MATHS

NCERT - FULL MARKS MATHS(TAMIL)

APPLICATION OF INTEGRALS

Example

1. Find the area of the circle $x^2 + y^2 = a^2$ using integration.

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2. (1) Draw the rough sketch of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1.$

Find the area enclosed by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1.$

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3. Find the area of the region bounded by the curve $y = x^2$ and the line y = 4.

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4. Find the area of the region in the first quadrant enclosed by the x-aixs, the line y = x, and the circle $x^2 + y^2 = 32$.

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5. Find the area of the region BOB'RESB is enclosed by the ellipse and the lines x = 0 and x = ae , where $b^2 = a^2$ (1- e^2) and e<1

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6. Find the area of the region bounded by the two parabolas $y = x^2$ and $y^2 = x$.

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7. Find the area lying above x-axis and included between the circle $x^2 + y^2 = 8x$ and inside the parabola $y^2 = 4x$.

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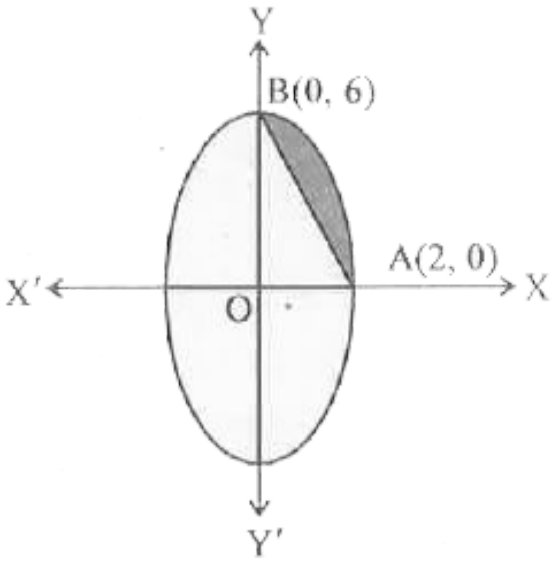
8. In the figure given below, AOBA is the part of the ellipse $9x^2 + y^2 = 36$ in the first quadrant such that OA = 2 and OB = 6. Find the area between arc AB and the chord AB



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9. Using integration, find the area of the region bounded by the triangle whose vertices are (0, 1), (2,2) and (3, 1).

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10. Find the area enclosed between the circles $x^2 + y^2 = 4$ and $(x - 2)^2 + y^2 = 4$.

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11. Consider the parabola $y^2 = 4ax$

(i) Write the equation of the rectum and obtain the x co-ordinates of the point of intersection of latus rectum and the parabola.

(ii) Find the area of the parabola bounded by the latus rectum.

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12. Find the area of the region bounded by the line y = 3x +2, the x-axis and the ordinates x = -1

and x = 1.

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13. Find the area bounded by the curve y = sin x between x = 0 and x = 2π.

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14. Prove that the curves $y^2 = 4x$ and $x^2 = 4y$ divide the area of the square bounded by x = 0, x = 4 and y = 0 into three equal parts.

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15. Find the area of the region $\{(x, y) : y^2 \leq 4x, 4x^2 + 4y^2 \leq 9\}$.

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Exercise 8 1

1. Find the area of the region bounded by the curve $y_2 = x$ and the lines x = 1, x = 4 and the

x-axis in the first quadrant.

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2. Find the area of the region bounded by $y_2 = 9x, x = 2, x = 4$ and the x-axis in the first quadrant.

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3. Find the area of the region bounded by $x^2 = 4y, y = 2, y = 4$ and the y-axis in the

first quadrant.

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4. Find the area of the region bounded by the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1.$

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5. Find the area of the region bounded by the ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1.$

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

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7. Find the area of the smaller part of the circle $x^2 + y^2 = a^2$ cut off by the line $x = \frac{a}{\sqrt{2}}$.

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8. The area between $x = y^2$ and x = 4 is divided into two equal parts by the line x = a find the value of a.

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9. Find the area of the region bounded between the parabola $x^2 = y$ and the curve y=|x|.

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10. Find the area bounded by the curve $x^2 = 4y$ and the line $x = 4y - 2$.

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11. Find the area of the region bounded by the curve $y^2 = 4x$ and the line x = 3.

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12. Area lying in the first quadrant and bounded by the circle $x^2 + y^2 = 4$ and the lines x = 0 and x = 2 is

A. π

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

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

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

Answer: A

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

A. 2

B. $\frac{9}{4}$

C. $\frac{9}{3}$

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

Answer: B

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Exercise 8 2

1. Find the area of the circle$4x^2 + 4y^2 = 9$ which is interior of the parabola $x^2 = 4y$.

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2. Find the area bounded by the curves $(x-1)^2 + y^2 = 1$ and $x^2 + y^2 = 1$.

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3. Find the area of the region bounded by the curves $y = x^2 + 2, y = x, x = 0$ and x = 3.

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4. Using integration find the area of region bounded by the triangle whose vertices are (-1,0), (1, 3) and (3, 2).

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5. Using integration, find the area of the triangular region whose sides have the equations $y = 2x + 1, y = 3x + 1$ and x = 4.

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6. Smaller area enclosed by the circle $x^2 + y^2 = 4$ and the line $x + y = 2$ is

A. $2(\pi - 2)$

B. $\pi - 2$

C. $2\pi - 1$

D. $2(\pi + 2)$

Answer: B

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7. Area lying between the curves $y^2 = 4x$ and $y = 2x$ is

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

B. $\frac{1}{3}$

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

D. $\frac{3}{4}$

Answer: B

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Miscellaneous Exercise

1. Find the area under the given curves and given lines:

(i) $y = x^2, x = 1, x = 2$ and x -axis

(ii) $y = x^4, x = 1, x = 5$ and x -axis.

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2. Find the area between the curves y = x and $y = x^2$.

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3. Find the area of the region lying in the first quadrant and bounded by $y = 4x^2$, x = 0, y = 1

and y = 4.

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4. Sketch the graph of $y = |x + 3|$ and evaluate $\int_{-6}^{0} |x + 3| dx$.

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5. Find the area bounded by the curve y = sin x between x = 0 and x = 2π.

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6. Find the area enclosed between the parabola $y^2 = 4ax$ and the line y = mx.

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7. Find the area enclosed by the parbola $4y = 3x^2$ and the line $2y = 3x + 12$.

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8. Find the area of the smaller region bounded by the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ and the line $\frac{x}{3}+\frac{y}{2}=1$

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9. Find the area of the smaller region bounded by the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ and the line $\frac{x}{a}+\frac{y}{b}=1.$

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10. Find the area of the region enclosed by the parabola $x^2 = y$ and the line $y = x + 2$ and the x-axis.

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11. Using the method of integration find the area bounded by the curve $|x| + |y| = 1$.

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12. Find the area bounded by curves $\{(x, y) : y \geq x^2 \text{ and } y = |x|\}$

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13. Using the method of integration find the area of the triangle ABC, coordinates of whose vertices are A(2, 0) , B (4, 5) and C(6, 3).

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14. Using the method of integration find the area of the region bounded by lines :

$2x + y = 4, 3x - 2y = 6$ and $x - 3y + 5 = 0$

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15. Find the area of the region $\{(x, y) : y^2 \leq 4x, 4x^2 + 4y^2 \leq 9\}$.

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16. The area bounded by the curve $y = x|x|$, x-axis and the ordinates x = -1 and x = 1 is given by

A. -9

B. $-\frac{15}{4}$

C. $\frac{15}{4}$

D. $\frac{17}{4}$

Answer: D

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17. The area bounded by the curve $y = x^3$, x-axis and the ordinates: x = - 1 and x= 1 is given by

A. 0

B. $\frac{1}{3}$

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

D. $\frac{4}{3}$

Answer: C

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18. The area of the circle $x^2 + y^2 = 16$ exterior to the parabola $y^2 = 6x$ is

A. $\frac{4}{3}(4\pi - \sqrt{3})$

B. $\frac{4}{3}(4\pi + \sqrt{3})$

C. $\frac{4}{3}(8\pi - \sqrt{3})$

D. $\frac{4}{3}(8\pi + \sqrt{3})$

Answer: C

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19. The are a bounded by the y-axis, y = cos x and y sin x when $0 \leq x \leq \frac{\pi}{2}$ is

A. $2\left(\sqrt{2-1}\right)$

B. $\sqrt{2}-1$

C. $\sqrt{2}+1$

D. $\sqrt{2}$

Answer: B

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