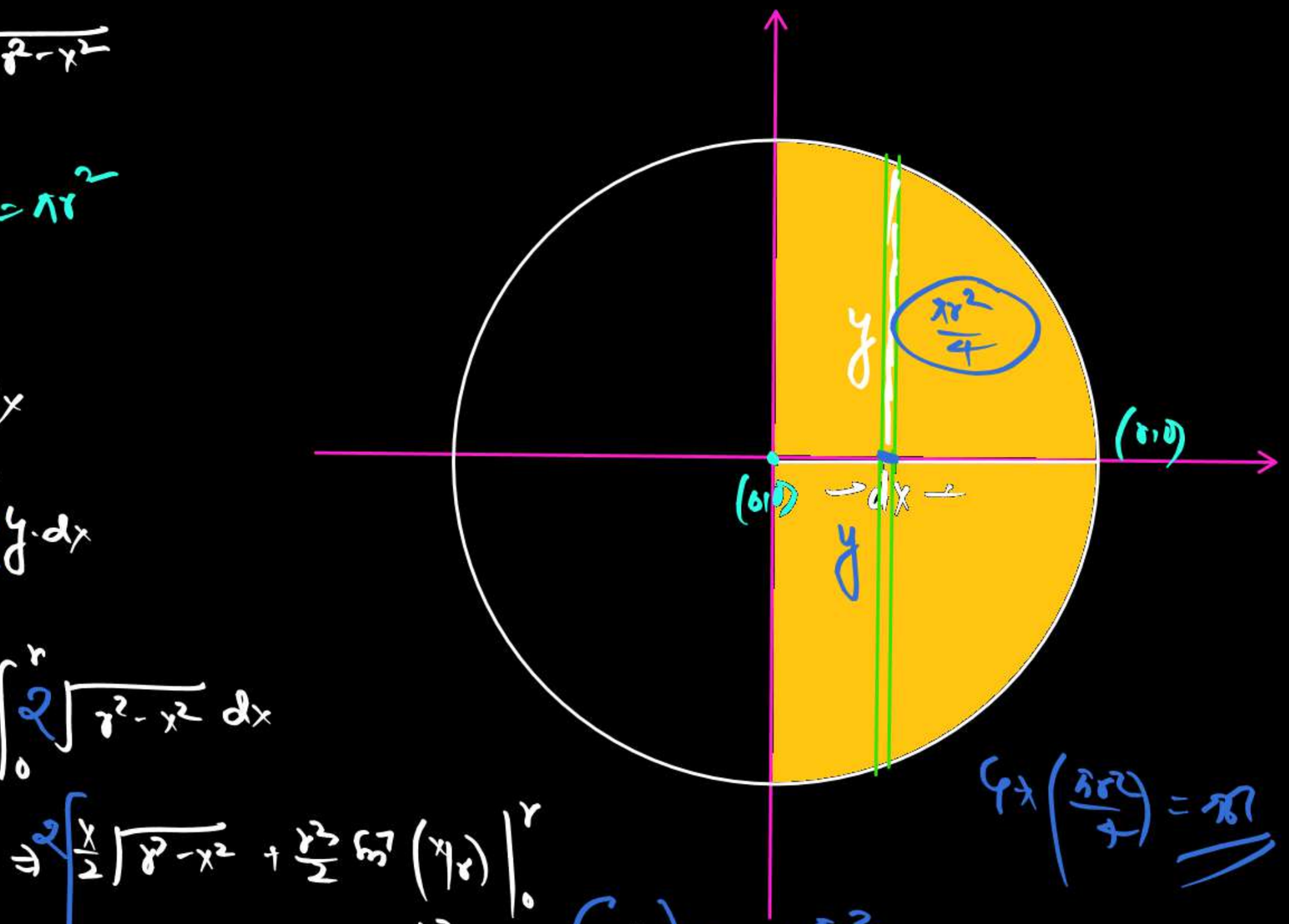
$$\text{Req Area} = |A_1| + A_2$$



Q: Find Area Under The Curve

$x^2+y^2=r^2 \Rightarrow y=\sqrt{r^2-x^2}$

↳ Area $= \pi r^2$



$dA = 2y \cdot dx$

$A_1 = \int_0^r 2y \cdot dx$

$A_1 = \int_0^r 2\sqrt{r^2-x^2}\, dx$

$\Rightarrow 2\left[\frac{x}{2}\sqrt{r^2-x^2} + \frac{r^2}{2}\sin^{-1}\left(\frac{x}{r}\right)\right]_0^r$

$\Rightarrow 0 + \frac{r^2}{2}\cdot\frac{\pi}{2} \Rightarrow \left(\frac{\pi r^2}{4}\right)\times 2 \Rightarrow \frac{\pi r^2}{2}$

$4\times\left(\frac{\pi r^2}{4}\right) = \pi r^2$

AREA of the Ellipse.

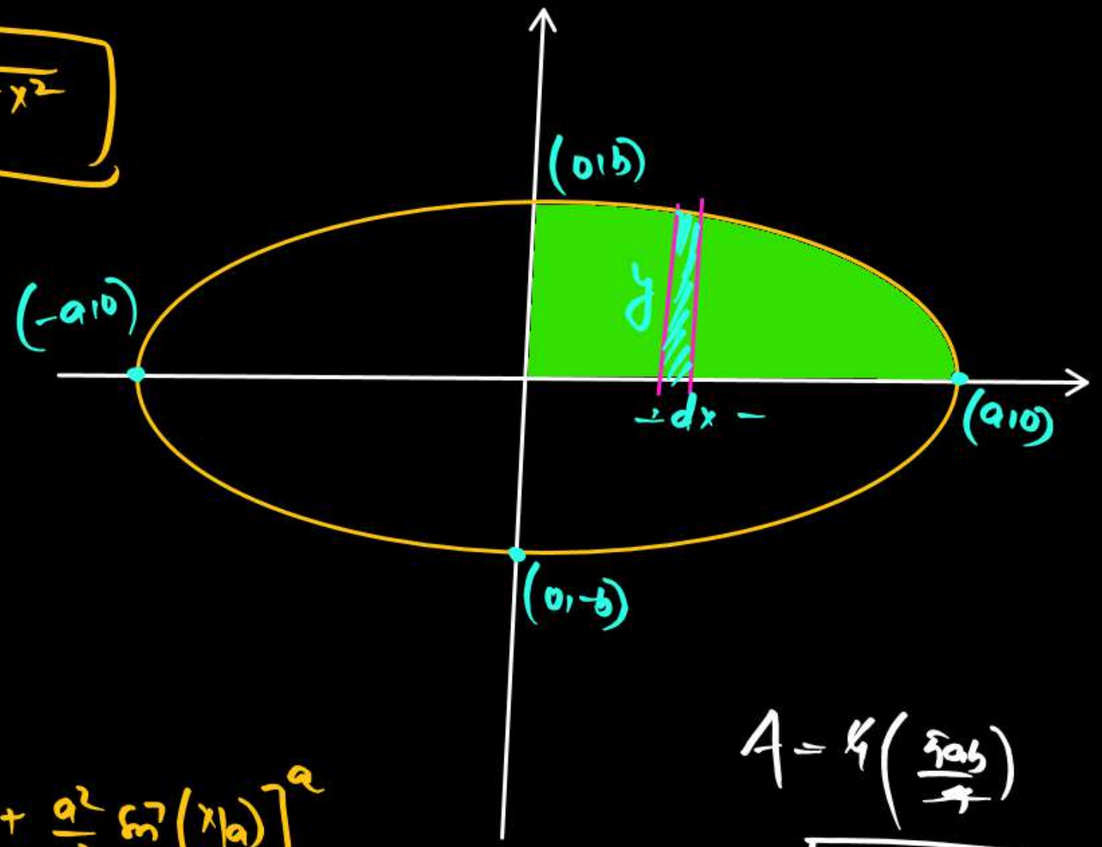
$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$$

$$\frac{y^2}{b^2}=1-\frac{x^2}{a^2}$$

$$y^2=\frac{b^2}{a^2}(a^2-x^2)$$

$$\boxed{y=\pm\frac{b}{a}\sqrt{a^2-x^2}}$$

$$\hookrightarrow \boxed{A=|\pi ab| \text{ Sq Unit.}}$$



$$dA = y\,dx$$

$$A_1=\int_0^a y\,dx$$

$$A_1=\int_0^a \frac{b}{a}\sqrt{a^2-x^2}\,dx \Rightarrow \frac{b}{a}\left[\frac{x}{2}\sqrt{a^2-x^2}+\frac{a^2}{2}\sin^{-1}\left(\frac{x}{a}\right)\right]_0^a$$

$$\Rightarrow \frac{b}{a}\left[0+\frac{a^2}{2}\cdot\frac{\pi}{2}\right] \Rightarrow \frac{\pi a^2 b}{4a} \Rightarrow \frac{\pi ab}{4}$$

$$A=4\left(\frac{\pi ab}{4}\right)$$

$$\boxed{A=\pi ab}$$

eg. $y = \sin x$

Integ → Summ / Area

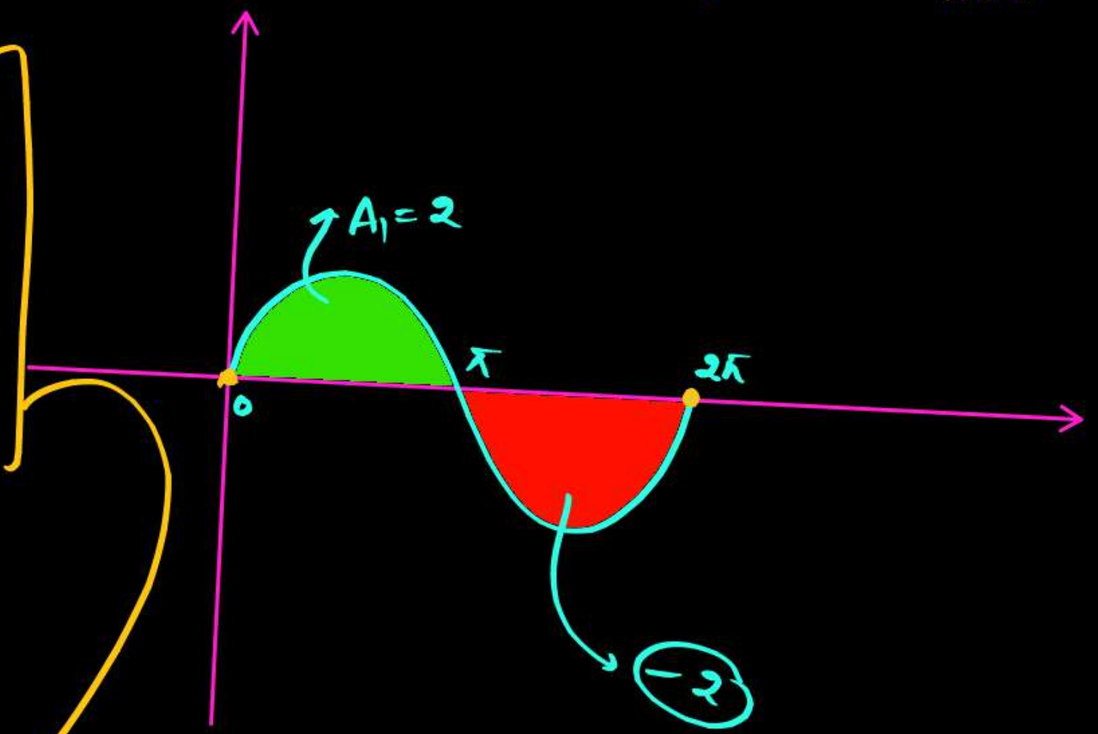
$$A_1 = \int_0^{\pi} \sin x\,dx = -\cos x\Big|_0^{\pi} = -[-1-1] = 2$$

$$\int_{\pi}^{2\pi} \sin x\,dx = -\cos x\Big|_{\pi}^{2\pi} = -[+1-(-1)] = -2$$

$$\int_0^{2\pi} \sin x\,dx = -\cos x\Big|_0^{2\pi} \Rightarrow -[\cos 2\pi - \cos 0]$$

$$\Rightarrow -[1-1]$$

$$\Rightarrow 0$$



Req Area $\Rightarrow 2 + |-2|$

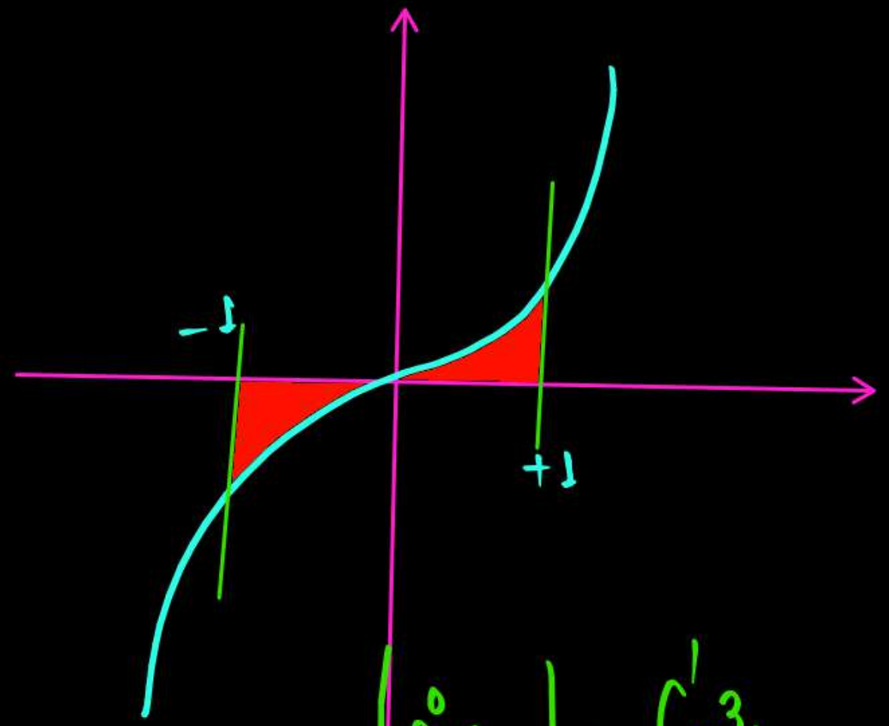
$\Rightarrow 2 + 2 \Rightarrow 4$

AREA → Graph Draw

1st

Q: $y = x^3$ from $x = -1$ to $x = 1$

$$A = \int_{-1}^{1} x^3 \, dx = 0$$



$$\text{Real } A \Rightarrow \left| \int_{-1}^{0} x^3 \, dx \right| + \int_{0}^{1} x^3 \, dx = \text{==}$$

Question – CBSE 2025 PYQs [MCQs]

The area of the region enclosed between the curve $y = x|x|$, x-axis, $x = -2$ and $x = 2$ is :

A $\frac{8}{3}$

B $\frac{16}{3}$

C 0

D 8

Question – CUET 2025 PYQs

The area (in sq. units) of the region bounded by the curve $y = 2x^3$, x - axis and ordinates $x = -1$ and $x = 1$ is.

A 1

B 2

C 3

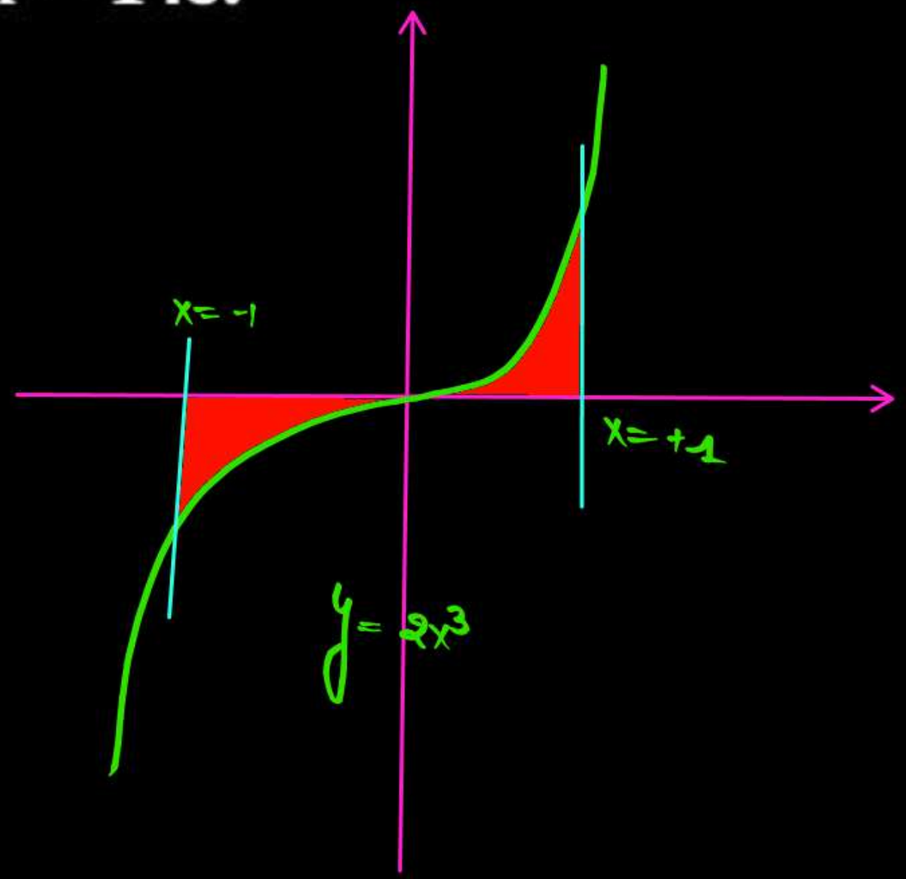
D $\frac{3}{2}$

Req A $\Rightarrow \left| \int_{-1}^{0} 2x^3 dx \right| + \int_{0}^{1} 2x^3 dx$

$\Rightarrow \left| \frac{2x^4}{4} \right|_{-1}^{0} \Big| + \left. \frac{2x^4}{4} \right|_{0}^{1}$

$\Rightarrow \left| \frac{1}{2}\left(0 - \frac{1}{2}\right) \right| + \frac{1}{2}$

$\Rightarrow \frac{1}{2} + \frac{1}{2} \Rightarrow 1$



Question – CUET 2025 PYQs

The area of the region bounded by the line $y = 2x$ and the x-axis between $x = -2$ and $x = 2$ is

A. 8 sq.units

B. 4 sq.units

C. 16 sq.units

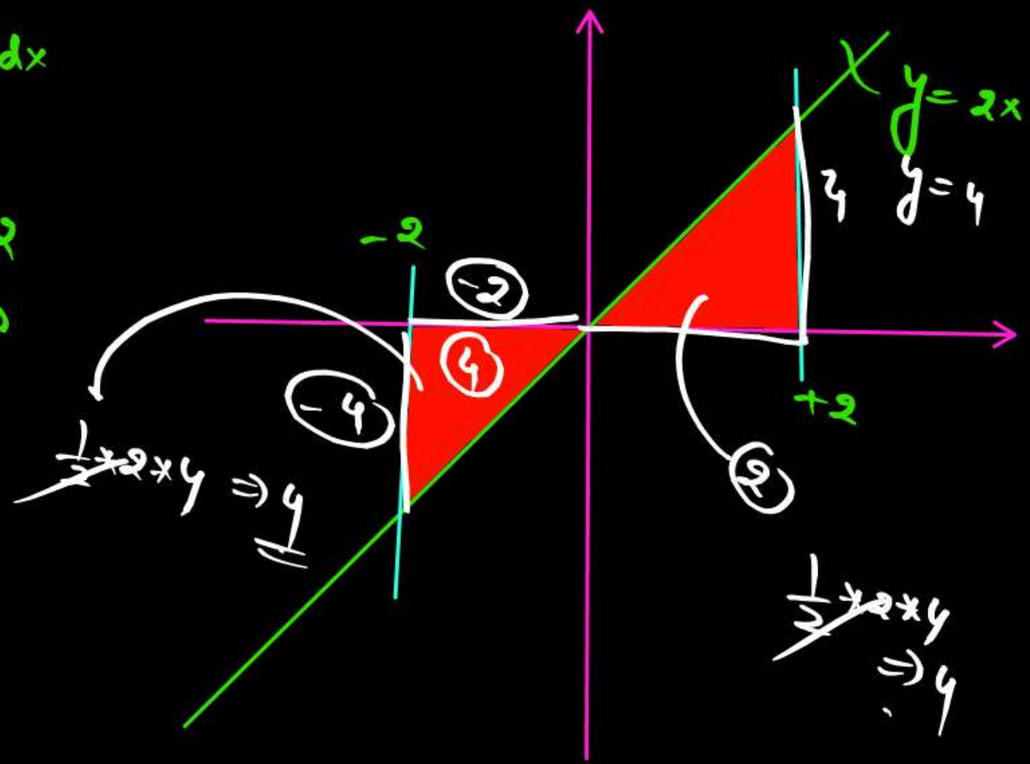
D. 0 sq.units

$$\text{A} = \left| \int_{-2}^{0} 2x\,dx \right| + \int_{0}^{2} 2x\,dx$$

$$= \left| \frac{2x^2}{2} \right|_{-2}^{0} + \left| \frac{2x^2}{2} \right|_{0}^{2}$$

$$\Rightarrow 4 + 4$$

$$\Rightarrow 8$$



Question

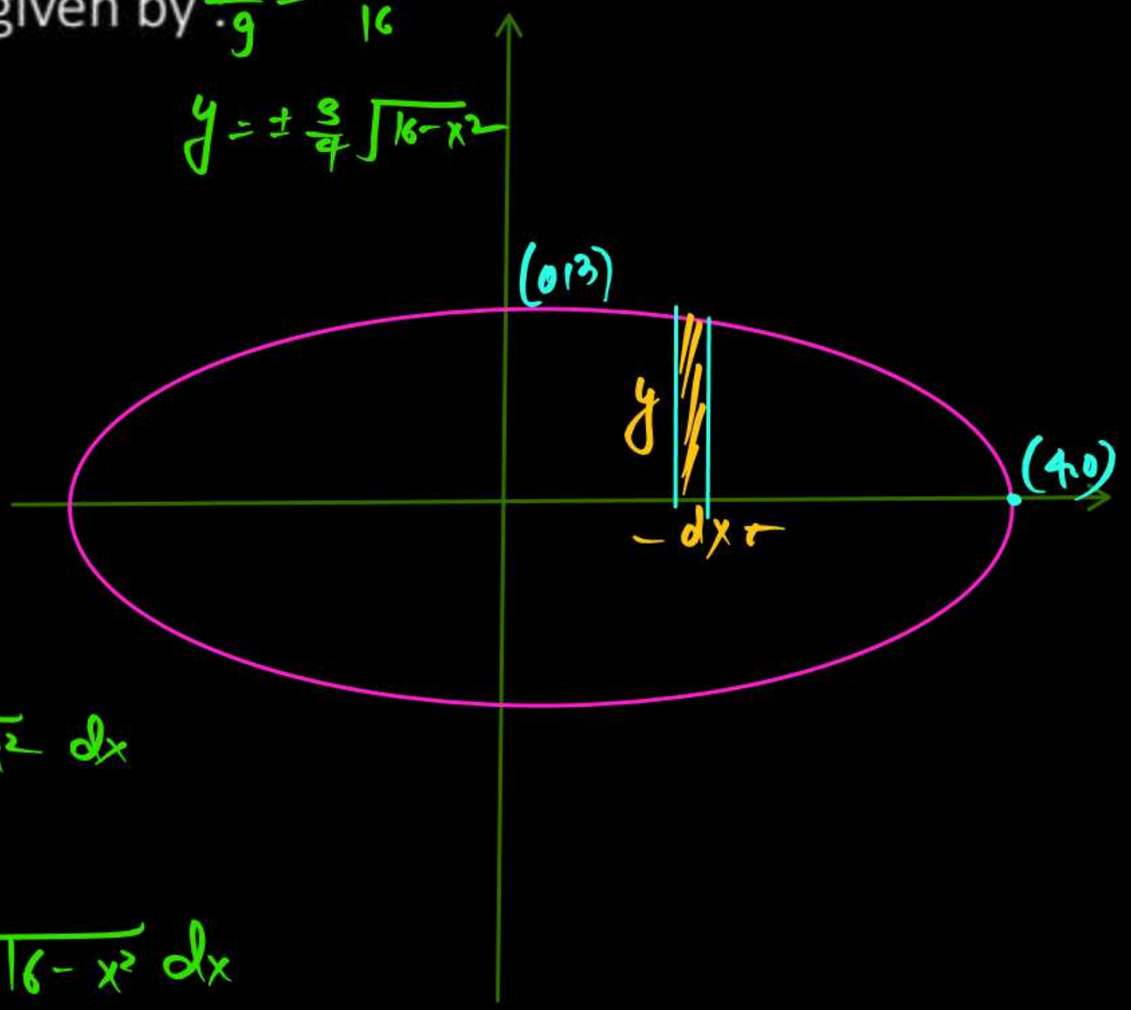
The area enclosed by the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ is given by

$\frac{y^2}{9}=1-\frac{x^2}{16}$

$\frac{y^2}{9}=\frac{16-x^2}{16}$

$\frac{x^2}{4^2}+\frac{y^2}{3^2}=1$

$y=\pm\frac{3}{4}\sqrt{16-x^2}$



A $3\int_0^4 \sqrt{9-x^2}\,dx$

B $\frac{3}{4}\int_0^4 \sqrt{9-x^2}\,dx$

C $3\int_0^4 \sqrt{16-x^2}\,dx$

D $\frac{3}{4}\int_0^4 \sqrt{16-x^2}\,dx$

$dA = y\,dx$

$A = 4\int_0^4 y\,dx$

$A = 4\int_0^4 \frac{3}{4}\sqrt{16-x^2}\,dx$

$A = \int_0^4 \sqrt{16-x^2}\,dx$

Question – CBSE 2025 PYQs [MCQs]

The area of the region bounded by the lines $y = x + 1, x = 1, x = 3$ and x-axis is

A. 6 sq units

B. 8 sq units

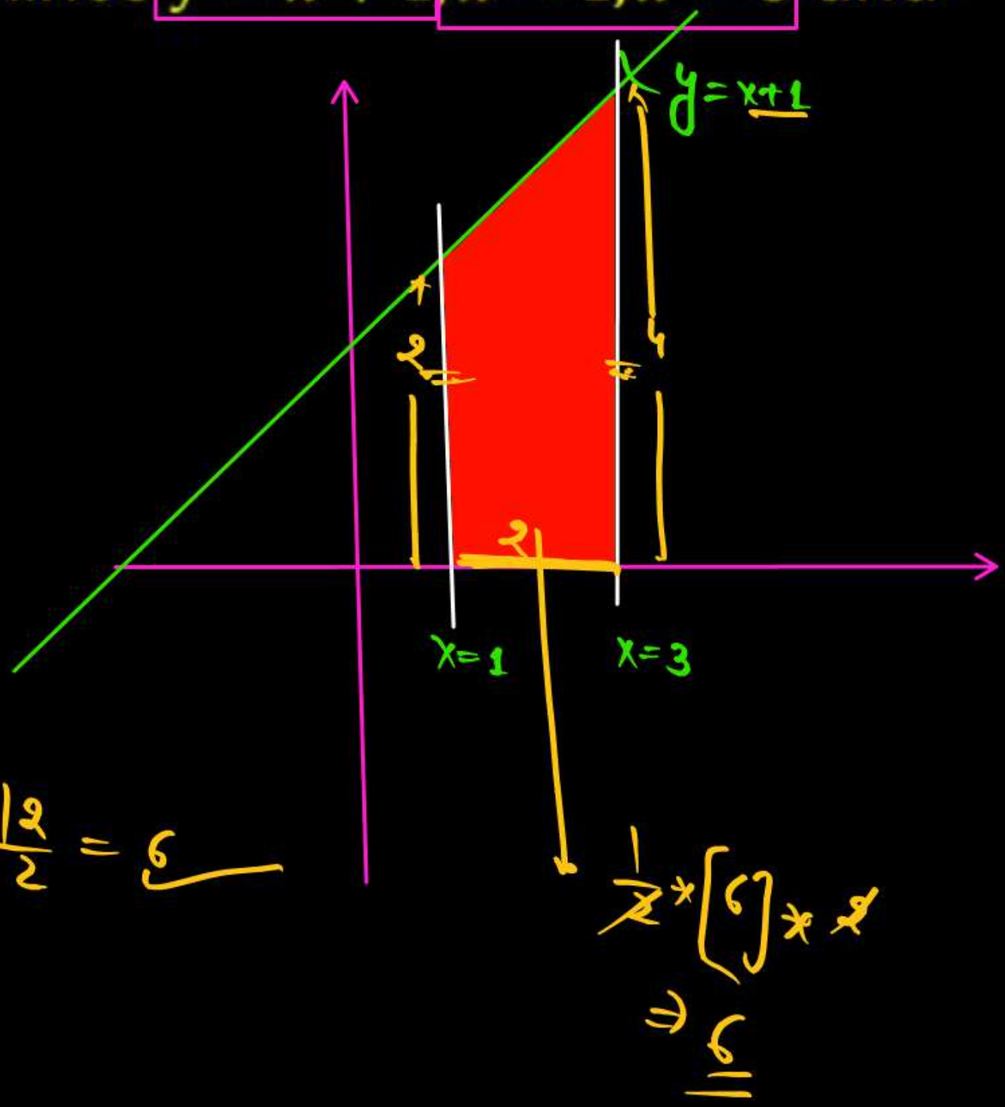
C. 7.5 sq units

D. 2 sq units

$$\int_1^3 (x+1)\,dx$$

$$\Rightarrow \frac{(x+1)^2}{2}\Big|_1^3$$

$$\Rightarrow \frac{1}{2}\left[16 - 4\right] \Rightarrow \frac{12}{2} = 6$$



Question – CBSE 2025 PYQs [MCQs]

The area of the region bounded by the curve $y^2 = x$ between $x = 0$ and $x = 1$ is :

A $\frac{3}{2}$ sq units

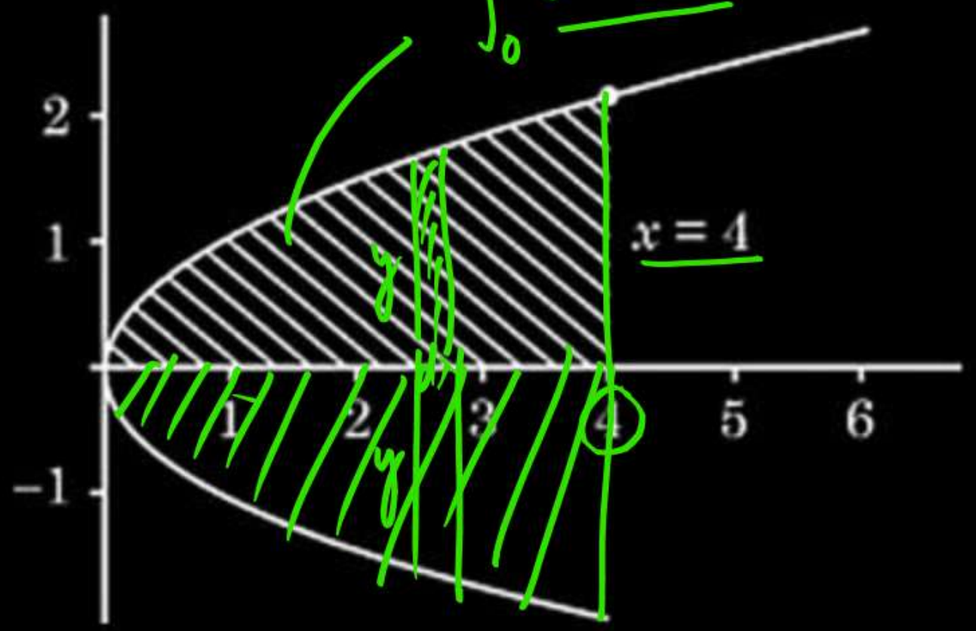
B $\frac{2}{3}$ sq units

C 3 sq units

D $\frac{4}{3}$ sq units

Question – CBSE 2025 PYQs [MCQs]

The area of the shaded region bounded by the curves $y^2 = x$, $x = 4$ and the x-axis is given by



$\int_0^1 \sqrt{x}\, dx$

$2\int_0^4 \sqrt{x}\, dx$

(A) $\int_0^4 x\, dx$

(B) $\int_0^2 y^2 dy$

(C) $2\int_0^4 \sqrt{x}\, dx$

(D) $\int_0^4 \sqrt{x}\, dx$

Question – CBSE 2025 PYQs [MCQs]

The area of the region enclosed by the curve $y = \sqrt{x}$ and the lines $x = 0$ and $x = 4$ and x -axis is :

A $\frac{16}{9}$ sq. units

B $\frac{32}{9}$ sq. units

C $\frac{16}{3}$ sq. units

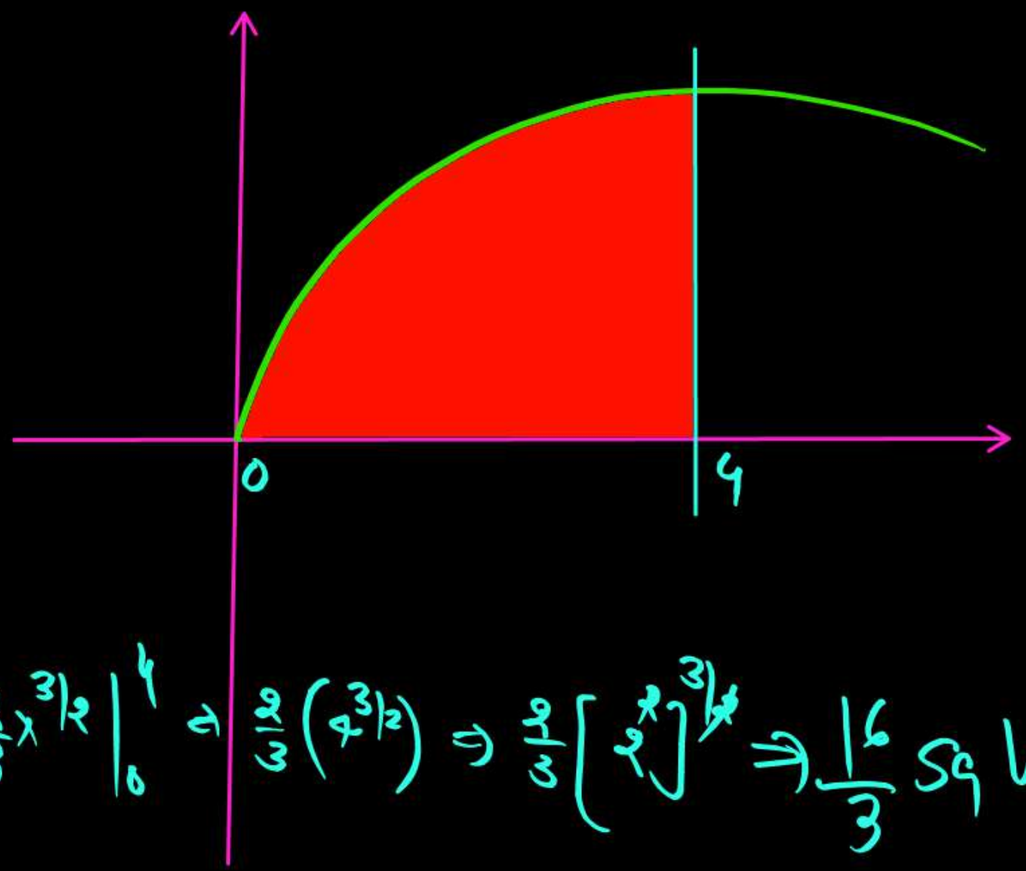
D $\frac{32}{3}$ sq. units

$y = \sqrt{x}$ $(\because \sqrt{x} \geq 0)$

$(y \geq 0)$

$y^2 = x$

$y = 4ax$



$$RA = \int_0^4 y \, dx$$

$$\Rightarrow \int_0^4 \sqrt{x} \, dx \Rightarrow \frac{2}{3} x^{3/2} \Big|_0^4 \Rightarrow \frac{2}{3}(4^{3/2}) \Rightarrow \frac{2}{3}\left[2^2\right]^{3/2} \Rightarrow \frac{16}{3} \text{ Sq Unit}$$

Question – CUET 2025 PYQs

The area (in sq. units) of the region bounded by $y = 2\sqrt{1 - x^2}$, $x \in [0, 1]$ and $[0, 1]$ and x-axis is equal to

A. 1

B. 2

C. $\frac{\pi}{2}$

D. $\frac{\pi}{4}$

$y \geq 0$

$y^2 = 4(1 - x^2)$

$y^2 = 4 - 4x^2$

$4x^2 + y^2 = 4$

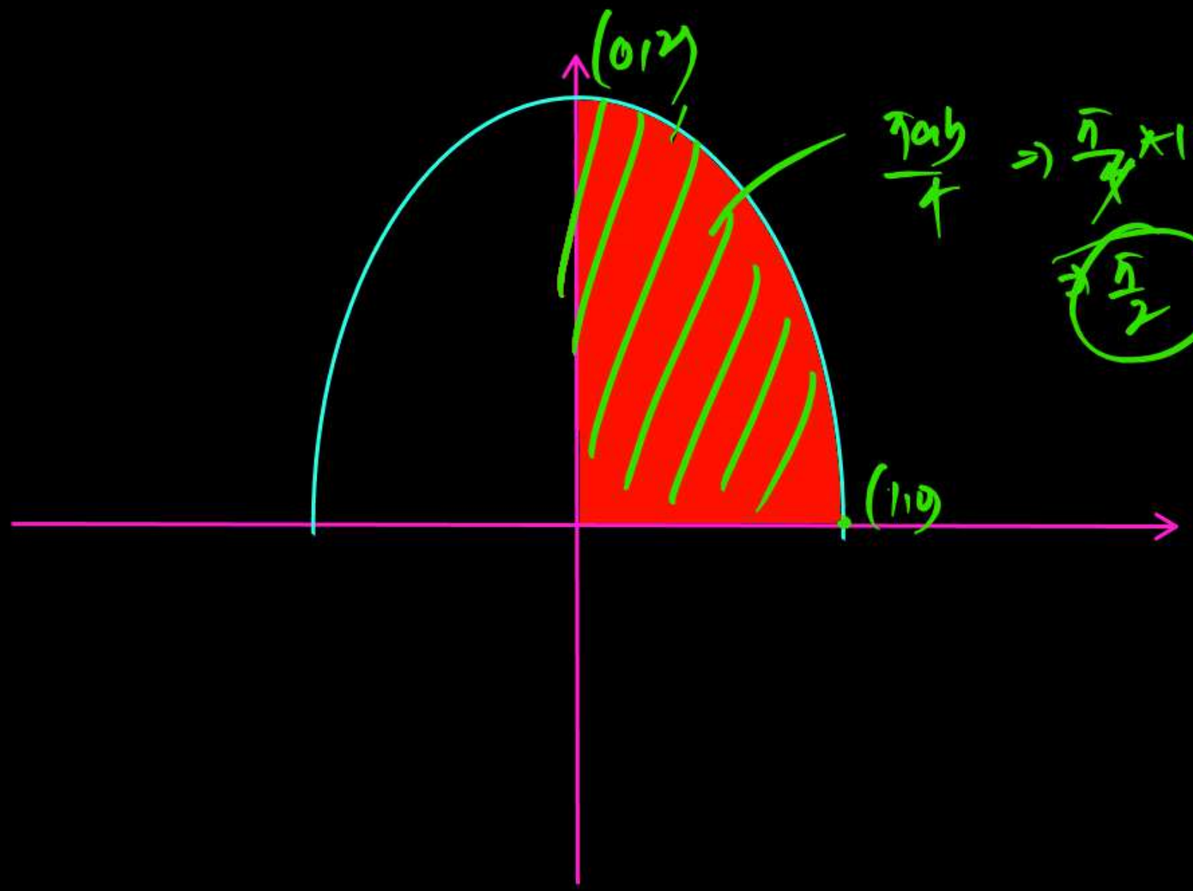
$\frac{4x^2}{4} + \frac{y^2}{4} = 1$

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

$a = 1$

$b = 2$

Ellipse



$\frac{\pi ab}{4} \Rightarrow \frac{\pi}{4} * 1 * 2$

$\frac{\pi}{2}$

Question – CUET 2025 PYQs

Consider the region bounded by the lines $y - 1 = x, x = -2, x = 3$ and x - axis. Then

(A) The area of the bounded region is given by $\int_{-2}^{3} (x + 1)dx$

(B) The numerical value of the area is $\frac{15}{2}$ sq. units

(C) The numerical value of the area is 8 sq. units

(D) The numerical value of the area is $\frac{17}{2}$ sq. units

Choose the correct answer from the options given below:

A (A) and (B) only

B (A) and (C) only

C (C) and (D) only

D (D) only

Question – CUET 2025 PYQs

The area (in square units) of the region enclosed between the lines $x + y = 2, x = 0, x = 3$ and x - axis is equal to

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

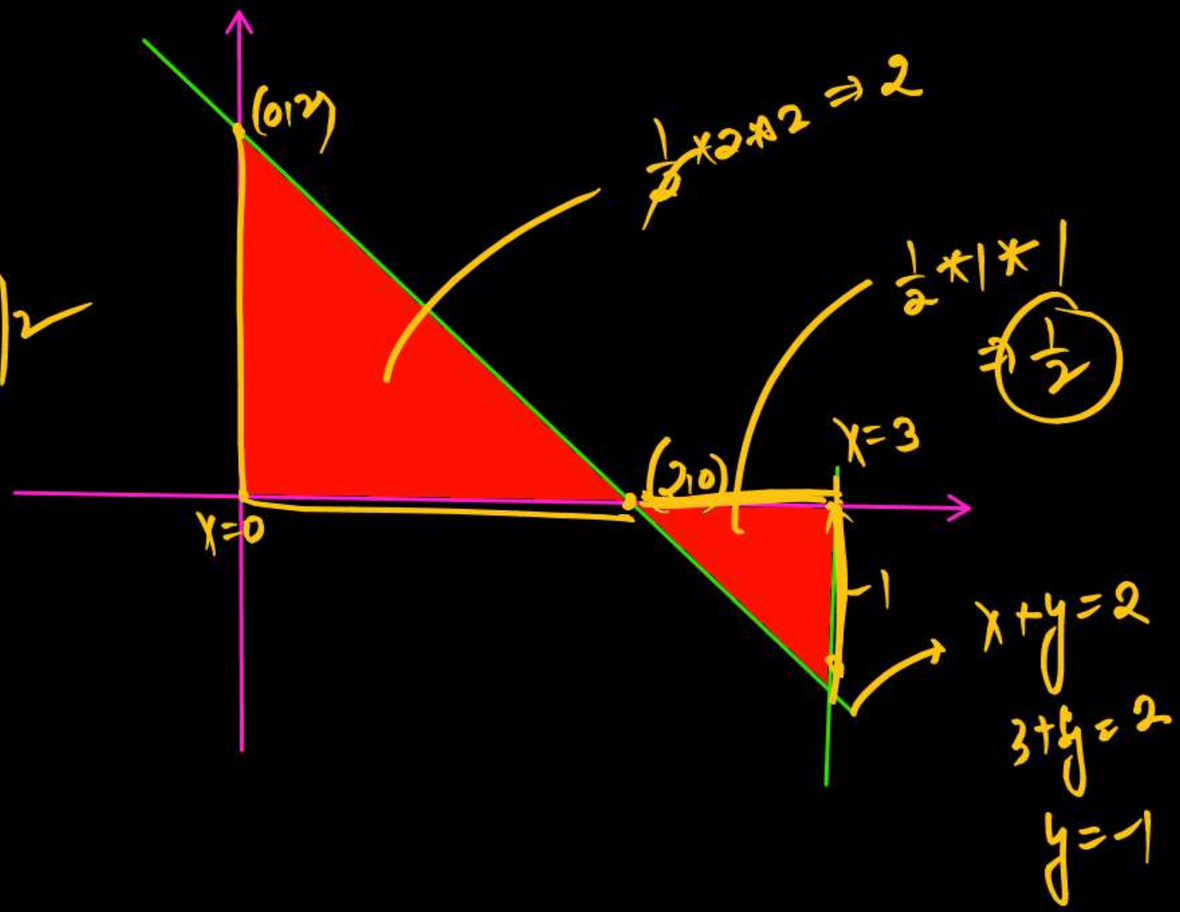
A $\frac{6}{7}$

B $\frac{7}{12}$

C $\frac{5}{2}$

D 7

$2 + \frac{1}{2} \Rightarrow \frac{9}{2}$



Question – CUET 2025 PYQs

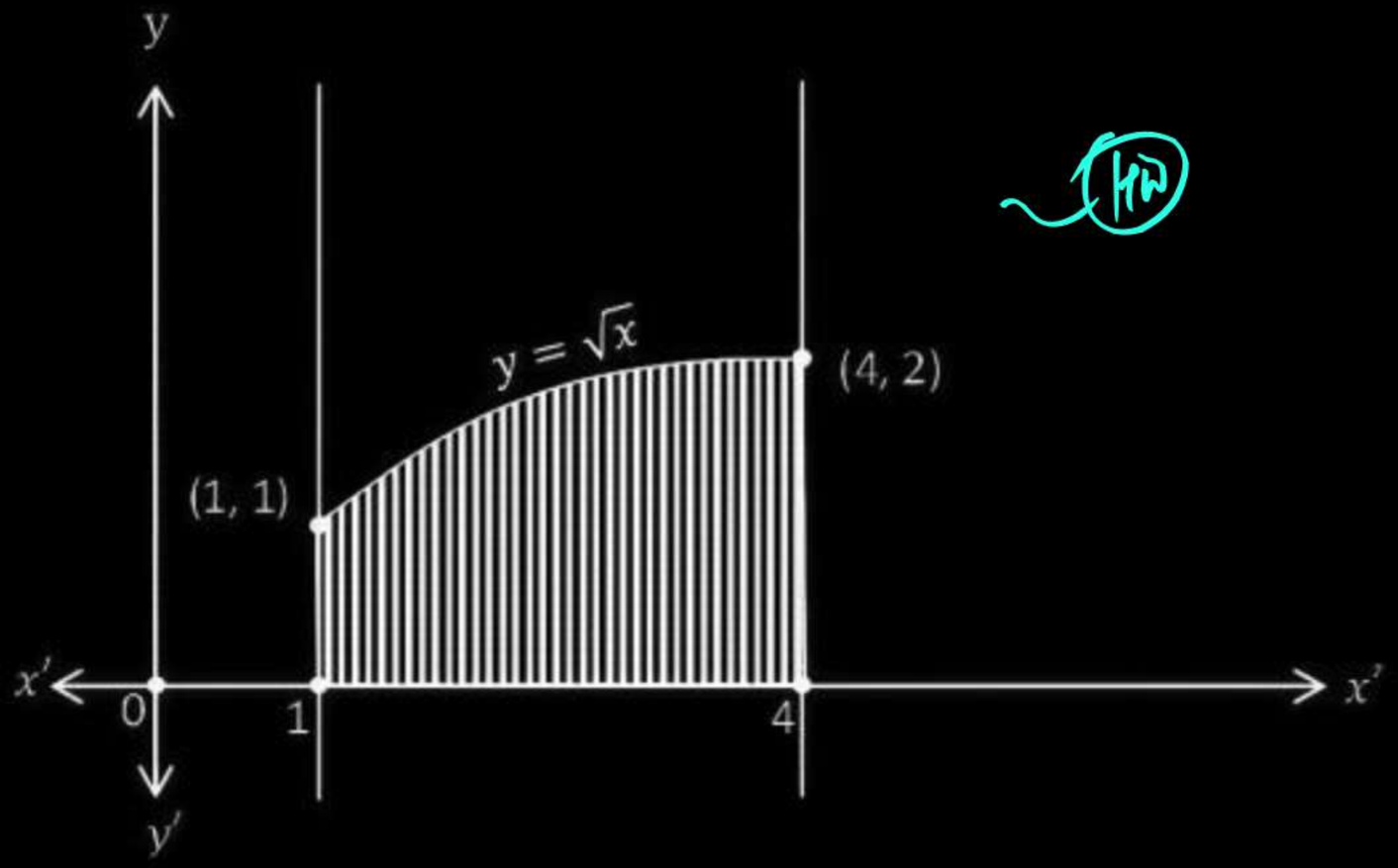
The nearest integral value of the shaded area shown below is :

A 3 square units

B $\frac{11}{3}$ square units

C $\frac{14}{3}$ square units

D 6 square units



Question – CUET 2025 PYQs

The area (in sq.units) of the region bounded by the line $2y + x = 8$, the x-axis and the lines $x = 2$ and $x = 4$ is

$\frac{x}{8} + \frac{y}{4} = 1$

A 19

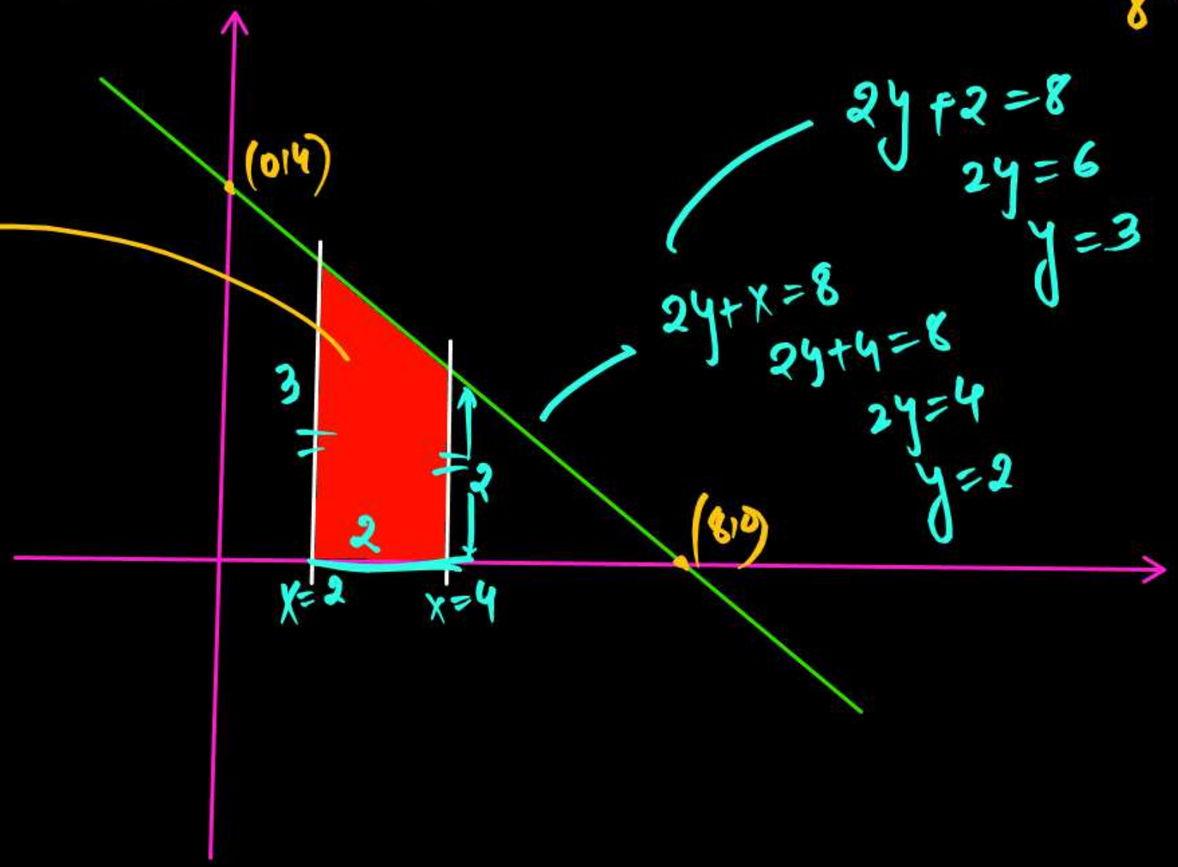
B 5

C 2

D $\frac{3}{2}$

$\frac{1}{2} * [5] * 2$

$\Rightarrow 5$ sq



$2y + 2 = 8$

$2y = 6$

$y = 3$

$2y + x = 8$

$2y + 4 = 8$

$2y = 4$

$y = 2$

Question – CUET 2025 PYQs

The area bounded by $y = 3x + 1$, $x = 0$, $y = 0$ and $x = a$ is 8 Sq.units. Then value of a (where > 0) is

A 1

B 2

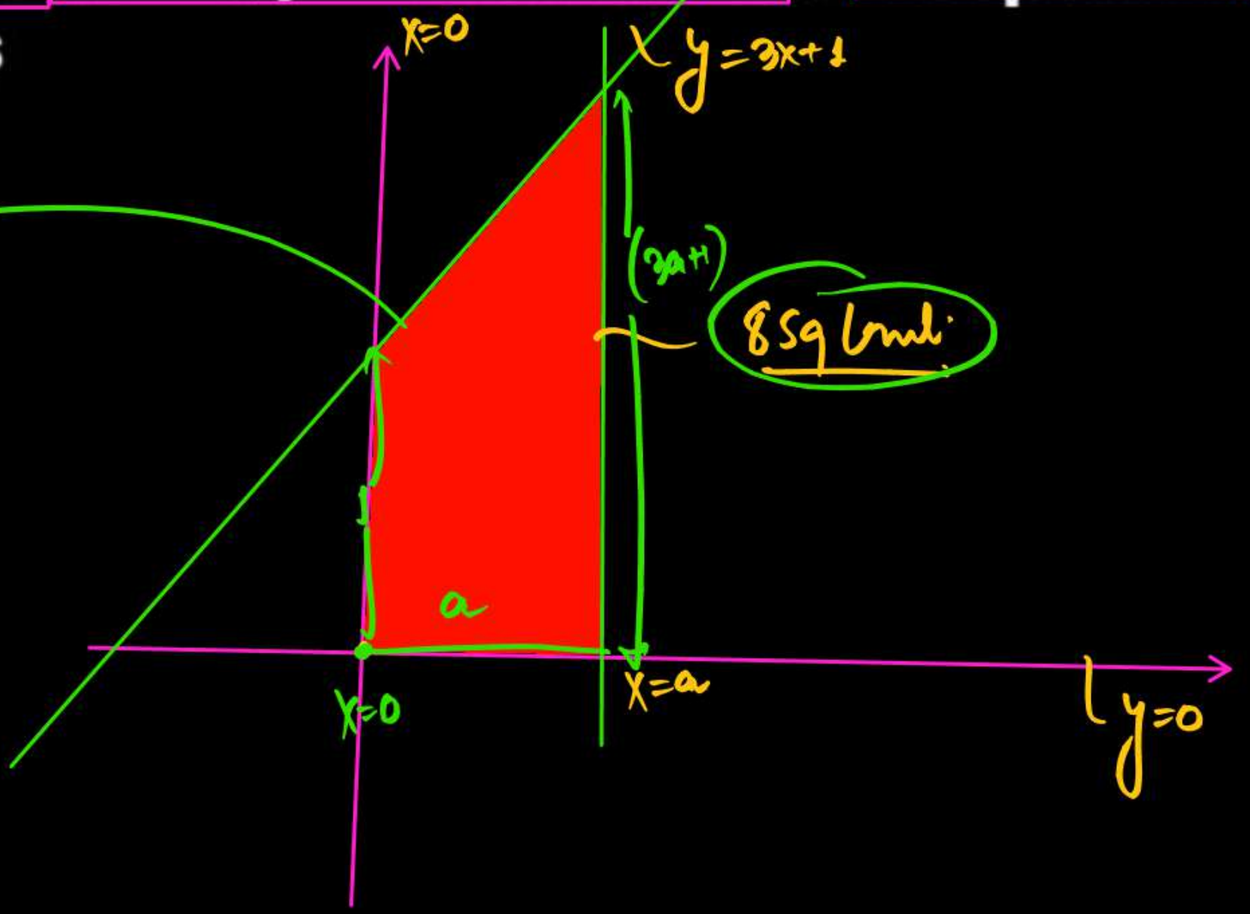
C 3

D 8/3

$8 = \frac{1}{2}[(3a+1)+1] * a$

$16 = (3a+2)a$

$a = 2 (> 0)$



Question – CUET 2025 PYQs

The area (in sq. units) of the region bounded by the curve $x^2 = 250y, y = 0$ and $x = 50$ is

A $\frac{1000\sqrt{2}}{3}$

B 1000

C $\frac{4}{3}$

D $\frac{500}{3}$

Question – CUET 2025 PYQs

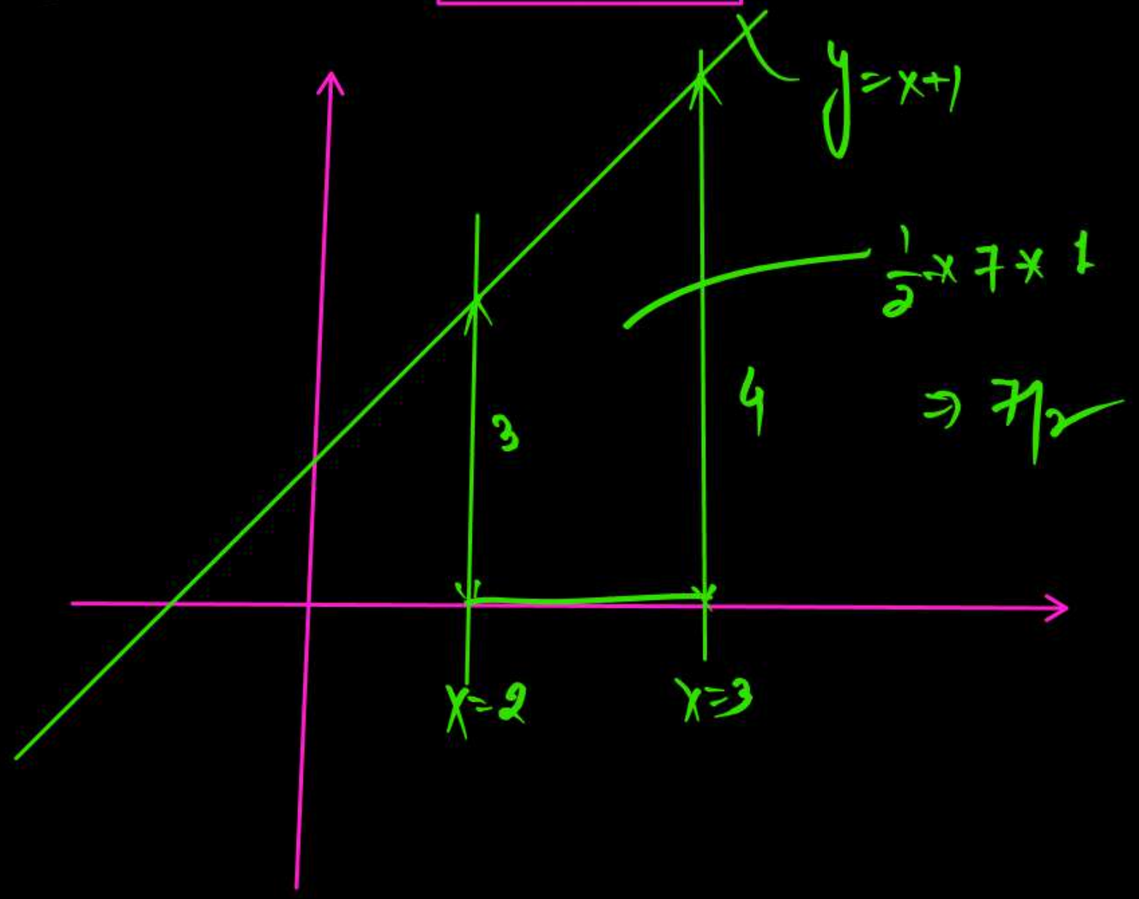
The area of the region bounded by the curve $y = x + 1$, x-axis and the lines $x = 2$ and $x = 3$ is

A $\frac{9}{2}$ sq. units

B $\frac{7}{2}$ sq. units

C $\frac{13}{2}$ sq. units

D $\frac{5}{2}$ sq. units



Question – CUET 2025 PYQs

The area (in sq. units) of the region enclosed by the curve $9x^2 + 4y^2 = 36$ is

A 10π

B 8π

C 6π

D 4π

$9x^2 + 4y^2 = 36$

$\frac{x^2}{4} + \frac{y^2}{9} = 1$

$\pi * 2 * 3$

$\Rightarrow 6\pi$

Question – CUET 2025 PYQs

$2\left[(2^2)^{3/2} - 2\sqrt{2}\right]$

$2\left[8 - 2\sqrt{2}\right] \Rightarrow 4\left[4 - \sqrt{2}\right]$

The area (in sq.units) of region bounded by $y^2 = 9x$, $x = 2, x = 4$ and the x - axis in the first quadrant is

A $3[4 - \sqrt{2}]$

B $2[4 + \sqrt{2}]$

C $8[4 - \sqrt{2}]$

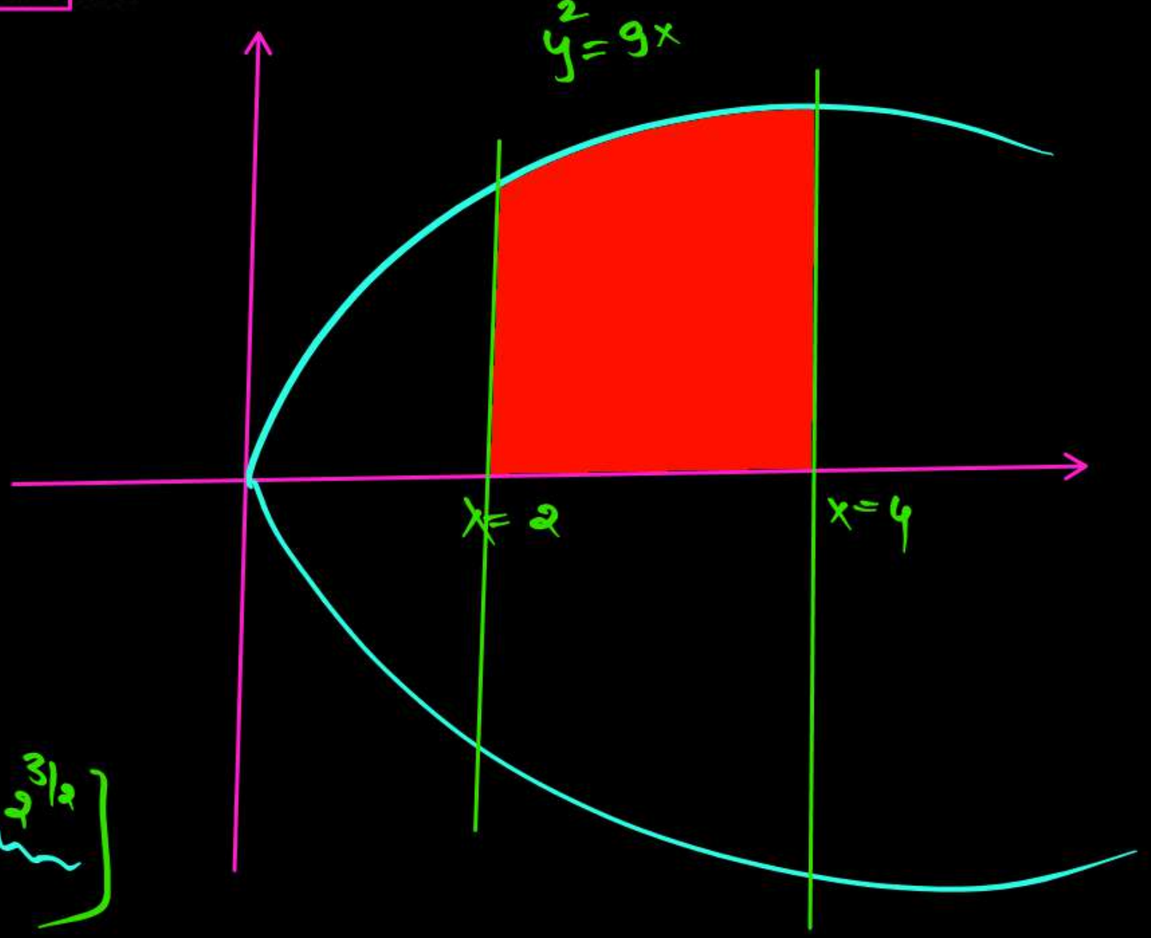
D $4[4 - \sqrt{2}]$

$RA = \int_2^4 y\,dx$

$\Rightarrow \int_2^4 \sqrt{9x}\,dx$

$\Rightarrow 3 * \frac{2}{3} x^{3/2} \Big|_2^4$

$\Rightarrow 2\left[4^{3/2} - 2^{3/2}\right]$



Question – CUET 2025 PYQs

The area (in sq. units) of the region enclosed by the ellipse $16x^2 + 25y^2 = 400$ is

A 400π

B 200π

C 40π

D 20π

$\frac{x^2}{25} + \frac{y^2}{16} = 1$

$\pi(5)(4)$

$\Rightarrow 20\pi$

Question – CUET 2025 PYQs

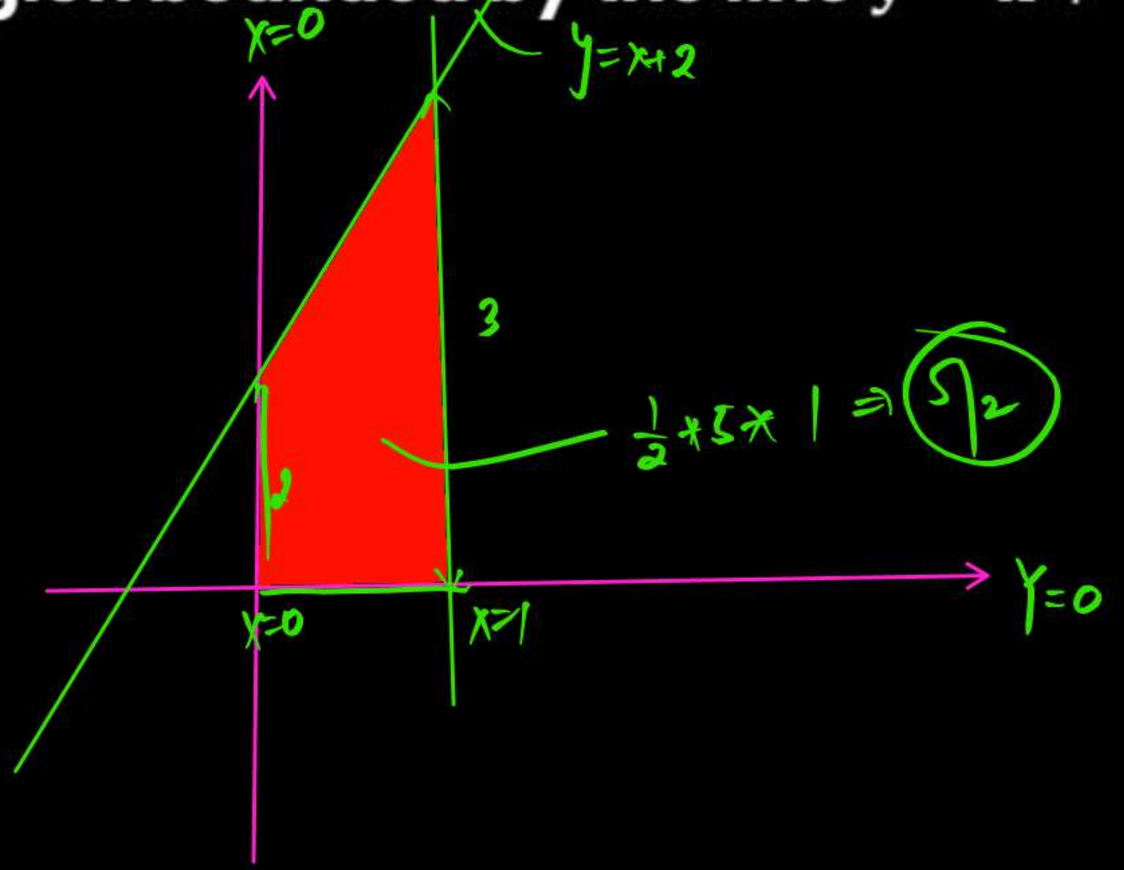
The area (in sq. units) of the region bounded by the line $y = x + 2, x = 0, x = 1$ and $y = 0$ is

A. 9

B. $\frac{5}{2}$

C. 18

D. $\frac{9}{2}$



Question – CUET 2025 PYQs

The area (in sq. units) of the region bounded by the parabola $y^2 = 4x$ and the line $x = 1$ is

A $\frac{1}{3}$

B $\frac{4}{3}$

C $\frac{5}{3}$

D $\frac{8}{3}$

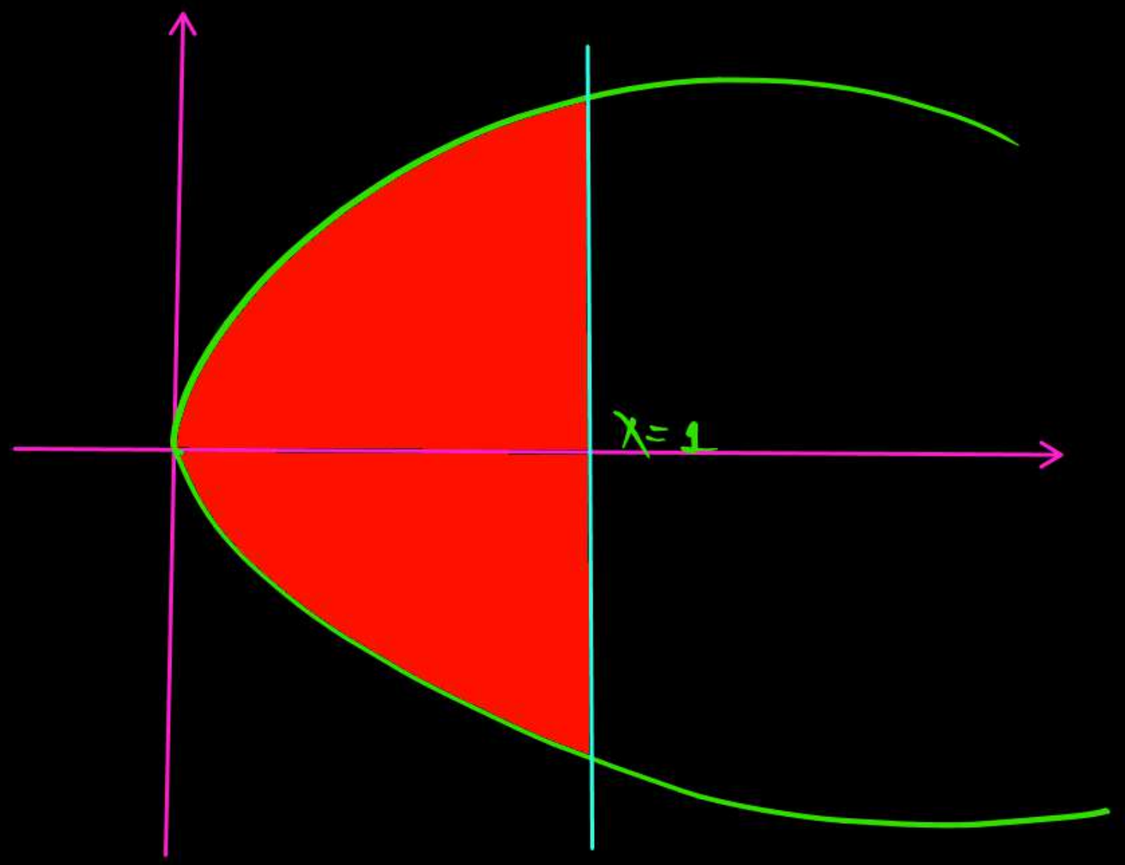
$y^2 = 4x$

$$A = 2\int_0^1 y\,dx$$

$$\Rightarrow 2\int_0^1 \sqrt{4x}\,dx$$

$$\Rightarrow (2\cdot 2)\cdot\frac{2}{3}x^{3/2}\Big|_0^1$$

$$\Rightarrow \frac{8}{3}$$ sq. units



Question – CUET 2025 PYQs

The area of the region (in square units) bounded by $x = 1, x = 2$ and the curve $y^2 = 4x$ in the first quadrant is

A $\frac{4}{3}[2\sqrt{2} - 1]$

B $\frac{2}{3}[2\sqrt{2} - 1]$

C $\frac{2}{3}[2\sqrt{2} + 1]$

D $\frac{4}{3}[2\sqrt{2} + 1]$

Question – CUET 2025 PYQs

The area bounded by the curve $y = \log x, y = 0$ and $x = e$, is

A $e - 1$ sq. units

B e sq. units

C 1 sq. units

D 0 sq. units

Question – CUET 2025 PYQs

The area of the region bounded by the curves $y = x^2 + 2$ and x-axis, between $x = 0$ and $x = 3$ in the first quadrant is:

A $\frac{16}{3}$ sq.units

B 15 sq.units

C $\frac{21}{2}$ sq.units

D 12 sq.units

Question – CUET 2025 PYQs

The area (in sq. units) of the region bounded by the curve $y = \sqrt{16 - x^2}$ and x-axis is

$y = \sqrt{16 - x^2} \geq 0 \Rightarrow y \geq 0$

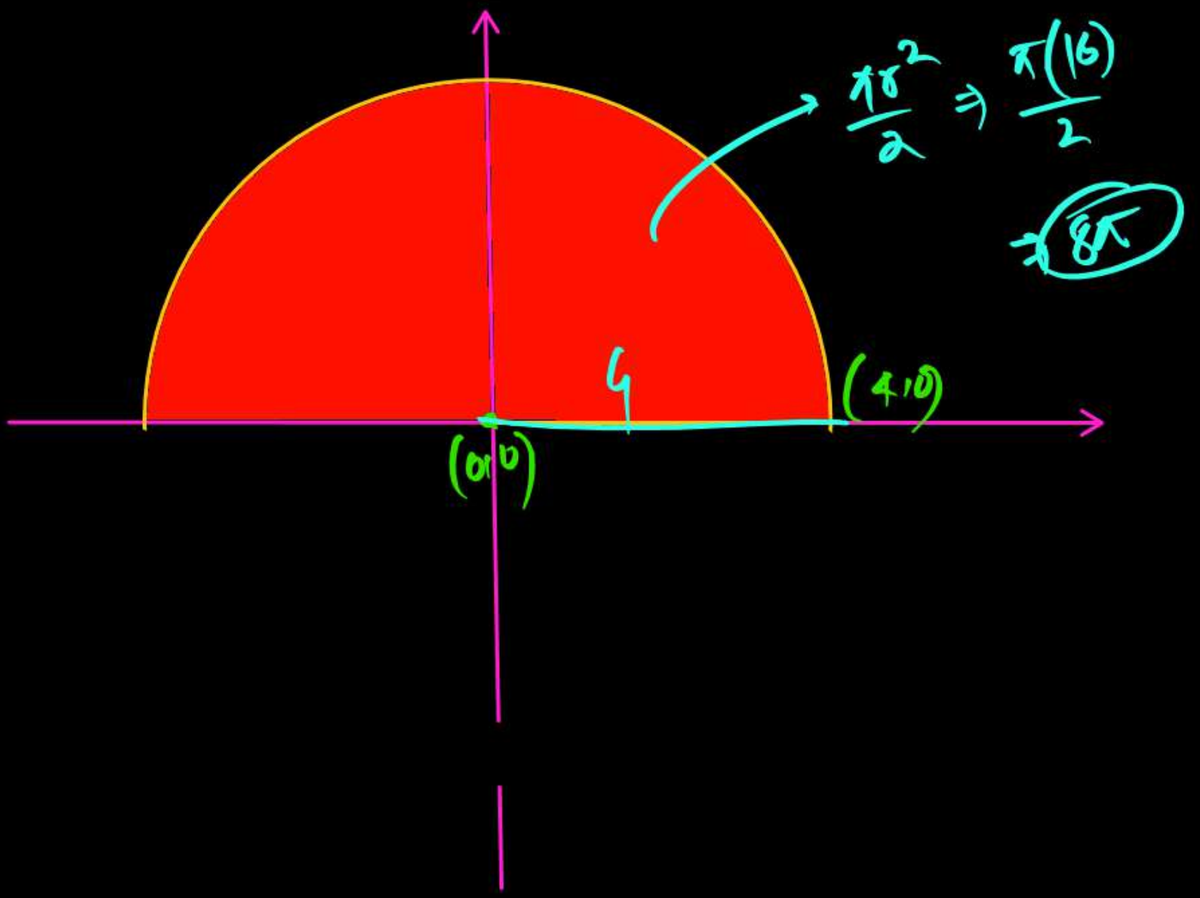
$y^2 = 16 - x^2$

$x^2 + y^2 = 16$

Circle

$C : (0, 0)$

$R : 4$ Units



A 8π

B 16π

C 24π

D 32π

Question – CUET 2025 PYQs

If the area above x-axis, bounded by the curves $y = 3^{\beta x}, x = 0$ and $x = 3$ is $\frac{26}{\log_e 3}$, then the value β is:

A $\beta = 2$

B $\beta = 1$

C $\beta = -1$

D $\beta = \frac{1}{2}$

Question – CUET 2025 PYQs

The area of the region bounded by the curves $y = x^2 + 2, y = x, x = 0$ and $x = 2$ is

A $\frac{11}{3}$ Sq. units

B $\frac{2}{3}$ Sq. units

C $\frac{14}{3}$ Sq. units

D $\frac{26}{3}$ Sq. units

Question – CUET 2025 PYQs

Area (in sq. units) of the region bounded by curves $y^2 = x$ and $x = 4$ is

A. $\frac{16}{3}$

B. $\frac{32}{3}$

C. $\frac{8}{3}$

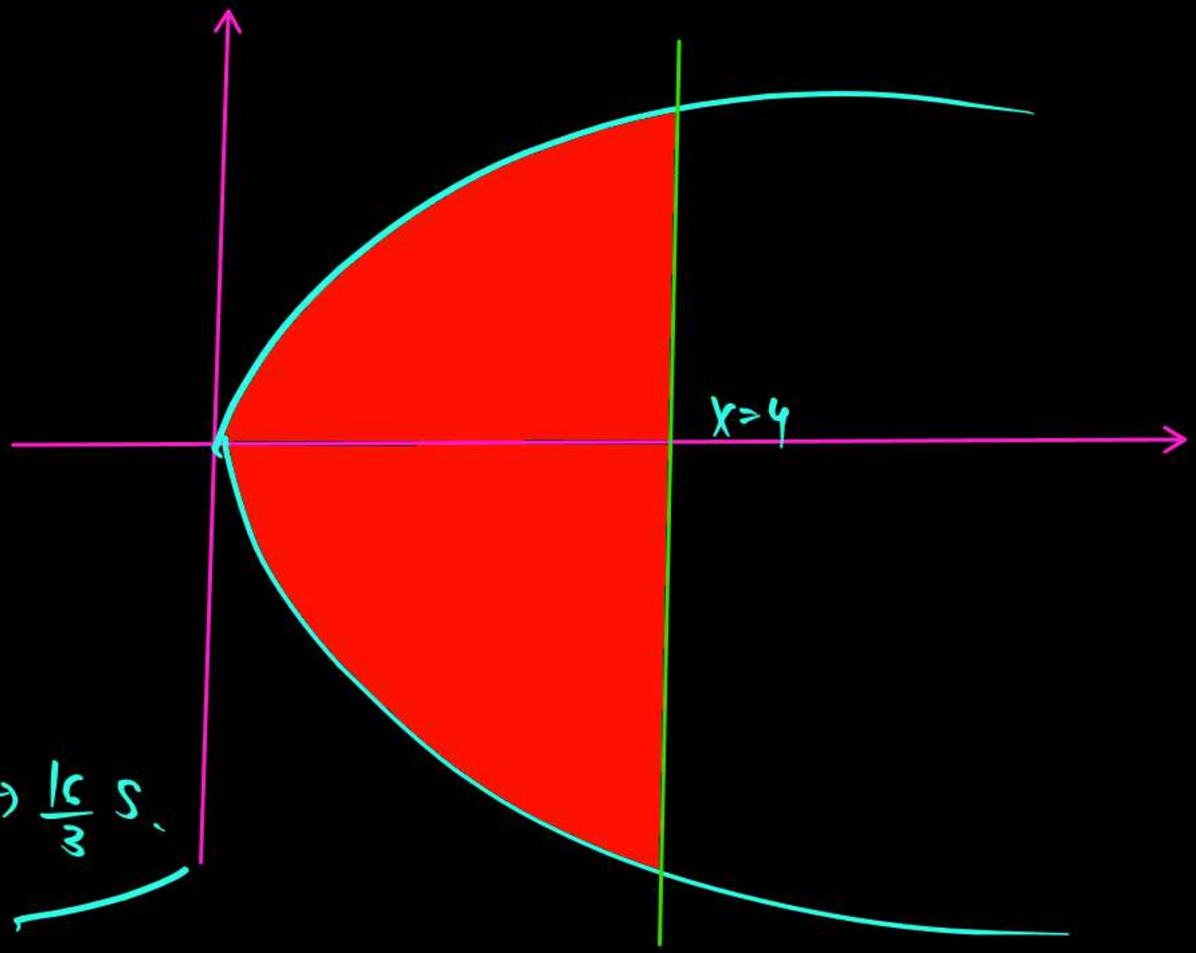
D. $\frac{64}{3}$

$$R.A = \int_0^4 \sqrt{x}\, dx$$

$$\Rightarrow \frac{2}{3} x^{3/2} \Big|_0^4$$

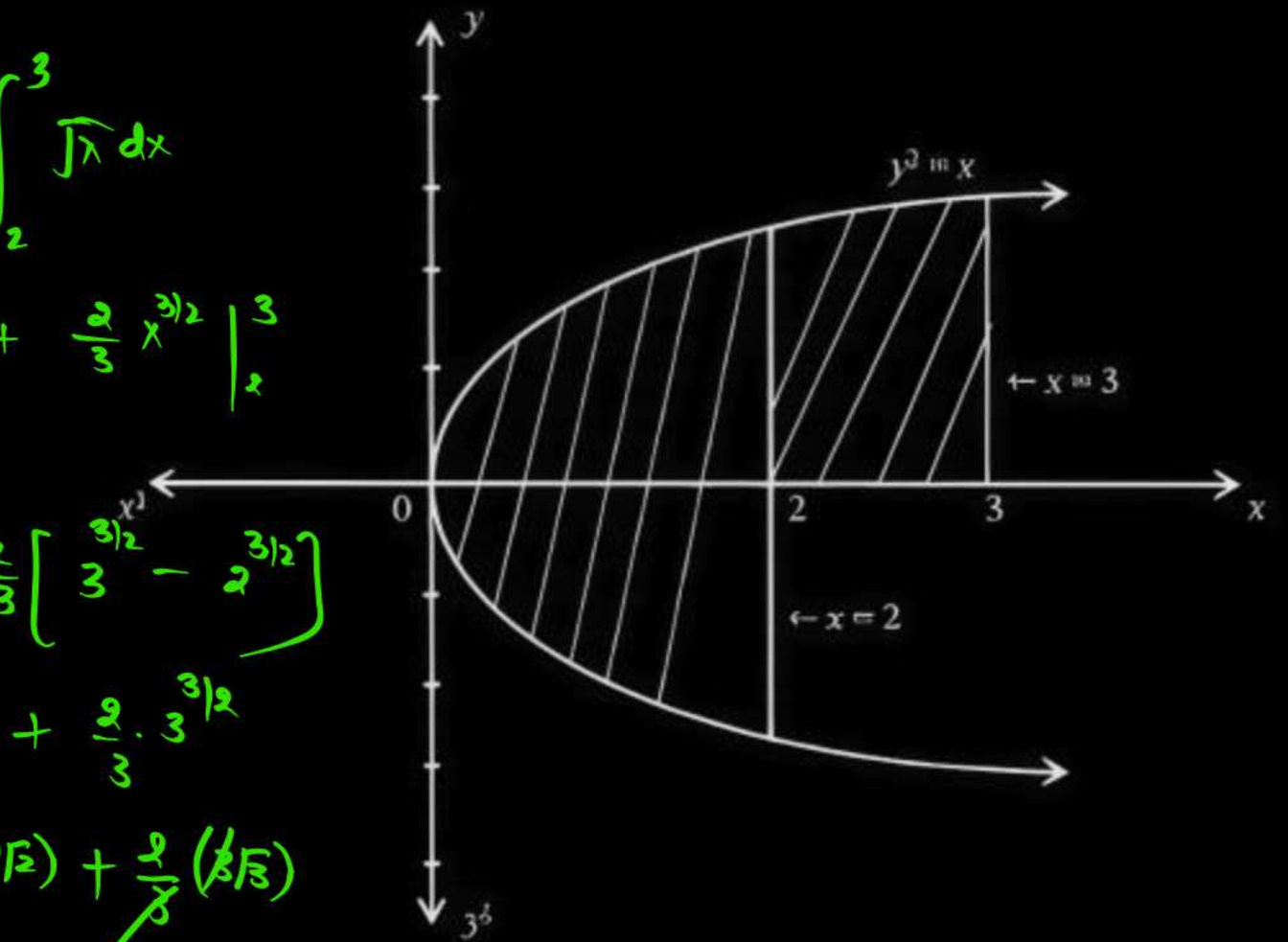
$$\Rightarrow \frac{2}{3} 4^{3/2}$$

$$\Rightarrow \frac{2}{3}\left(2^2\right)^{3/2} \Rightarrow \frac{16}{3} \text{ S.}$$



Question – CUET 2025 PYQs

Shown below is the graph of parabola $y^2 = x$, the area (in sq. units) of the shaded region is:



A $2\sqrt{3}$

B $\frac{4\sqrt{2}}{3} + 2\sqrt{3}$

C $4\sqrt{3}$

D $\frac{4\sqrt{2}}{3} - 2\sqrt{3}$

$RA = 2\int_0^2 \sqrt{x}\,dx + \int_2^3 \sqrt{x}\,dx$

$\Rightarrow 2\cdot\left(\frac{2}{3}x^{3/2}\right)_0^2 + \frac{2}{3}x^{3/2}\Big|_2^3$

$\Rightarrow \frac{4}{3}\left[2^{3/2}\right] + \frac{2}{3}\left[3^{3/2} - 2^{3/2}\right]$

$\Rightarrow \frac{2}{3}\cdot 2^{3/2} + \frac{2}{3}\cdot 3^{3/2}$

$\Rightarrow \frac{2}{3}(2\sqrt{2}) + \frac{2}{3}(3\sqrt{3})$

$\frac{4\sqrt{2}}{3} + 2\sqrt{3}$

Question – CUET 2025 PYQs

The area (in sq. units) of the region bounded by the parabola $y^2 = 8x$ and the line $x = 2$ is

A $\frac{32}{3}$

B $\frac{1}{3}$

C $\frac{16}{3}$

D $\frac{4}{3}$

Question – CUET 2025 PYQs

The area of the smaller region of the circle $x^2 + y^2 = 8$ cut off by the line $x = 2$ is

A $2(\pi - 2)$ sq units

B 8π sq units

C $(3\pi + 2)$ sq units

D $2(3\pi + 2)$ sq units

Area bounded by the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$ is

दीर्घवृत्त $\frac{x^2}{4}+\frac{y^2}{9}=1$ से घिरा क्षेत्रफल क्या है?

A 6π sq. units

B 3π sq. units

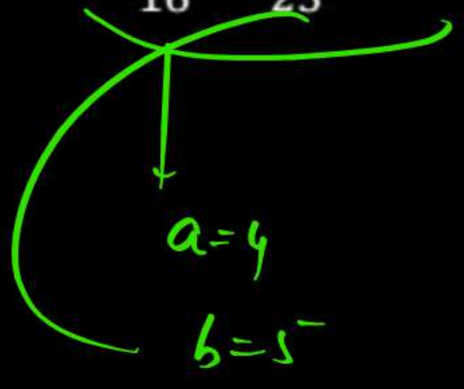
C 12π sq. units

D None of these

$a=2$
$b=3$
6π

Question

The area enclosed by the curve $\frac{x^2}{16} + \frac{y^2}{25} = 1$ is:



$A = |\pi ab|$

$\Rightarrow 20\pi$

A 2π

B 20π

C 40π

D 5π

C

Question

The area enclosed by the ellipse $\frac{x^2}{9^2} + \frac{y^2}{6^2} = 1$ is: is:

$a = 9$ $\quad b = 6$

A 15π

B 54π

C 18π

D $\frac{3}{2}\pi$

$A = \pi ab$

$\Rightarrow 54\pi$



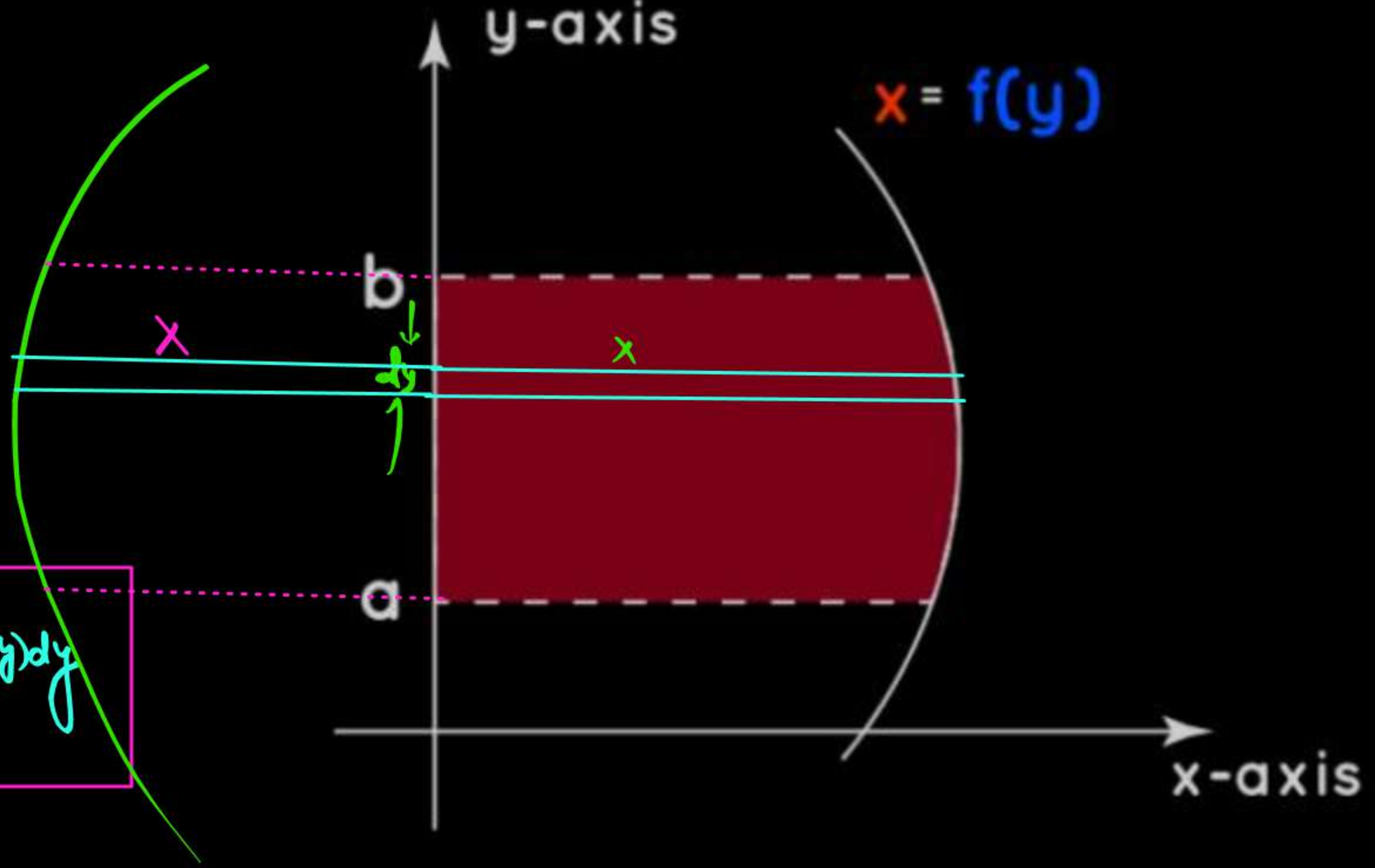
Area under the Curve WRT y axis

$$dA = x \cdot dy$$

$$RA = \int_a^b dA$$

$$RA = 2\int_a^b x \cdot dy$$

$$RA = 2\int_a^b f(y)\,dy$$



Question – CUET 2025 PYQs

The area (in square units) of the region bounded by the curve $x^2 = y$ and the straight line $y = 4$ in the first quadrant is equal to

A. $\frac{3}{2}$

B. $\frac{16}{3}$

C. $\frac{32}{3}$

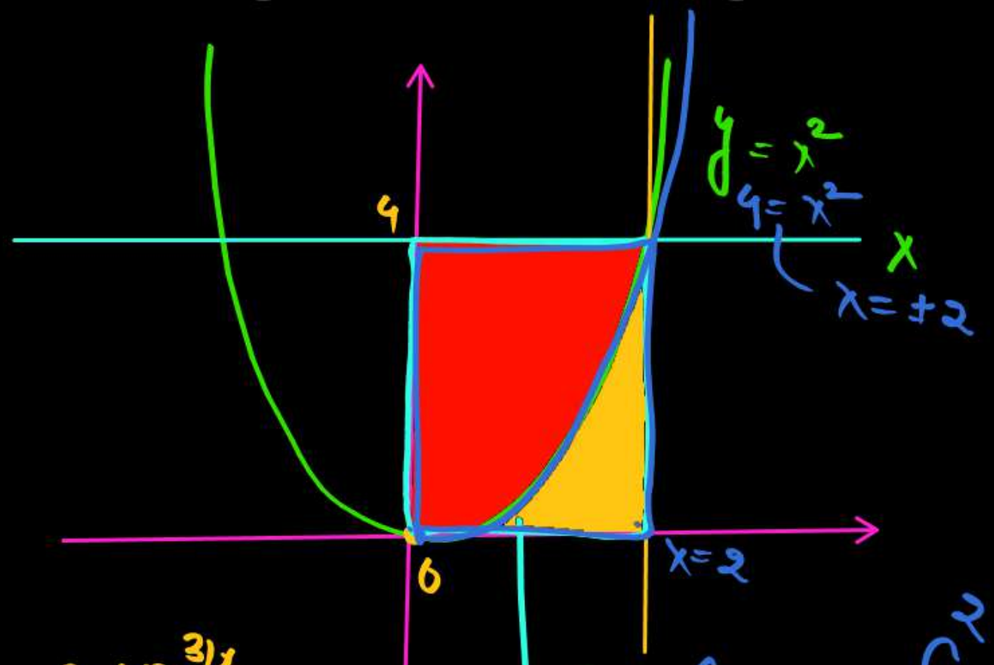
D. $\frac{7}{2}$

$$RA = \int_0^4 x\,dy$$

$$\Rightarrow \int_0^4 \sqrt{y}\,dy \Rightarrow \frac{2}{3} y^{3/2} \Big|_0^4$$

$$\Rightarrow \frac{2}{3}\left[4^{3/2}\right] \Rightarrow \frac{2}{3}\left(2^2\right)^{3/2}$$

$$\Rightarrow 16/3 \text{ sq unit}$$



$$RA = (4 \times 2) - \int_0^2 x^2\,dx$$

$$\Rightarrow 8 - \frac{x^3}{3}\Big|_0^2$$

$$\Rightarrow 8 - \frac{8}{3}$$

$$\Rightarrow \frac{16}{3}$$

Question – CUET 2025 PYQs

Area of the region bounded by $y = x^2$ and the line $y = 16$ is

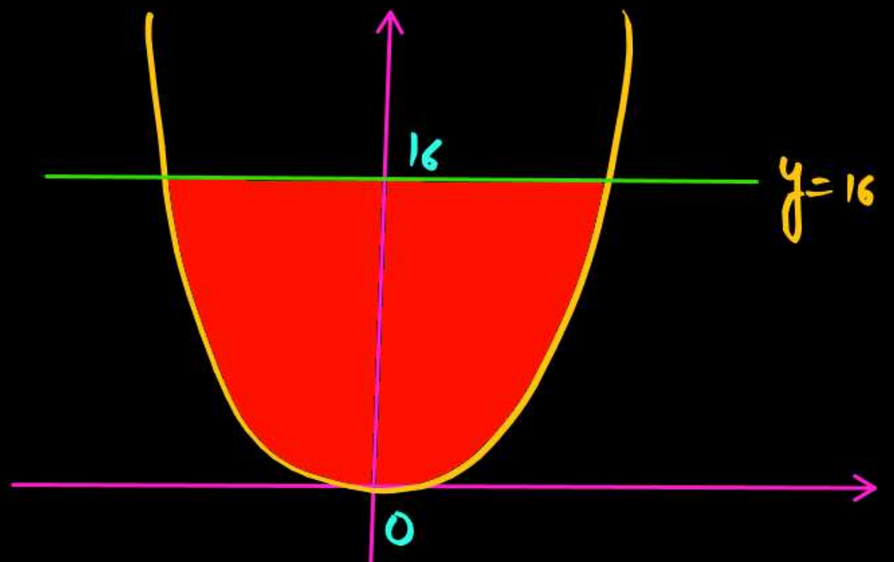
A $\frac{256}{3}$ square units

B $\frac{128}{3}$ square units

C $\frac{64}{3}$ square units

D $\frac{32}{3}$ square units

$x = \sqrt{y}$



$$RA = 2\int_0^{16} x\,dy$$

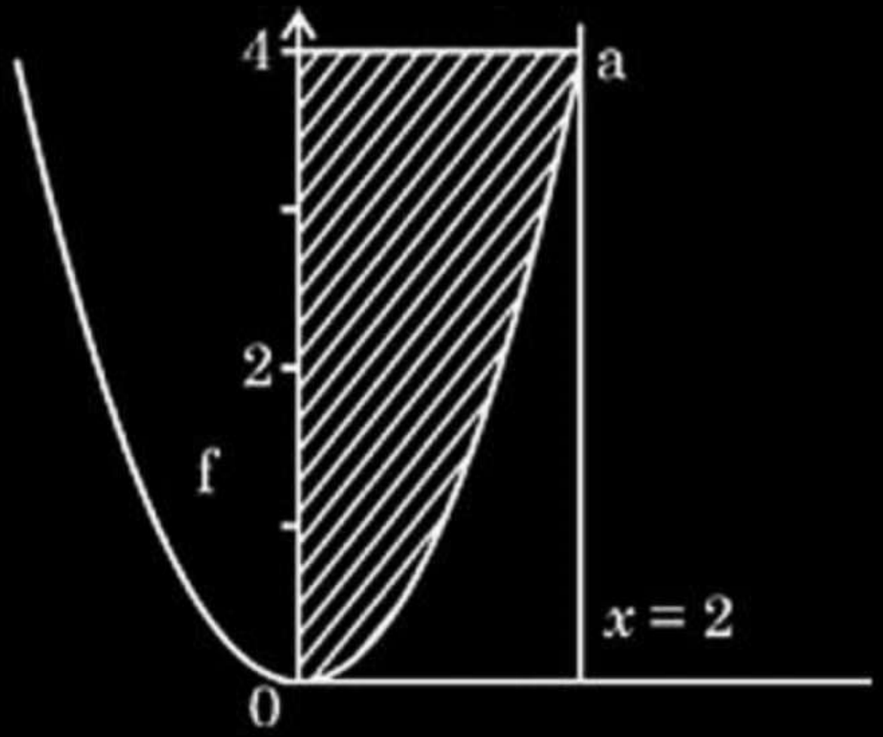
$$\Rightarrow 2\int_0^{16} \sqrt{y}$$

$$\Rightarrow 2 \times \frac{2}{3} y^{3/2} \Big|_0^{16} \Rightarrow \left(\frac{4}{3}\right)(16)^{3/2}$$

$$\Rightarrow \left(\frac{4}{3}\right)(4^2)^{3/2} \Rightarrow \frac{256}{3}\ \text{sq. units}$$

Question – CBSE 2025 PYQs [MCQs]

The area of the shaded region (figure) represented by the curves $y = x^2$, $0 \leq x \leq 2$ and y -axis is given by



A $\int_0^2 x^2\,dx$

B $\int_0^2 \sqrt{y}\,dy$

C $\int_0^4 x^2\,dx$

D $\int_0^4 \sqrt{y}\,dy$

Question – CUET 2025 PYQs

The area (in sq. units) of the region bounded by $y = -1, y = 2, x = y^3$ and $x = 0$ is equal to

A 4

B 8

C $\frac{17}{4}$

D $\frac{15}{4}$

Question – CUET 2025 PYQs

Area of the region bounded by the curve $y^2 = 4x$, y-axis and the line $y = 3$ is equal to

A $\frac{9}{2}$ sq. units

B 9 sq. units

C 2 sq. units

D $\frac{9}{4}$ sq. units

Question – CUET 2025 PYQs

Area (in sq. units) of the region bounded by the curve $y^2 = 4x$, y-axis and the line $y = 3$ is

A $\frac{9}{4}$

B 2

C 3

D $\frac{9}{2}$



Area enclosed by two curve

In our Syllabus

Complicated Region

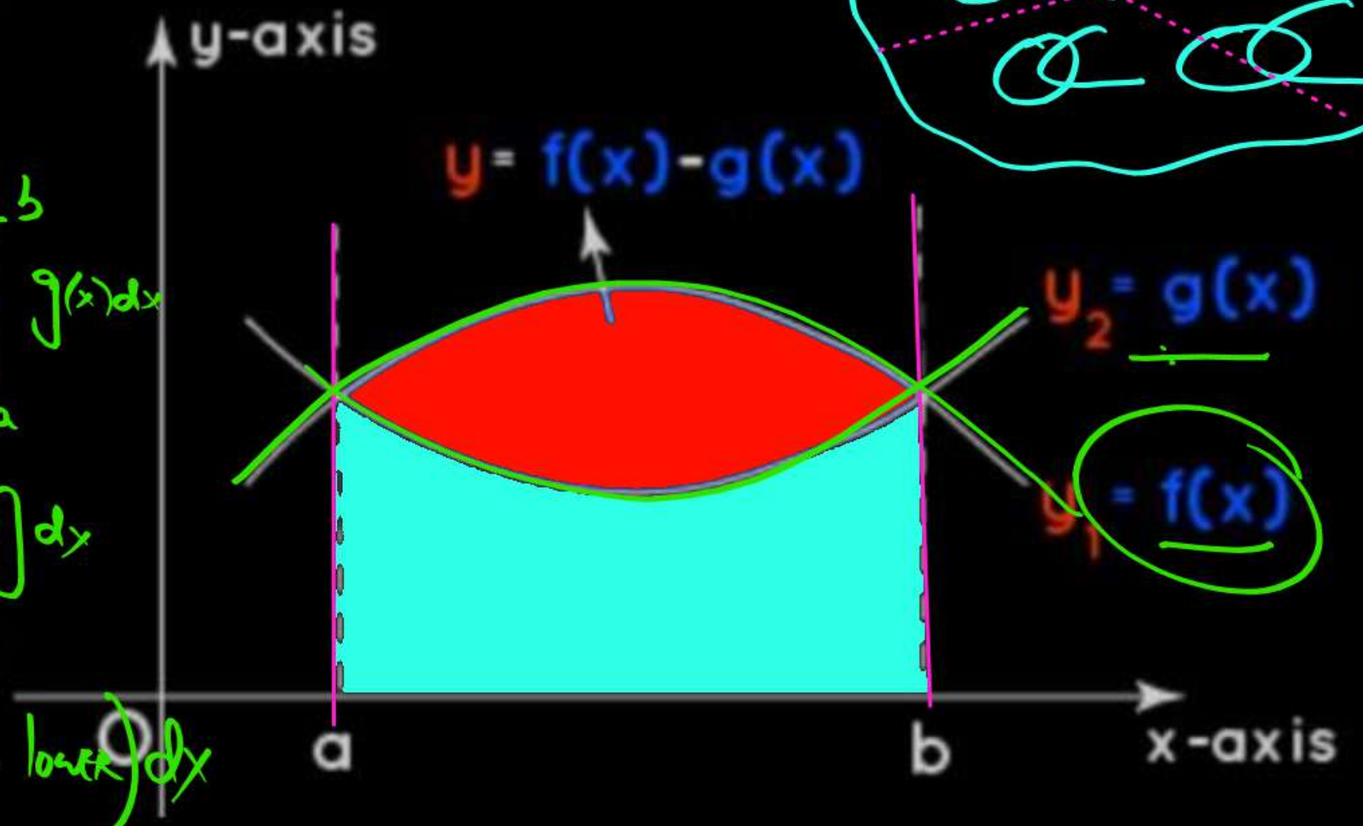
Steps:

1. Find intersection of both the curves
2. Let intersection is x=a & x=b
3. Required Area

$$RA = \int_a^b f(x)\,dx - \int_a^b g(x)\,dx$$

$$\Rightarrow \int_a^b [f(x) - g(x)]\,dx$$

$$\Rightarrow \int_a^b (\text{upper} - \text{lower})\,dx$$



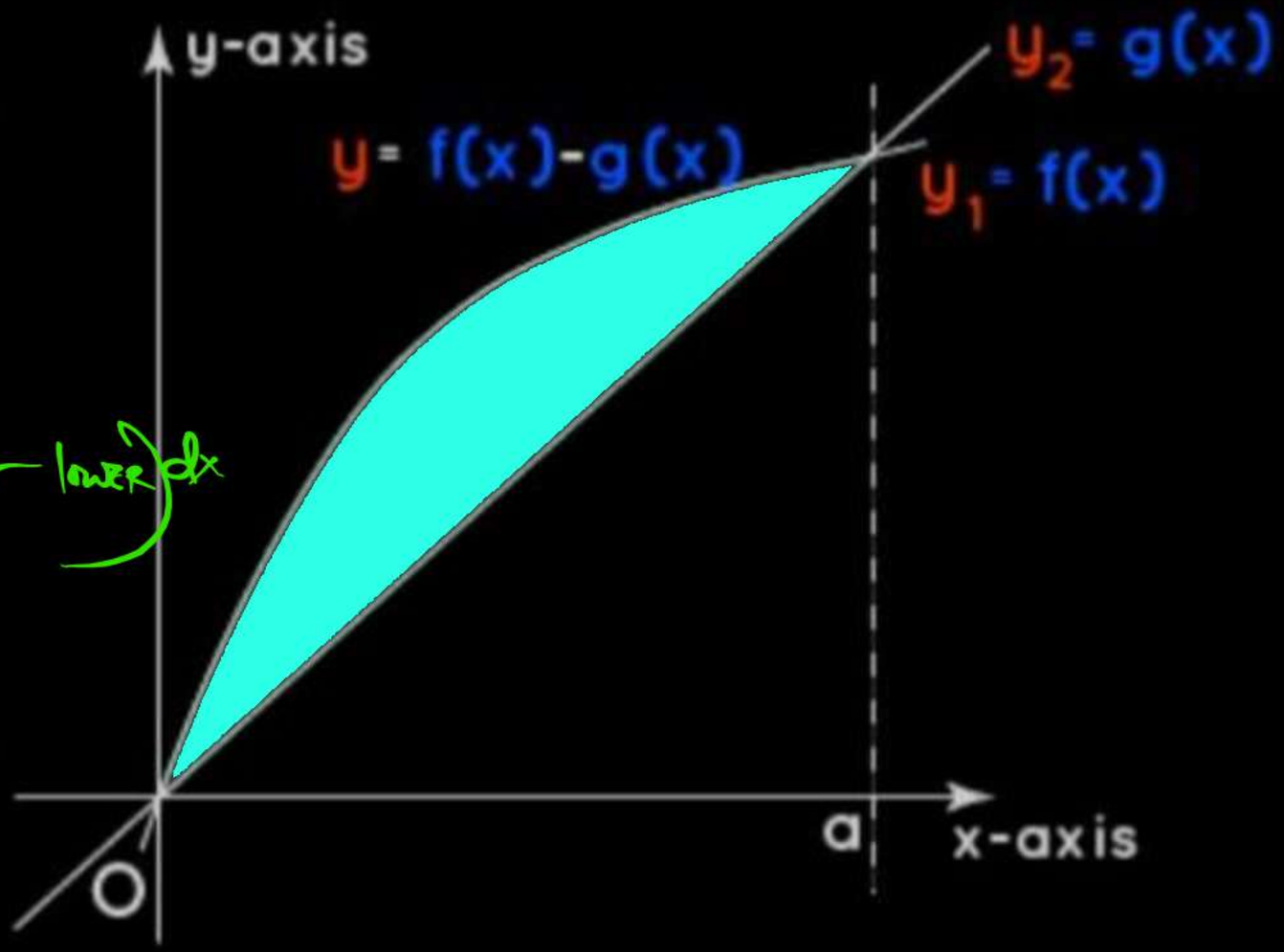


Area enclosed by a line & curve

Steps:

1. **Find intersection of Line and curve**
2. **Let intersection is x=a & x=b**
3. **Required Area**

$$RA = \int_a^b (\text{upper} - \text{lower})\,dx$$



Question – CUET 2025 PYQs

The area (in sq. units) of the region $\{(x, y): 3x^2 \leq y \leq |x|\}$ is equal to

A $\frac{1}{54}$

B $\frac{1}{9}$

C $\frac{1}{27}$

D $\frac{1}{36}$

Question – CUET 2025 PYQs

The area of the region enclosed between the parabola $y = \frac{3x^2}{4}$ and the line $3x - 2y = 12$ is,

A 63 sq. units

B 36 sq. units

C 27 sq. units

D 18 sq. units

Question – CUET 2025 PYQs

The area of the region bounded by the curves $y = x$ and $y = x^3$ is:

A 1 sq. units

B $\frac{3}{4}$ sq. units

C $\frac{1}{2}$ sq. units

D $\frac{1}{4}$ sq. units

Question – CUET 2025 PYQs

Area of the region bounded by the curve $y = \sqrt{x}$ and lines $x + y = 2, y = 0$ is

A $\frac{9}{6}$ square units

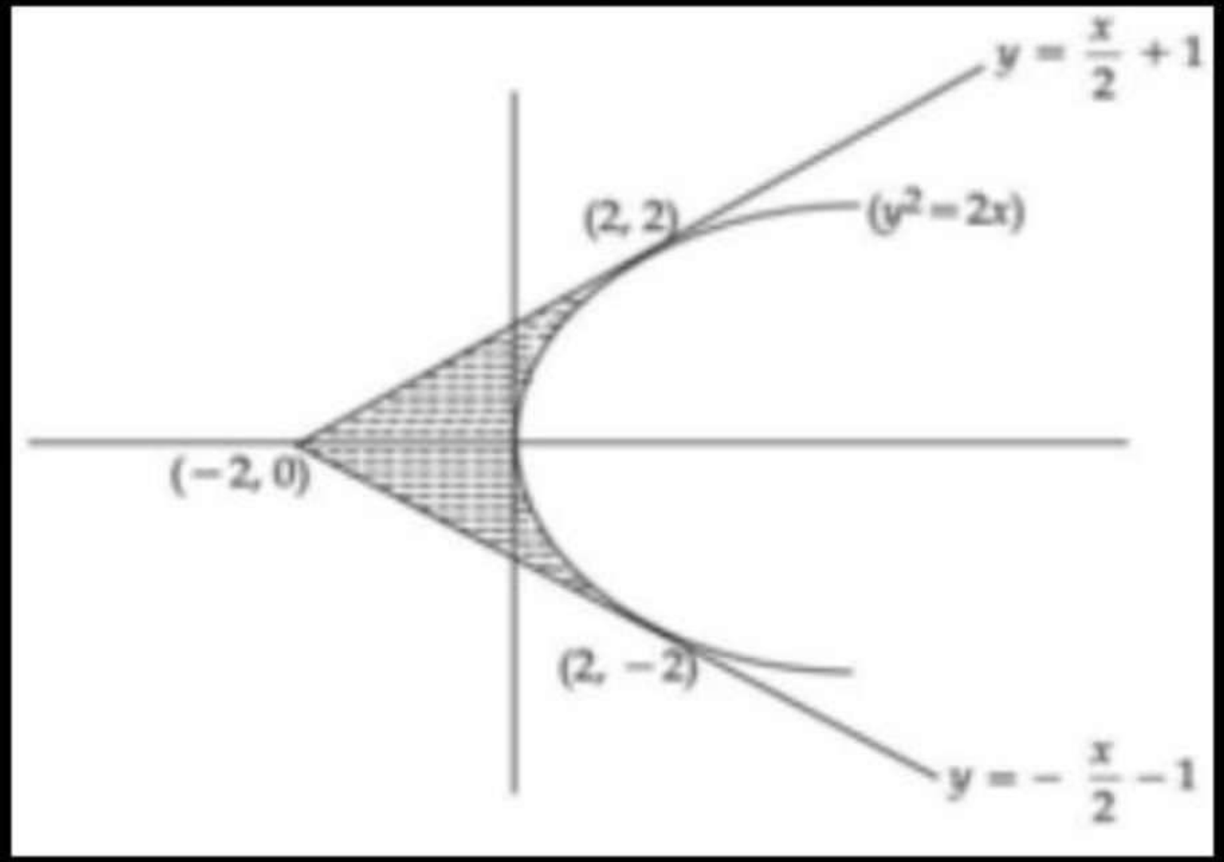
B $\frac{9}{2}$ square units

C $\frac{7}{6}$ square units

D $\frac{7}{3}$ square units

Question

Calculate the shaded area as given below :



A $\frac{8}{3}$ sq. units

B $\frac{8}{5}$ sq units

C 3 sq. units

D 8 sq. units

The area of the region bounded by the parabola $y = x^2$ and $y = |x|$ is

परवलय $y = x^2$ और $y = |x|$ से घिरे क्षेत्र का क्षेत्रफल है

A $\frac{2}{3}$ sq. units

B $\frac{4}{3}$ sq. units

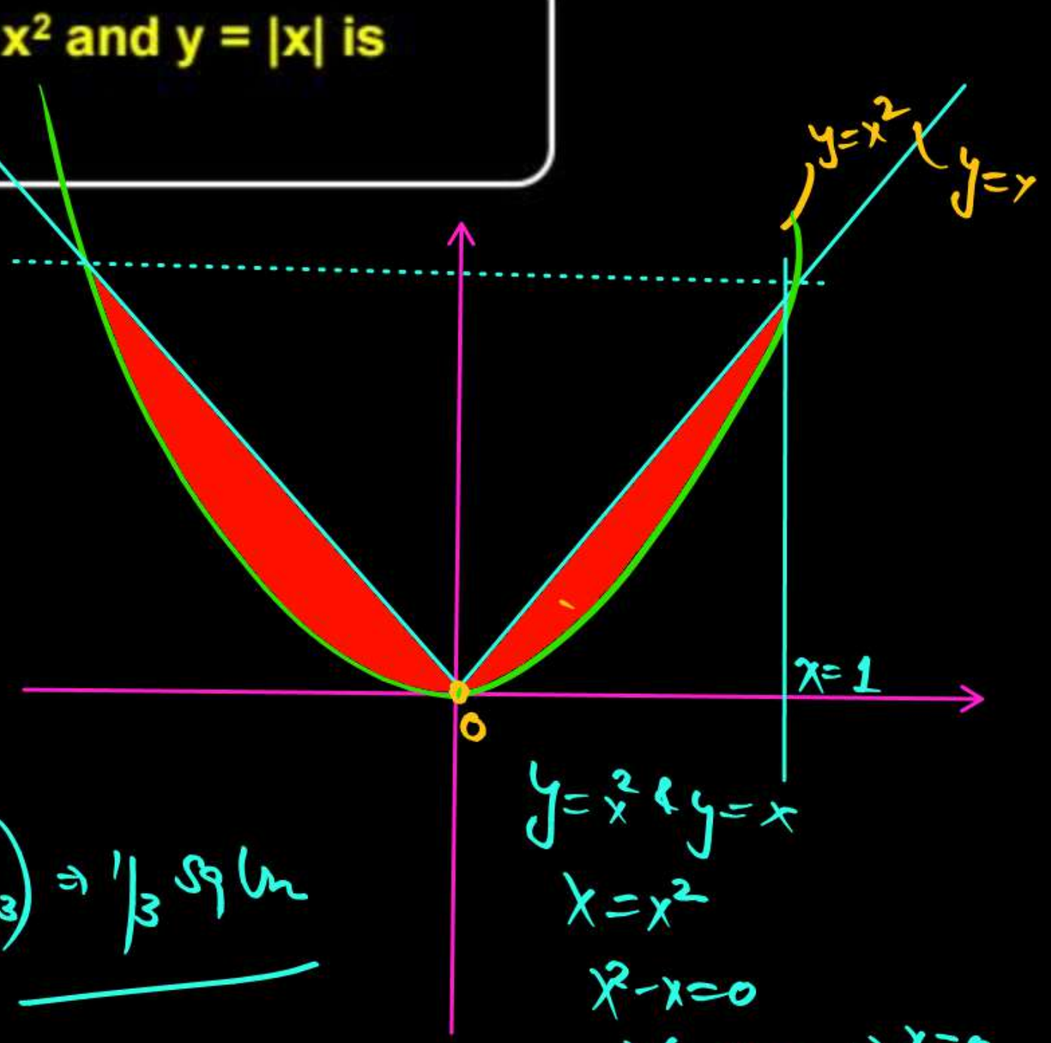
C $\frac{5}{3}$ sq. units

D $\frac{1}{3}$ sq. units

$$RA = 2\int_0^1 (x - x^2)\,dx$$

$$\Rightarrow 2\left[\frac{x^2}{2} - \frac{x^3}{3}\right]_0^1$$

$$\Rightarrow 2\left[\frac{1}{2} - \frac{1}{3}\right] \Rightarrow 2\left(\frac{1}{6}\right) \Rightarrow 1/3 \text{ sq. unit}$$



$y = x^2$ & $y = x$

$x = x^2$

$x^2 - x = 0$

$x(x-1) = 0 \Rightarrow x = 0$

$x = 1$



Area enclosed by the Parabola & its latus rectum

Area enclosed by the curve parabola $y^2 = 4ax$ and its latus rectum is

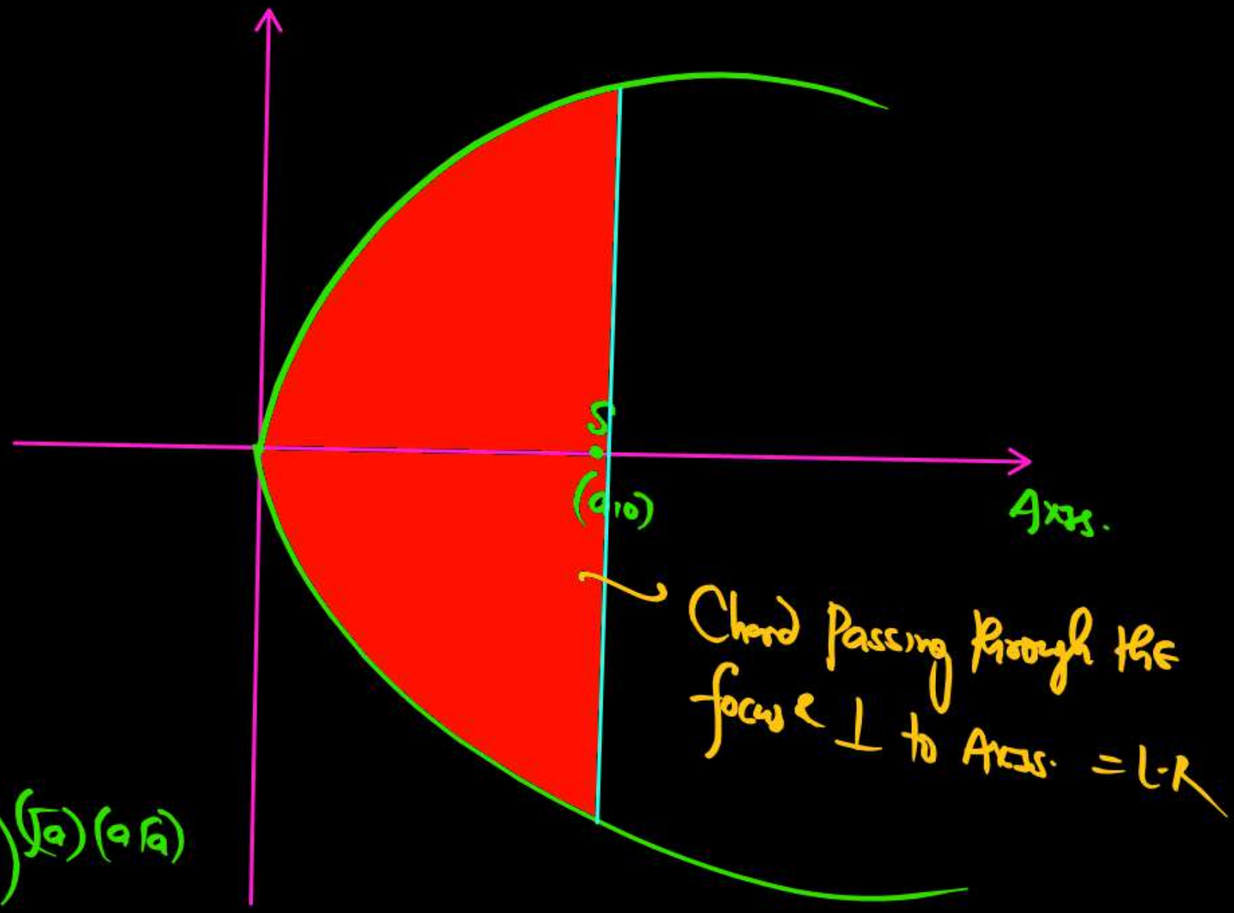
$$RA = \frac{8}{3} \cdot a^2$$

$$RA = 2\int_0^a y\,dx = 2\int_0^a \sqrt{4ax}\,dx$$

$$\Rightarrow 2(2\sqrt{a}) \cdot \frac{2}{3} \cdot x^{3/2} \Big|_0^a$$

$$\Rightarrow \left(\frac{4}{3}\sqrt{a}\right) a^{3/2} \quad 2\left(\frac{4}{3}\right)(\sqrt{a})(a\sqrt{a})$$

$$\Rightarrow \frac{8}{3}a^2$$



Question – CUET 2025 PYQs

The area (in sq. units) bounded by the parabola $y^2 = 4ax$, its latus rectum and the x-axis in the first quadrant is:

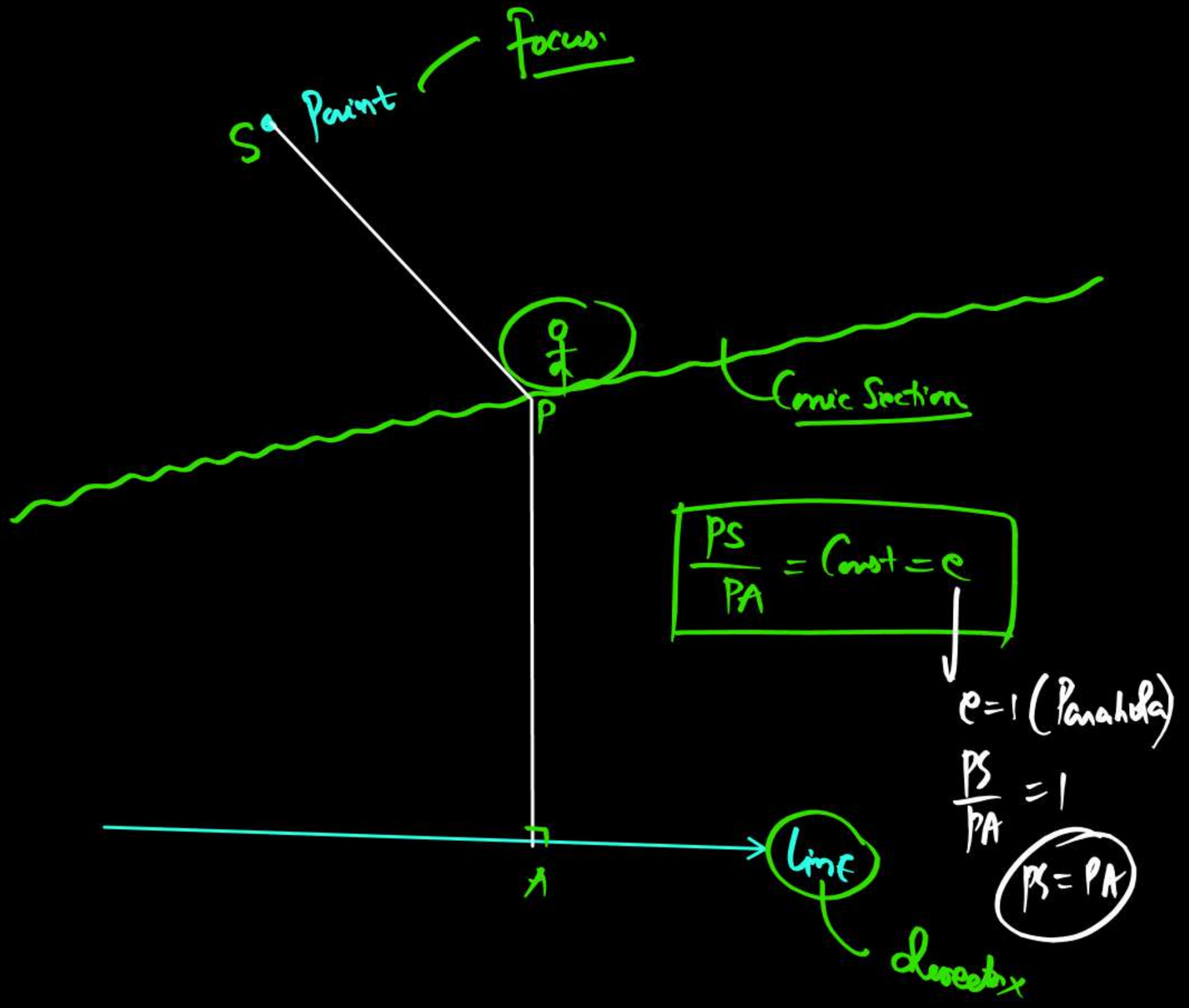
A $\frac{1}{3}a^2$

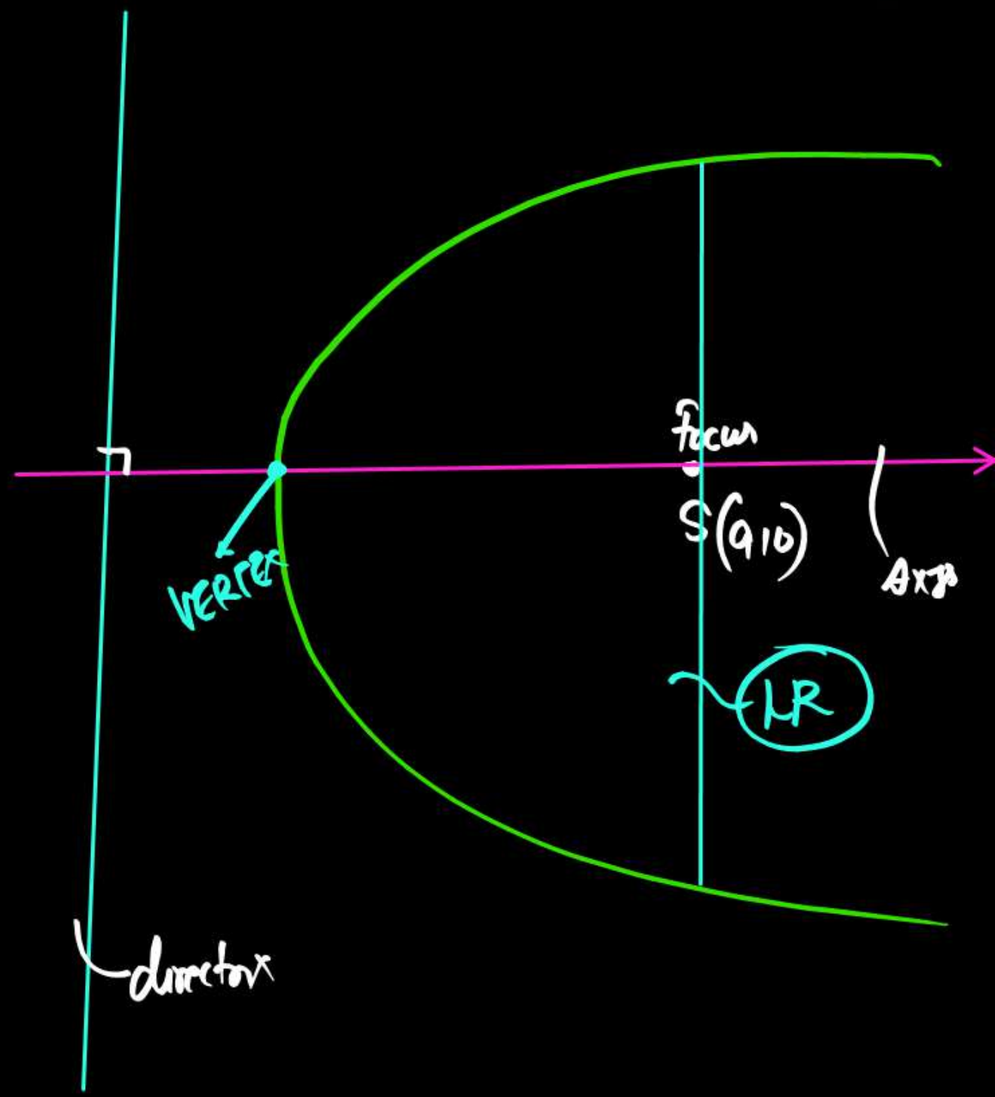
B $\frac{2}{3}a^2$

C $\frac{4}{3}a^2$

D $\frac{8}{3}a^2$

$\left(\frac{8}{3}a^2\right) * \frac{1}{2}$


S
Point
Focus
P
Conic Section
$\frac{PS}{PA} = \text{Const} = e$
e=1 (Parabola)
$\frac{PS}{PA} = 1$
PS = PA
A
Line
directrix


focus
S(a,0)
Axis
vertex
LR
directrix

Question – CUET 2025 PYQs

The area of the region bounded by the parabola $y^2 = 8x$ and its latus rectum in the first quadrant, is

A $\frac{8}{3}$ sq. units

B $\frac{32}{3}$ sq. units

C $\frac{16\sqrt{2}}{3}$ sq. units

D $\frac{16}{3}$ sq. units

$y^2 = 8x$

$4ax$

$4a = 8$

$a = 2$

$\left(\frac{8}{3}a^2\right) * \frac{1}{2}$

$\Rightarrow \frac{4}{3}a^2 \Rightarrow \frac{4}{3}(2^2)$

$\Rightarrow 16/3$

Question – CUET 2025 PYQs

The area (in sq. units) bounded by the parabola $y^2 = 16x$ and its latus rectum is

$= 4ax$

$4a = 16$

$a = 4$

A) 64 Sq. units

B) $\frac{32}{3}$ Sq. units

C) $\frac{64}{3}$ Sq. units

D) $\frac{128}{3}$ Sq. units

$\frac{8}{3}a^2 \Rightarrow \frac{8}{3} * 16$

$\Rightarrow \frac{128}{3}$

Question

Area bounded by $x = \frac{y^2}{4}$ and its latus rectum is :

$y^2 = 4x = 4ax$

$a = 1$



A $\frac{2}{3}$ sq. units

B $\frac{8}{3}$ sq. units

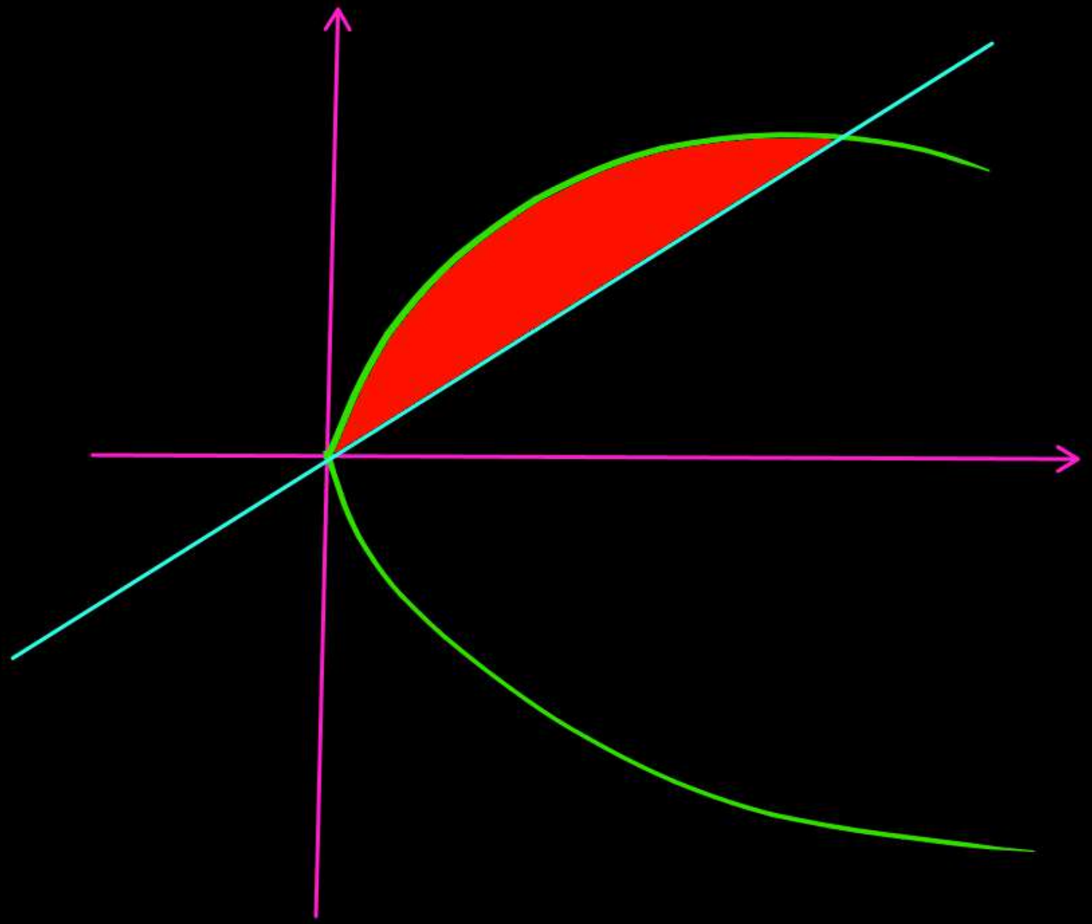
C $\frac{1}{3}$ sq. units

D 2 sq. units



Area enclosed by the parabola $y^2=4ax$ & line $y=mx$

$$A = \frac{8}{3}\frac{a^2}{m^3}$$



Question

The area lying between the curves $y^2 = 4x$ and $y = 2x$ is :

$y^2 = 4x$

$= 4ax$

$4a = 4$

$a = 1$

$y = 2x$

$m = 2$

$A = \frac{8}{3}\left(\frac{a^2}{m^3}\right)$

$\Rightarrow \frac{8}{3} * \frac{1}{8} \rightarrow \frac{1}{3}$

A $\frac{2}{3}$

B 1

C $\frac{1}{3}$

D $\frac{1}{4}$

Question

If the area bounded by the curve $y^2 = 16x$ and the line $y = mx$ is $\frac{2}{3}$ sq.units, then value of m is:

$y^2 = 16x$

$= 4ax$

$4a = 16$

$a = 4$

A 1

B 2

C 3

D 4

$A = \frac{8}{3}\frac{a^2}{m^3}$

$\frac{2}{3} = \frac{8}{3}\left(\frac{16}{m^3}\right)$

$m^3 = 64 \Rightarrow m = 4$

Question

C

Area bounded by the curves $y^2 = 9x$ and $y = 3x$ is :

$= 4ax$

$4a = 9$

$a = 9/4$

$y = mx$

$m = 3$

A $\frac{2}{3}$ sq units

B $\frac{1}{3}$ sq units

C $\frac{1}{2}$ sq units

D 2 sq units

$$RA = \frac{8a^2}{3m^3} \Rightarrow \frac{8}{3}\left(\frac{9}{4}\right)^2 * \frac{1}{3^3}$$

$$\Rightarrow \frac{8}{3} * \frac{81}{16} * \frac{1}{27} \Rightarrow 1/2$$

Question – CUET 2025 PYQs

The area of the region bounded by the parabola $y^2 = x$ and the straight line $2y = x$ is

A. 7/3 sq. units

B. 5/3 sq. units

C. 4/3 sq. units

D. 2/3 sq. units

$y^2 = 4ax$

$4a = 1$

$a = 1/4$

$2y = x$

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

$m = 1/2$

$A = \frac{8}{3} * \left(\frac{1}{4}\right)^2 * \frac{1}{\left(\frac{1}{2}\right)^3}$

$\Rightarrow \frac{8}{3} * \frac{1}{16} * 8$

$\Rightarrow 4/3$

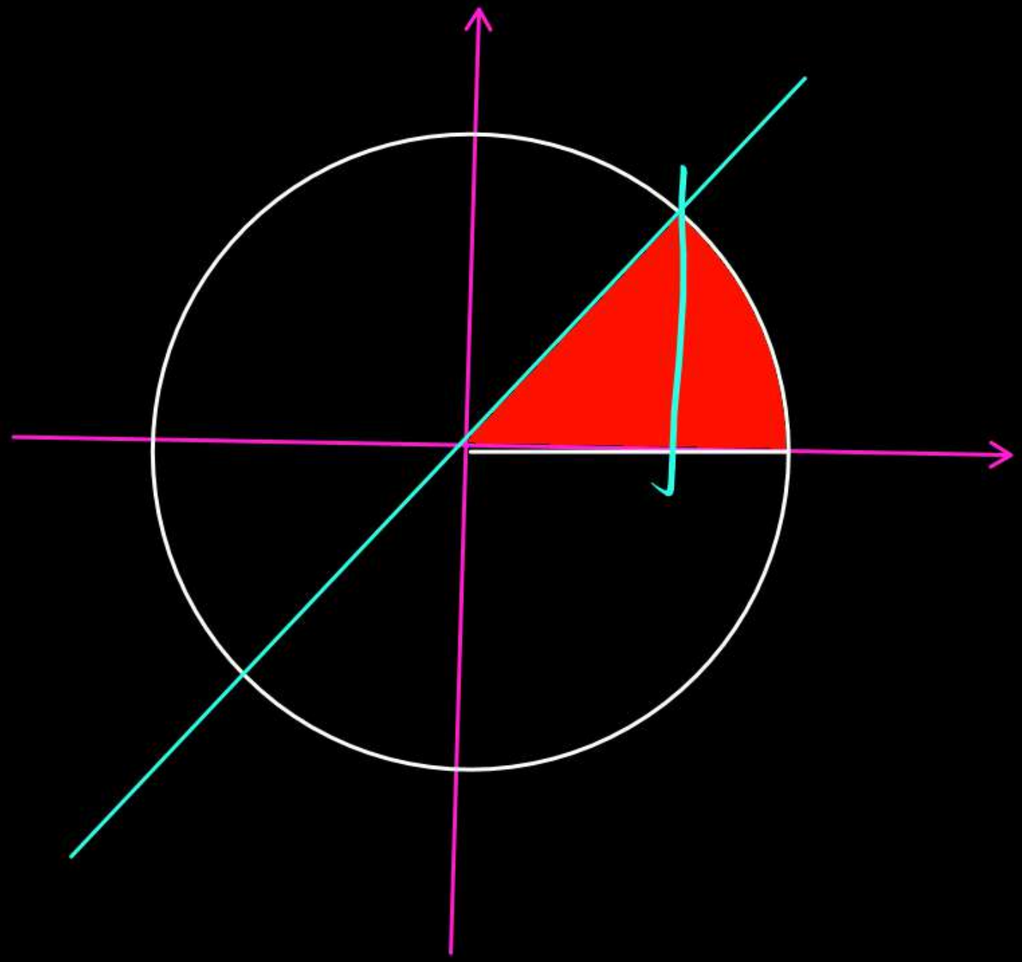


Area enclosed by the Std Circle & line y=mx

Area enclosed by the circle $x^2 + y^2 = a^2$ and line $y = mx$ is

$m = \tan\theta \Rightarrow \theta$

$$A = \frac{1}{2} \cdot \theta \cdot a^2$$



Q) $x^2 + y^2 = 4$ & $y = x$ $\quad m = 1$

$\tan\theta = 1$

$A = \frac{1}{2} * \theta * a^2$ $\quad \theta = \pi/4$

$\Rightarrow \frac{1}{2} * \pi/4 * 4 \Rightarrow \pi/2$

Question

Find the area of the region bounded by the curves $x^2 + y^2 = 4, y = \sqrt{3}x$ and x-axis in the first quadrant.

$m = \sqrt{3}$

$\tan\theta = \sqrt{3} \Rightarrow \theta = \frac{\pi}{3}$

[CBSE Sample Paper 2021]

$\frac{1}{2} \cdot \theta \cdot r^2$

$\Rightarrow \frac{1}{2} \cdot 4^2 * \frac{\pi}{3}$

$\Rightarrow \frac{2\pi}{3}$

Question

Using integration, find the area of region bounded by line $y = \sqrt{3}x$, the curve $y = \sqrt{4 - x^2}$ and y-axis in first quadrant.

[CBSE 2023(65/2/1)]

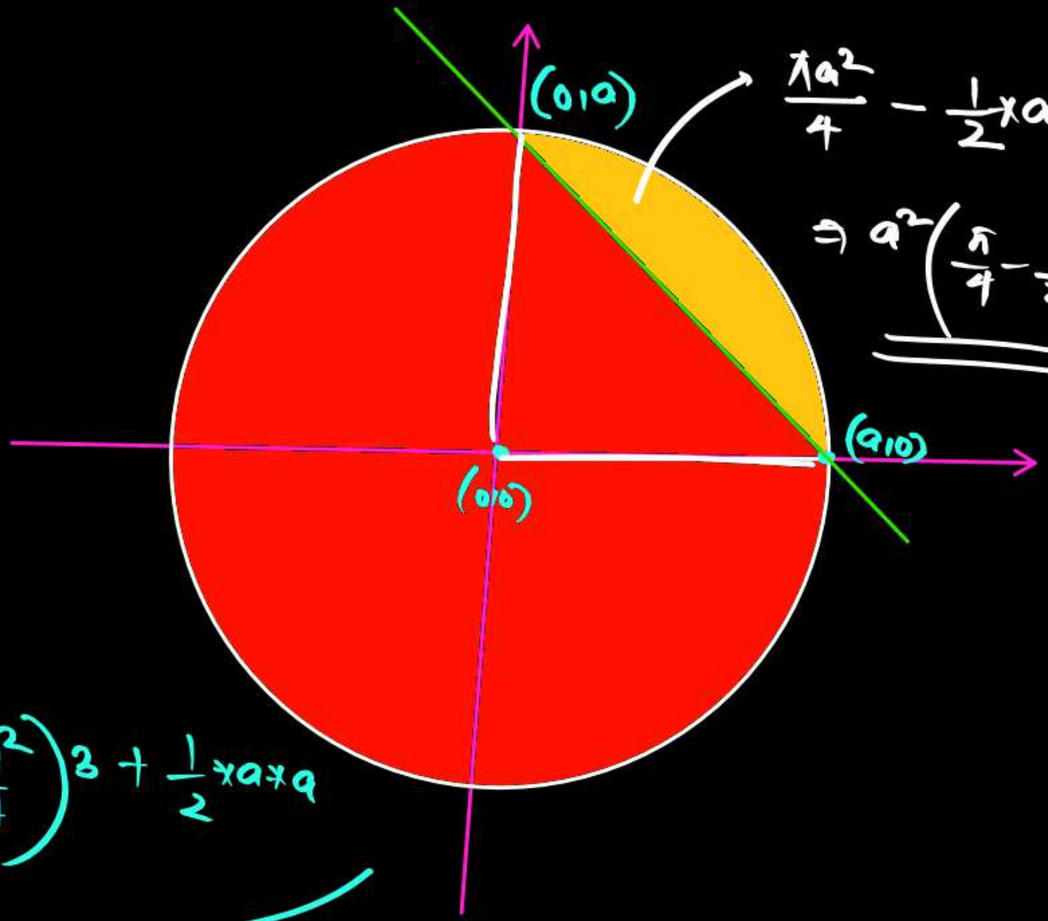


Area enclosed by Std circle & Line

Area enclosed by the circle $x^2 + y^2 = a^2$ and line $x + y = a$ is

$$\left[\begin{array}{l} x^2+y^2=a^2 \\ \frac{x}{a}+\frac{y}{a}=1 \end{array}\right]$$

Small Area $= a^2\left[\frac{\pi}{4}-\frac{1}{2}\right]$



$\frac{\pi a^2}{4} - \frac{1}{2}\times a\times a$

$\Rightarrow a^2\left(\frac{\pi}{4}-\frac{1}{2}\right)$

Bigger Portion $\Rightarrow \left(\frac{\pi a^2}{4}\right)3 + \frac{1}{2}\times a\times a$

Question: CUET 2023

The area of the region $\{(x, y): x^2 + y^2 \leq 1 \leq x + y\}$ is :

A $\left(\frac{\pi}{4} - \frac{1}{2}\right)$

B $\left(\frac{\pi}{4} + \frac{1}{2}\right)$

C $\left(\frac{\pi}{2} - \frac{1}{2}\right)$

D $\left(\frac{\pi}{2} + \frac{1}{2}\right)$

Question – CUET 2025 PYQs

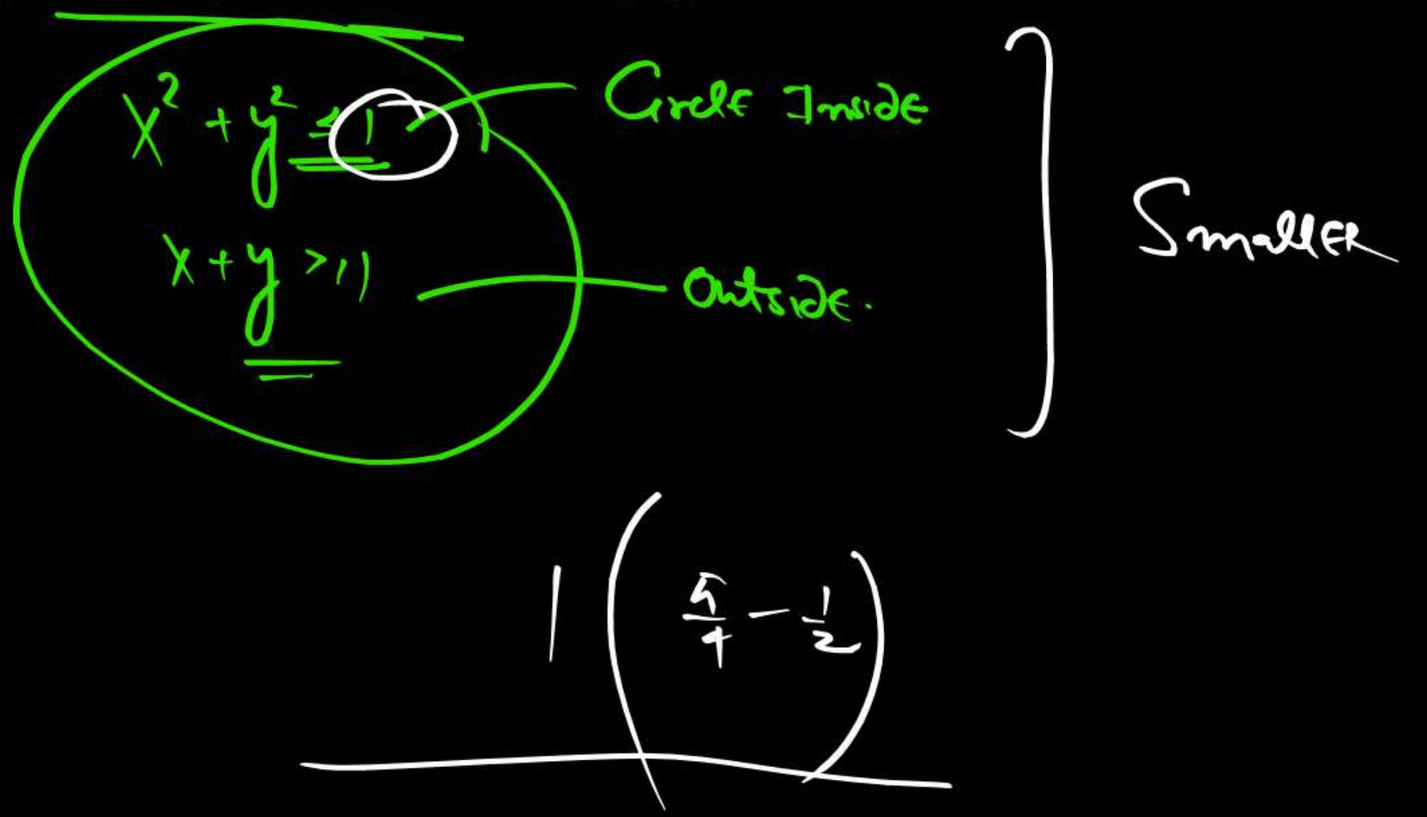
The area of the region $\{(x, y): x^2 + y^2 \leq 1 \leq x + y\}$ is

A $\left(\frac{\pi}{2} - 1\right)$ sq. unit

B $\frac{1}{2}(\pi - 1)$ sq. unit

C $\frac{1}{2}\left(\frac{\pi}{2} - 1\right)$ sq. unit

D $(\pi - 1)$ sq. unit



C

Q. The smaller of the areas enclosed by the circle $x^2 + y^2 = 4$ and the line $x + y = 2$ is:

(1) $2(\pi - 2)$

(2) $\pi - 2$

(3) $2\pi - 1$

(4) $2\pi + 2$

$4\left(\frac{\pi}{4} - \frac{1}{2}\right)$

$\Rightarrow (\pi - 2)$

A 1

B 3

C 2

D 4



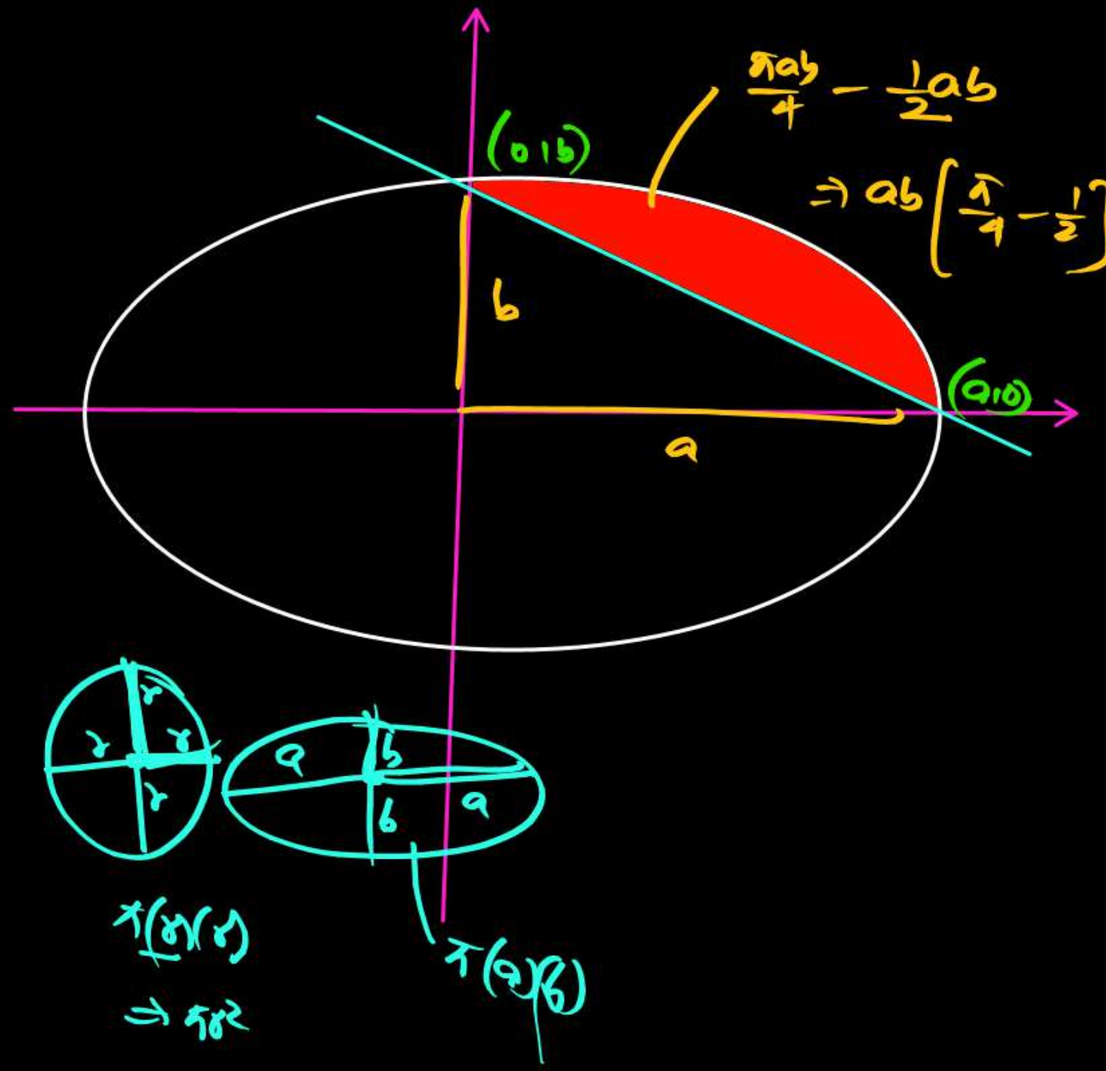
Area enclosed by Std ellipse & Line

Area enclosed by the Ellipse

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1 \quad \&$$

$$\frac{x}{a}+\frac{y}{b}=1$$

Smaller: $\left(\frac{\pi}{4}-\frac{1}{2}\right)\cdot ab$



Q. The least area enclosed by line $\frac{x}{a}+\frac{y}{b}=1$ and curve $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, is :

(1) $\frac{1}{2}ab(\quad -2)$

(2) $\frac{3}{4}ab(\quad -2)$

(3) $\frac{ab}{4}(\pi-2)$

(4) $\frac{ab}{4}(\pi-1)$

$ab\left(\frac{\pi}{4}-\frac{1}{2}\right)$

A 1

B 2

C 3

D 4

Question – CUET 2025 PYQs

The area (in sq. units) of the bigger portion of region enclosed by the curves $4x^2 + 9y^2 = 36$ and $2x + 3y = 6$ is

A $\frac{3}{2}(\pi - 2)$

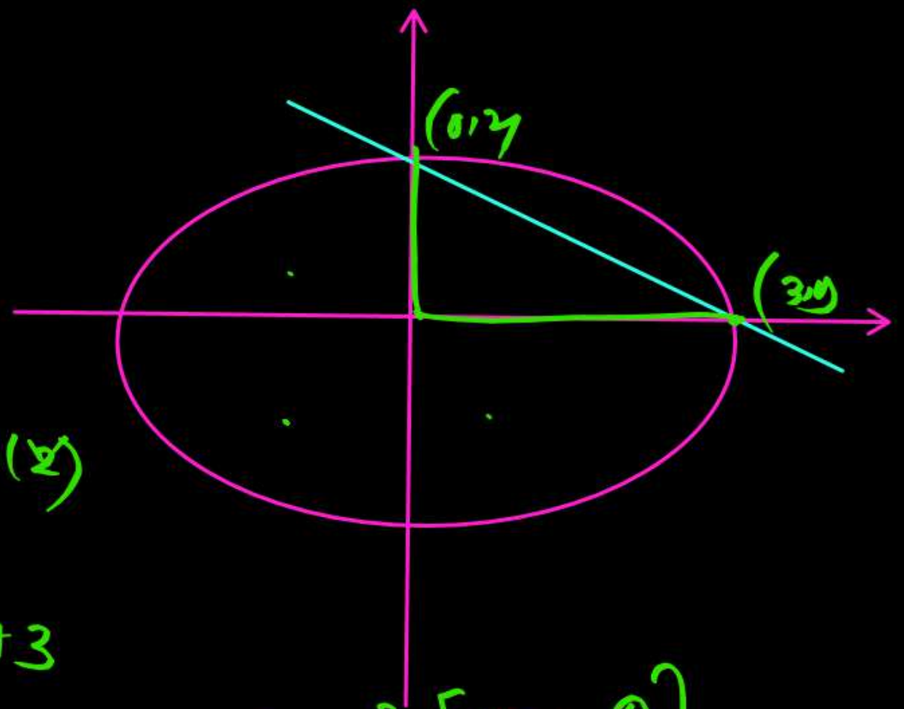
B $\frac{3}{2}(3\pi + 2)$

C 6π

D $3\pi + 3$

$\frac{x^2}{9} + \frac{y^2}{4} = 1$

$\frac{x}{3} + \frac{y}{2} = 1$



Bigger: $\left(\frac{\pi \cdot 3 \cdot 2}{4}\right) * 3 + \frac{1}{2} * (3)(2)$

$\Rightarrow \frac{\pi}{4}(3)(4) * 3 + 3$

$\Rightarrow \left(\frac{9\pi}{2} + 3\right)$

$\Rightarrow \frac{3}{2}[3\pi + 2]$

Question – CUET 2025 PYQs

The area of the smaller region bounded by the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ and the straight line $3x+4y=12$ is:

A $(6\pi-3)$ sq units

B $(3\pi+6)$ sq units.

C $(6\pi+3)$ sq units

D $(3\pi-6)$ sq units

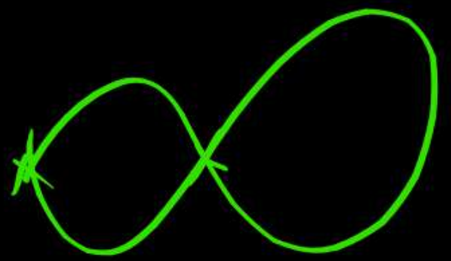
$4*3\left(\frac{\pi}{4}-\frac{1}{2}\right)$

$3\pi-6$



AREA OF Closed Curve

1. Draw the graph
2. Automatically closed curve ban jayega
3. Just find out points
4. Find area



Find the area bounded by the lines y = ||x| - 1| and the x-axis.

y = ||x| - 1 और x-अक्ष रेखाओं से घिरा हुआ क्षेत्रफल ज्ञात कीजिए।

$y = |x|$

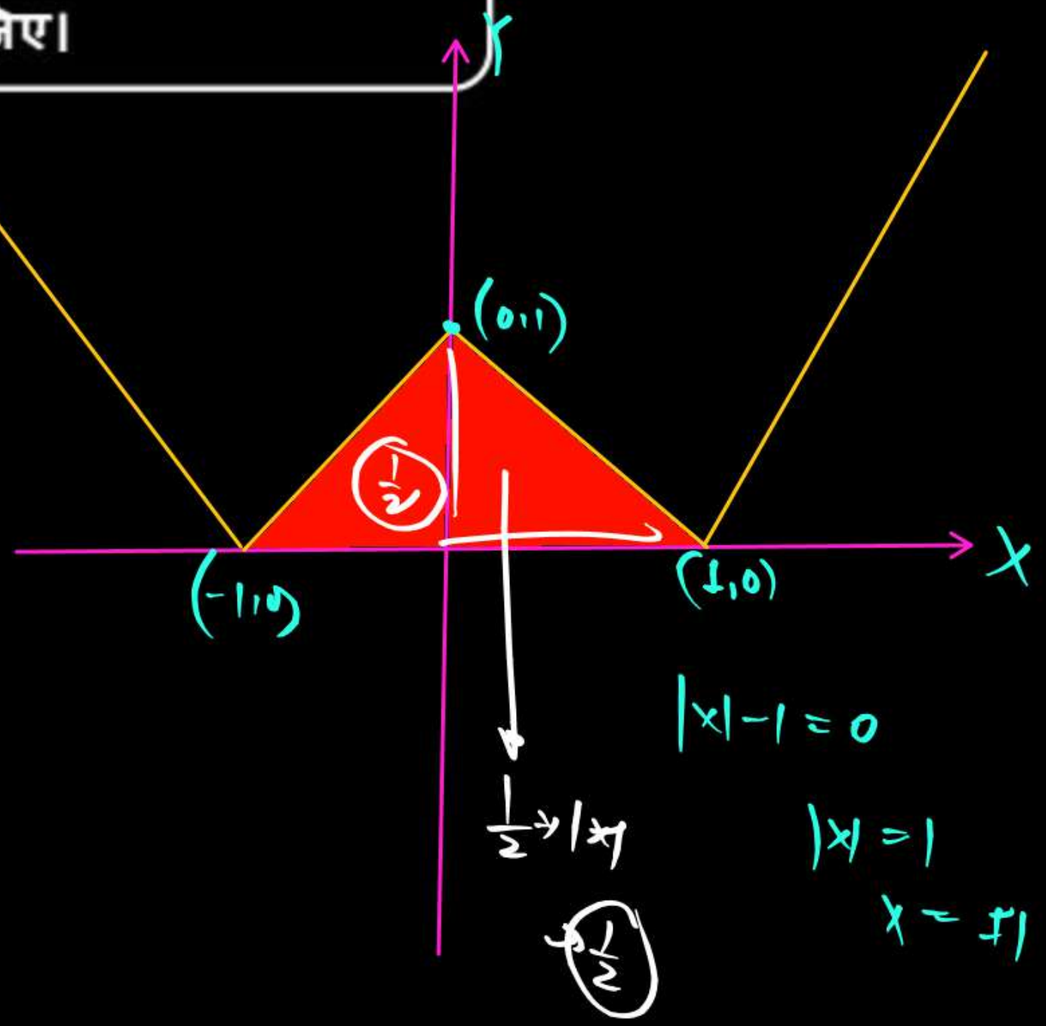
$\downarrow$

$|x| - 1$

$\downarrow$

$y = \big||x| - 1\big|$

Ans: 1



Question – CUET 2025 PYQs

The area bounded by the x-axis and the parabola $y = 3x - x^2$ is:

(A) $\frac{27}{2}$ Sq.unit

(B) $\frac{9}{2}$ Sq.unit

(C) $\frac{15}{2}$ Sq.unit

(D) $\frac{11}{2}$ Sq.unit

$3x - x^2 = 0$

$x = 0$

$x = 3$

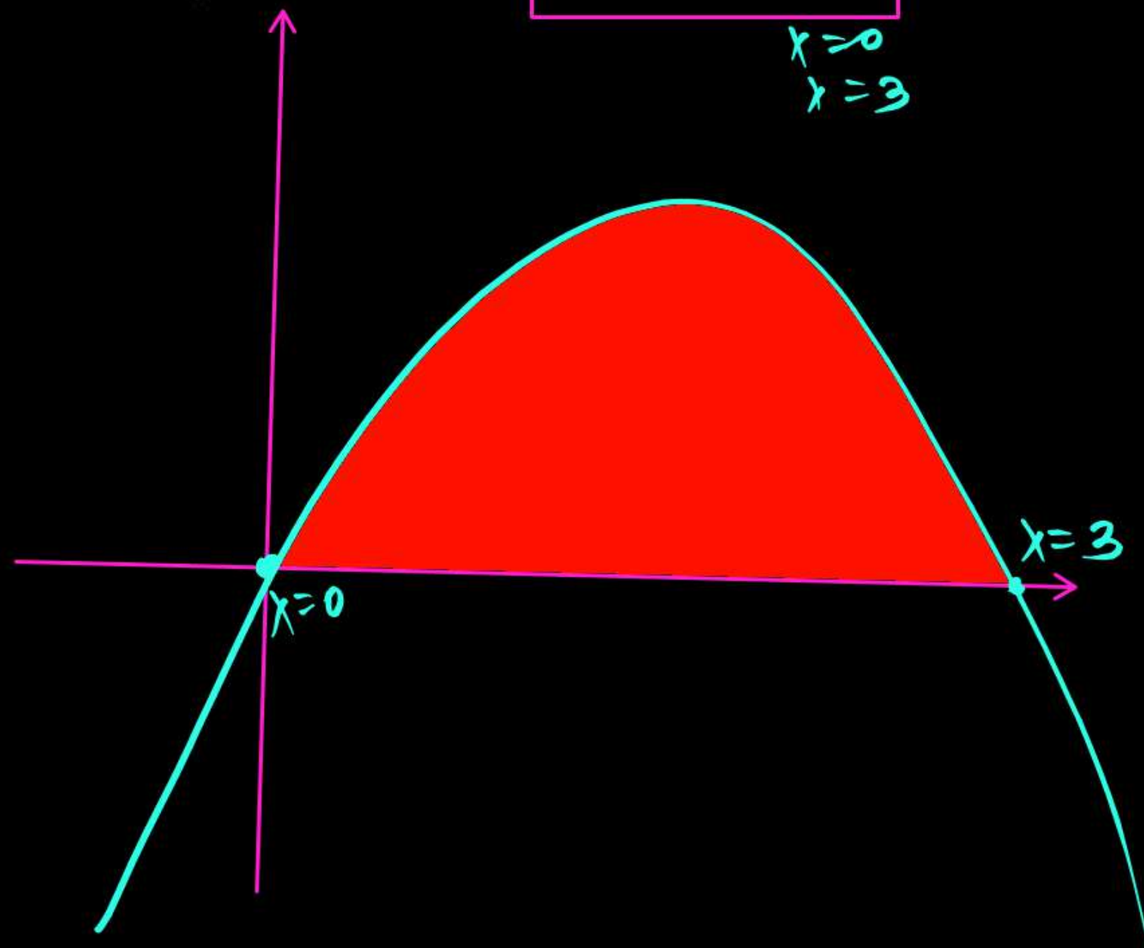
$$RA = \int_0^3 (3x - x^2)\,dx$$

$$= \left(\frac{3x^2}{2} - \frac{x^3}{3}\right)_0^3$$

$$= \frac{3}{2}\left(3^2 - \frac{27}{3}\right)$$

$$= \frac{9}{2}(9 - 9)$$

$$= 0$$



Question – CUET 2025 PYQs

The area bounded by the curve $y = 4 + 3x - x^2$ and x - axis is equal to

A $\frac{125}{6}$ Sq. units

B $\frac{125}{3}$ Sq. units

C $\frac{125}{2}$ Sq. units

D $\frac{121}{6}$ Sq. units

The area bounded by $y = -x^2 + 2x + 3$ and $y = 0$ is

$y = -x^2 + 2x + 3$ और $y = 0$ से घिरा हुआ क्षेत्रफल क्या है?

A 32 sq. units

B $\frac{32}{3}$ sq. units

C $\frac{1}{32}$ sq. units

D $\frac{1}{3}$ sq. unit



AREA OF |x|+|y|=a

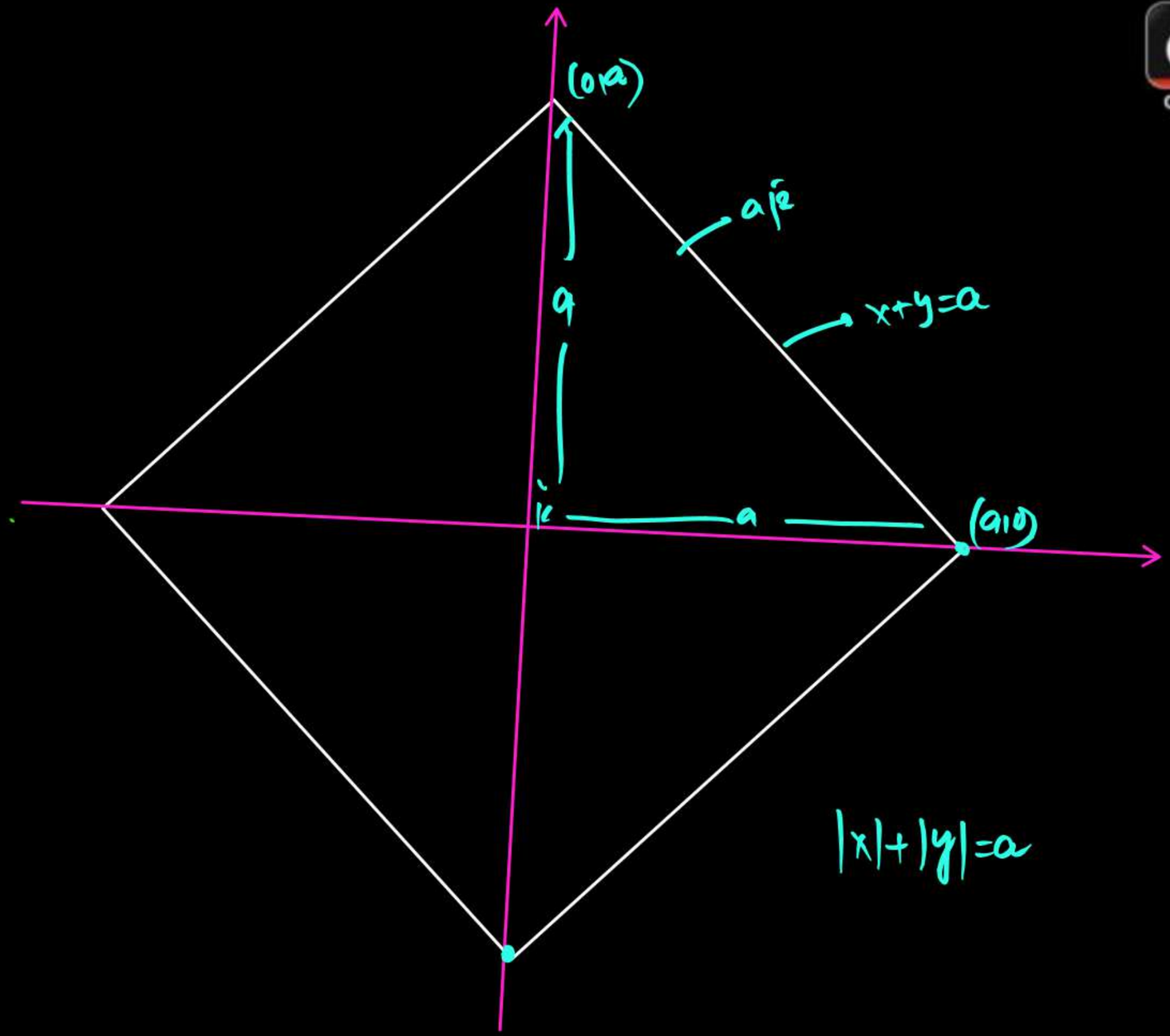
↓

Graph of Square

↓

Side : $(a\sqrt{2})$ Unit.

$A = (a\sqrt{2})^2$



$|x|+|y|=a$

Question

Area of the region bounded by $|x| + |y| \leq 2$ is :

A 16

B 4

C 12

D 8 ✓

Square

$a = |2|^2$

$A = (2)^2 = 4$

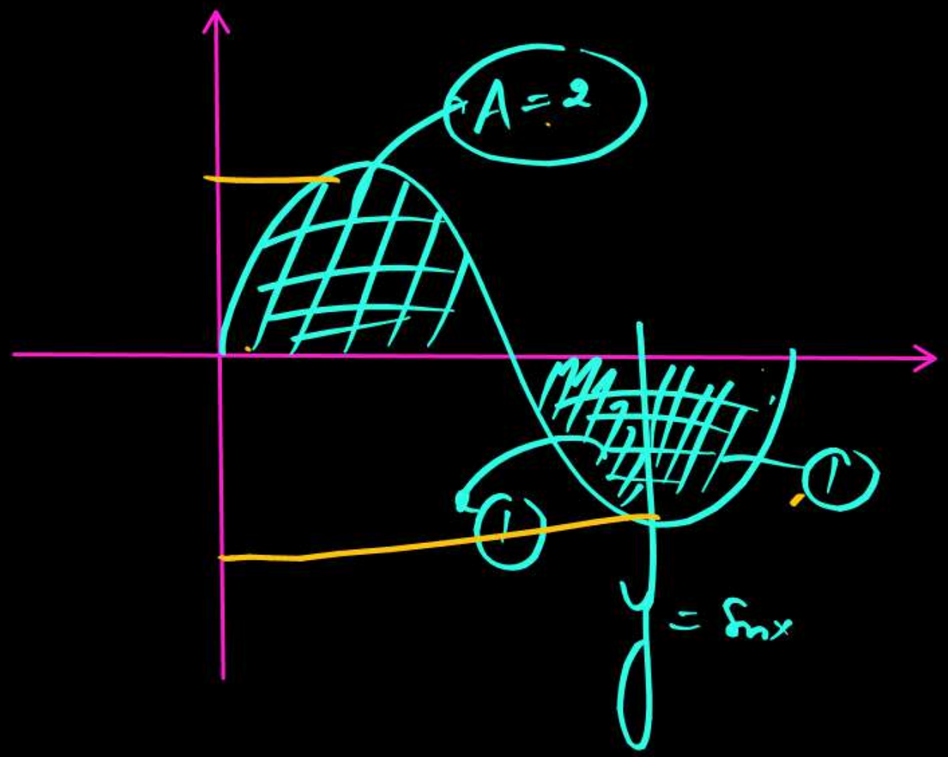


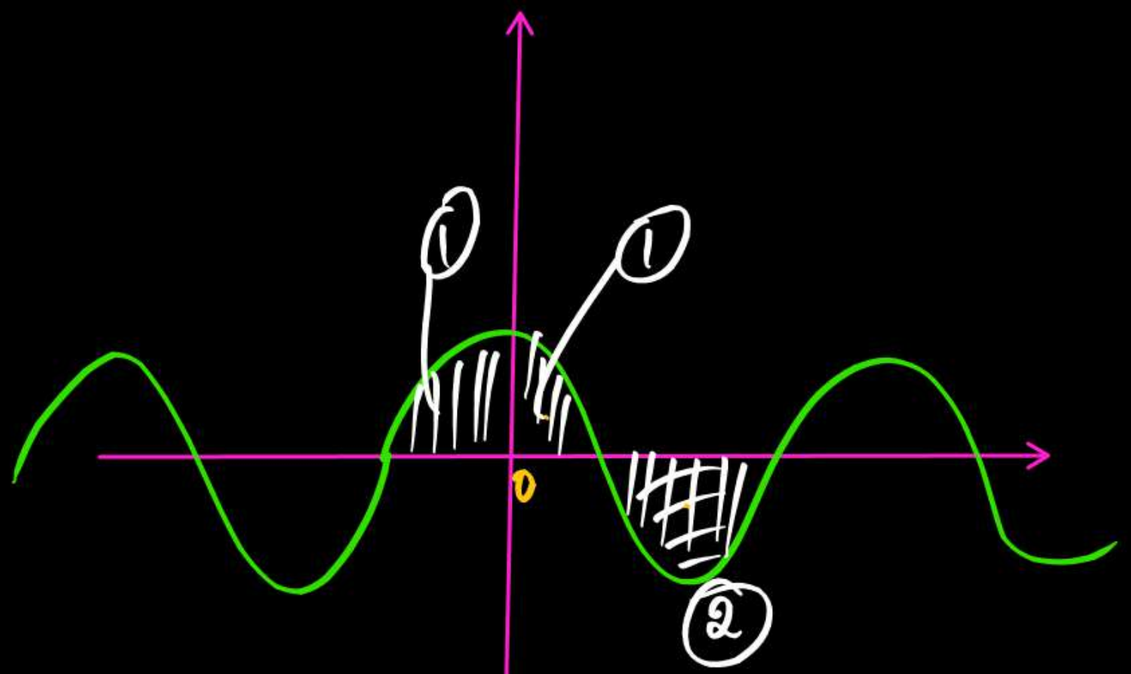
HUDDA Concept

By SSR

$y = \boxed{2}\sin x$ in $x = 0, 2\pi$

$\Rightarrow 4 \times 5 = 20$



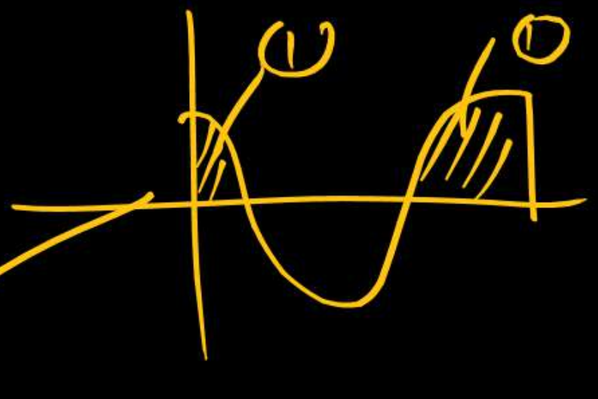


$y = \boxed{3}\sin x$ in $x = 0, x = \frac{3\pi}{2}$

$3 * 3 \Rightarrow 9$

Question – CUET 2025 PYQs

The area (in square units) bounded by the curve $y = \cos x$ between $x = 0$ and $x = 2\pi$ in first quadrant is equal to:



A 4

B 2

C 1

D 3

Question – CUET 2025 PYQs

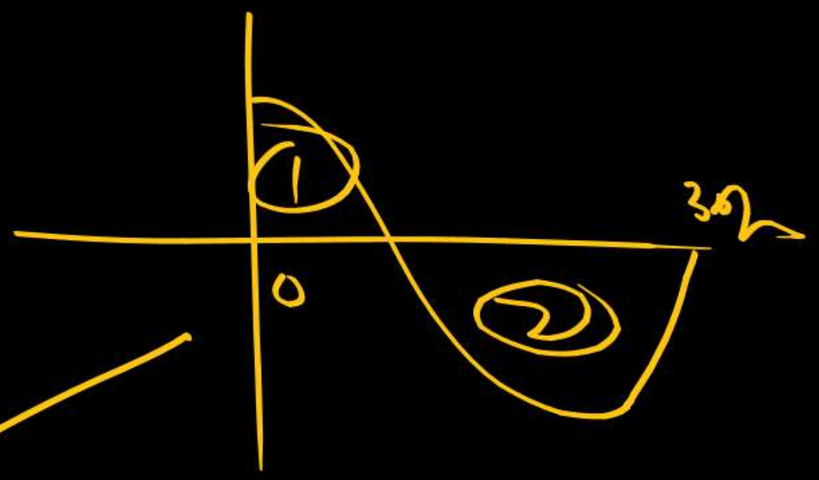
The area (in sq. units) bounded by the curve $y = \cos x$ and x-axis between $x = 0$ and $x = \frac{3\pi}{2}$ is

A 1

B 2

C 3

D 4



Question – CUET 2025 PYQs

The area (in sq.units) of the region enclosed by the curve $y = \cos x, \frac{-\pi}{2} \leq x \leq \frac{\pi}{2}$ and the x-axis is:

A 1

B 2

C 4

D 3



Question – CUET 2025 PYQs

The area (in sq.units) of the region bounded by the curve $y = \cos x$ between $x = -\frac{\pi}{2}, x = \frac{\pi}{2}$ and the x-axis is

A 0

B 3

C 2

D 1

Question – CUET 2025 PYQs

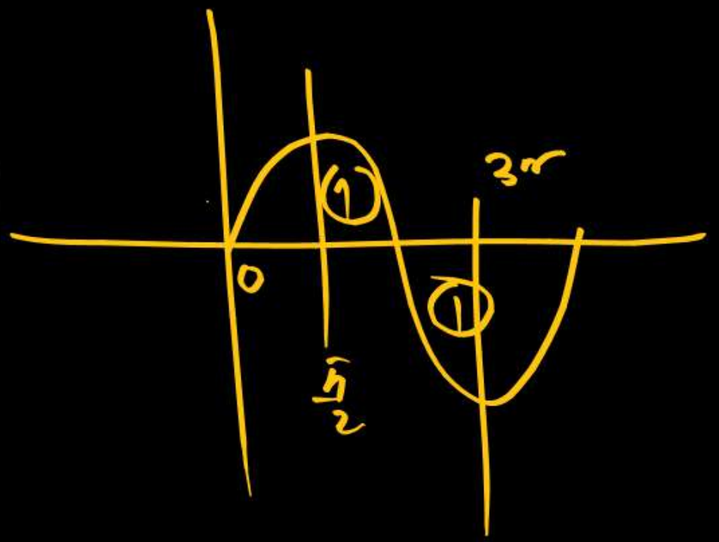
Area of the region bounded by the curve $y = \sin x$ and x-axis between $x = \frac{\pi}{2}$ and $x = \frac{3\pi}{2}$ is

A 1 sq. units

B π sq. units

C $\frac{\pi}{2}$ sq. units

D 2 sq. units



The area of the region bounded by the curve $y = \sin x$ between the ordinates $x = 0$, $x = \frac{\pi}{2}$ and the x-axis is

वक्र से घिरे क्षेत्र का क्षेत्रफल $y = \sin x$ अध्यादेशों $x = 0$, $x = \pi/2$ और x-अक्ष के बीच क्या है?

A 2 sq. units

B 4 sq. units

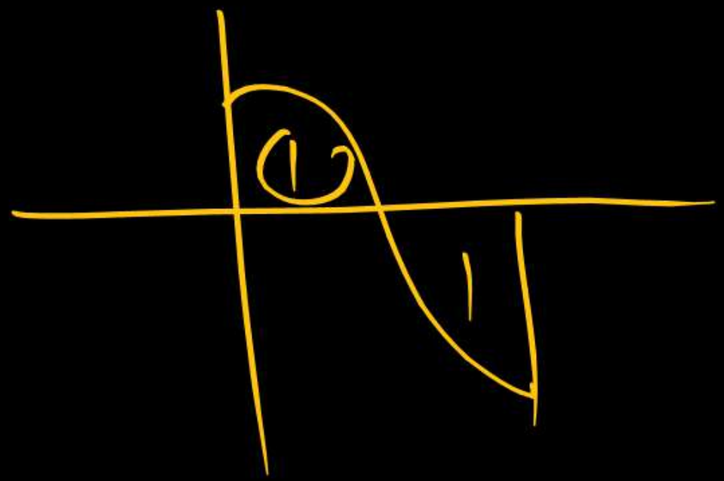
C 3 sq. units

D 1 sq. unit



Question

Area of the region bounded by the curve $y = \cos x$ and x-axis between $x = 0$ and $x = \pi$ is :



A 2sq. units

B 3sq, units

C 4 sq unit

D 1sq unit

Question

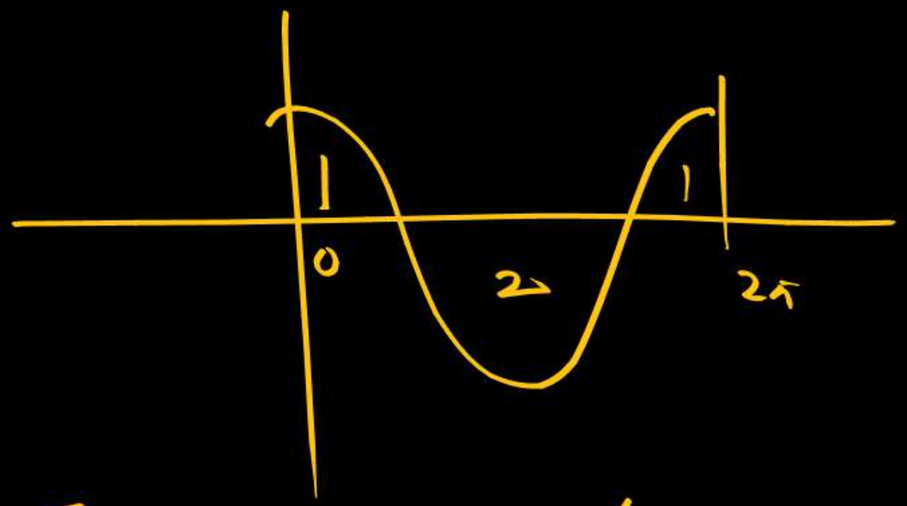
The area bounded by the curve $y = 3\cos x$ and x-axis between $x = 0$ and $x = 2\pi$ is:

A 4

B 8

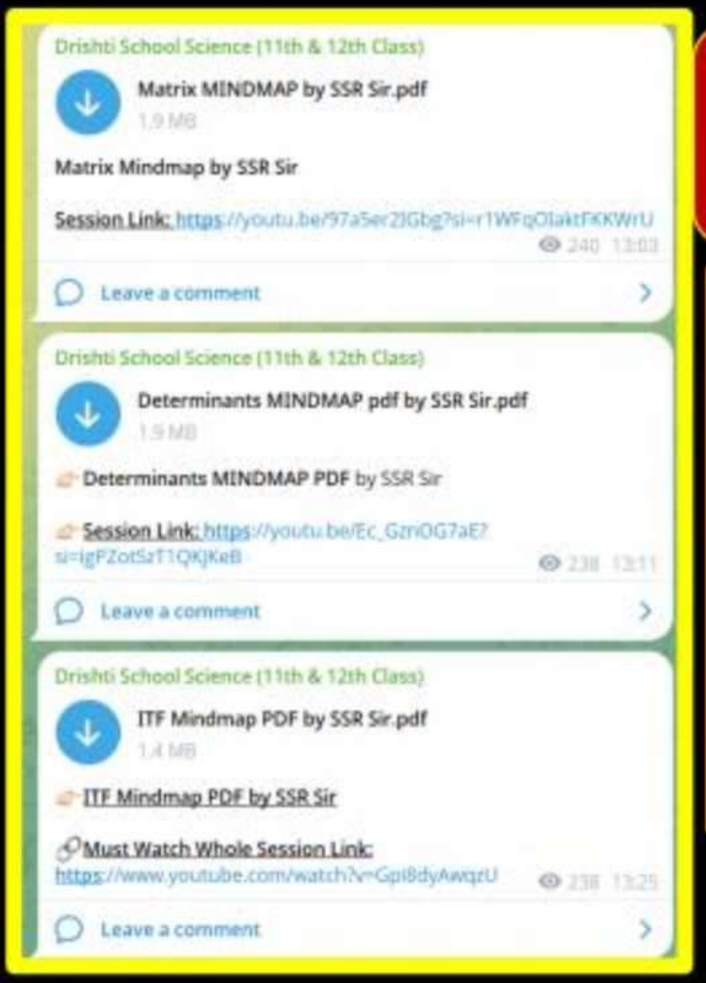
C 0

D 12

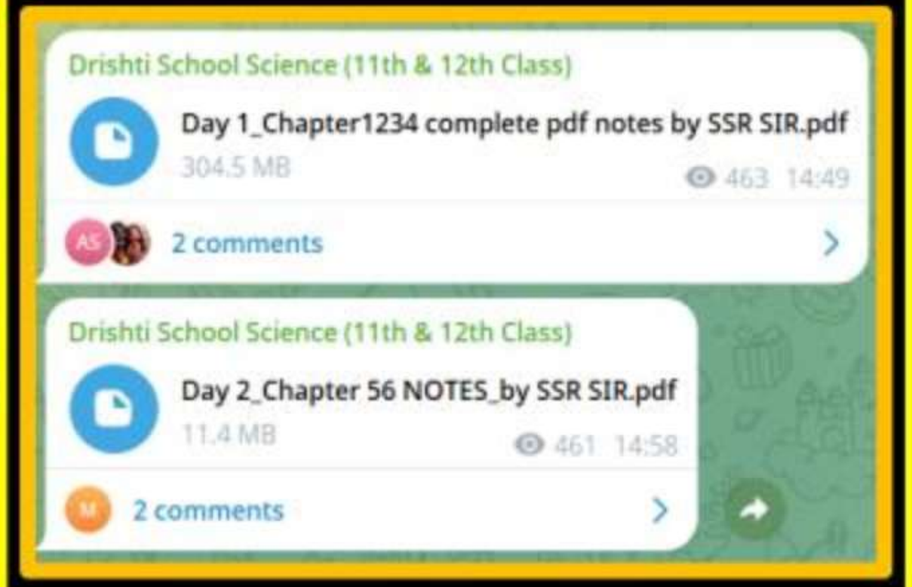


$4 * 3$

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Solved P.D.F
HW
BPHP 6.0
5.0
NCERT
Thank You
May God Watch Over You !!
~ SHASHANK SINGH RAJPUT (SSR)

Question: CUET 2026 PYQs

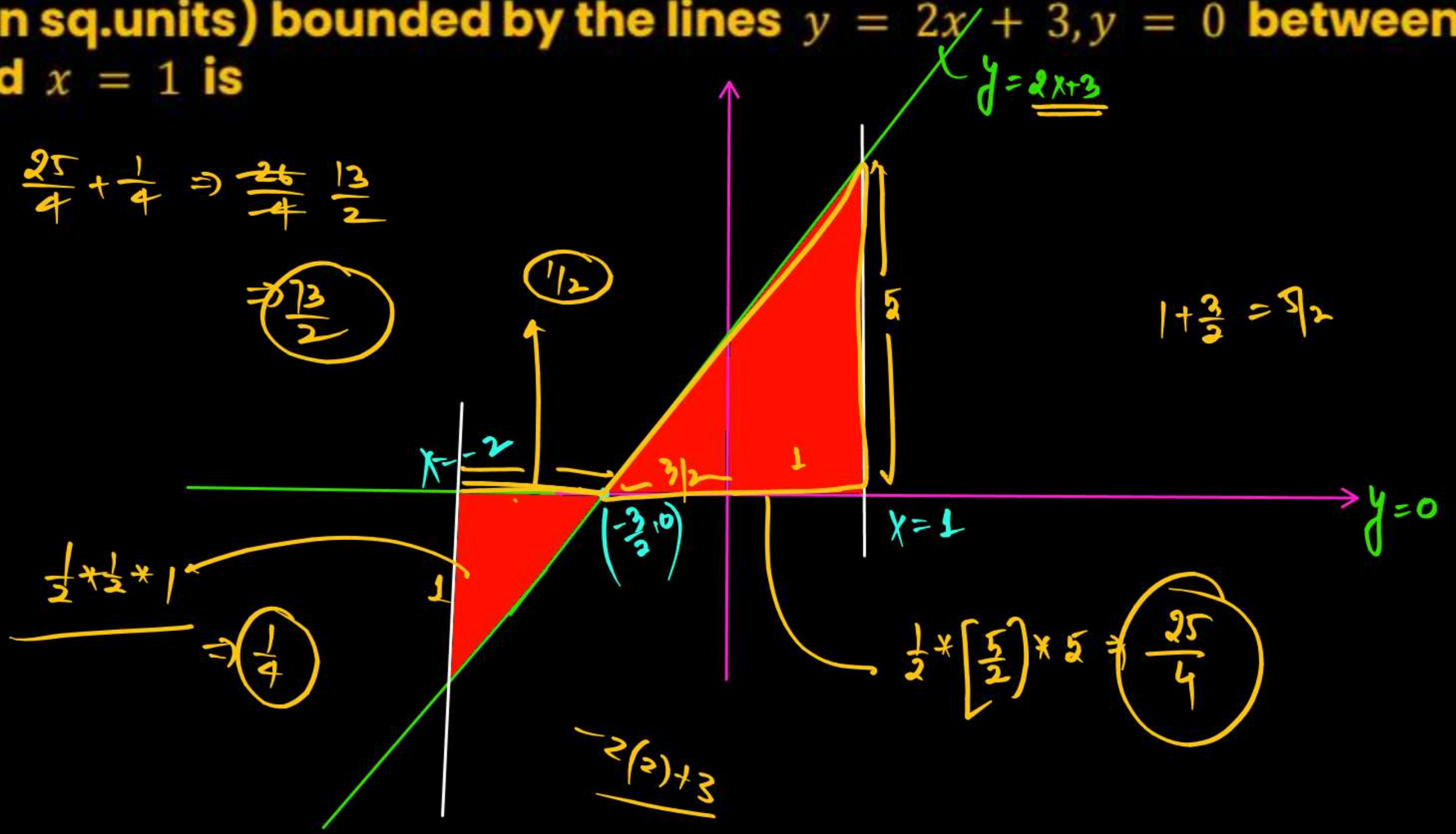
The area (in sq.units) bounded by the lines $y = 2x + 3, y = 0$ between $x = -2$ and $x = 1$ is

A. $\frac{9}{2}$

B. $\frac{15}{2}$

C. $\frac{11}{2}$

D. $\frac{13}{2}$



$\frac{25}{4} + \frac{1}{4} \Rightarrow \frac{26}{4}\ \frac{13}{2}$

$\Rightarrow \frac{13}{2}$

Question: CUET 2026 PYQs

The area (in sq. units) of the region bounded by the line $2y = 3x + 6$, x-axis and the ordinates $x = -3$ and $x = 1$ is:

A $\frac{15}{2}$

B $\frac{9}{2}$

C $\frac{15}{4}$

D $\frac{9}{4}$