



MATHS

NCERT - NCERT MATHEMATICS(TELUGU)

APPLICATION OF INTEGRALS

Example

1. The area bounded by the circle $x^2 + y^2 = a^2$ and the line $x + y = a$ in the first quadrant is



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2. Show that the area of the region bounded by

$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (ellipse) is πab . Also deduce the

area of the circle $x^2 + y^2 = a^2$



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3. Find the area of the region bounded by

$y = x^2$ and $y = 4$



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4. Find the area of the region in the first quadrant enclosed by the x-axis, 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 $x = ae$.



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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 in the parabola $y^2 = 4x$.



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



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9. Find the area of the region enclosed between the two circle $x^2 + y^2 = 4$ and $(x - 2)^2 + y^2 = 4$.



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10. Find the area of the parabola $y^2 = 4ax$ bounded by its latus rectum.



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11. 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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12. Find the area bounded by the curve $y = \cos x$ between $x = 0$ and $x = 2\pi$



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



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14. Find the area of the region

$$\{(x, y) : 0 \leq y \leq x^2 + 1, 0 \leq y \leq x + 1, 0 \leq x \leq 2\}$$



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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

$$r^2 + y^2 = 4.$$



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7. Find the area of the smaller part of the circle

$$x^2 + y^2 = a^2 \text{ cut off by the line } x = \frac{a}{\sqrt{2}}.$$



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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 by the parabola $y = x^2$ and $y = |x|$.



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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 to the parabola $x^2 = 4y$.



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2. Find the area bounded by curves

$$(x - 1)^2 + y^2 = 1 \text{ and } x^2 + y^2 = 1.$$



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3. The area of the region bounded by the curves

$$y = x^2 + 2, y = x, x = 0 \text{ and } x = 3 \text{ is}$$



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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 $y = |3|$ and evaluate

$$\int_{-6}^0 |x + 3| dx.$$



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5. The area of the region bounded by the curve

$y = \sin x$, x -axis in $[0, 2\pi]$ is



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6. Find the area enclosed between the parabola

$$y^2 = 4ax \text{ and the line } y = mx.$$



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7. Find the area enclosed by the parabola $4y = 3x^2$

and the line $2y = 3x + 12$.



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8. Find the area of the smaller region bounded by

$$\text{the ellipse } \frac{x^2}{9} + \frac{y^2}{4} = 1 \text{ and the line } \frac{x}{3} + \frac{y}{2} = 1$$



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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 $x^2 = y$, 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 $|x|+|y|=1$. [Hint: The required region is bounded by lines $x + y = 1$, $x - y = 1$, $-x + y = 1$ and $-x - y = 1$].



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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. Area bounded by the curve $v=x$, the x-axis and the ordinates $x = -2$ and $x = 1$ is

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 $y = 6x$ 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 area bounded by the y-axis, $y = \cos x$ and $y = \sin x$ when $0 \leq x \leq \frac{\pi}{2}$ is

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

B. $\sqrt{2} - 1$

C. $\sqrt{2} + 1$

D. $\sqrt{2}$

Answer: B



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