



MATHS

NCERT - NCERT MATHEMATICS(HINGLISH)

APPLICATION OF INTEGRALS

Exercise 8 1

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

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

$$\text{A. } a^4 \left[\frac{\pi}{5} - \frac{1}{3} \right]$$

B. $a^2 \left[\frac{\pi}{4} - \frac{1}{2} \right]$

C. $a^2 \left[\frac{\pi}{3} - \frac{1}{4} \right]$

D. $a^3 \left[\frac{\pi}{3} - \frac{1}{2} \right]$

Answer: B



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2. 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 .

A. $a = 7^{\frac{2}{3}}$

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

C. $a = 5^{\frac{2}{3}}$

D. $a = 4^{\frac{2}{3}}$

Answer: D



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3. Find the area of the region bounded by the parabola $y = x^2$ and $y = |x|$.



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



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

A. $16 - 4\sqrt{2}$

B. $15 - 4\sqrt{5}$

C. $17 - 4\sqrt{3}$

D. $18 - 4\sqrt{7}$

Answer: A



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6. 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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7. 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) $\frac{9}{2}$



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8. Find the area of the region bounded by the

curve $y^2 = x$ and the lines $x = 1$, $x = 4$ and the x-axis.



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



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



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



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

A. 10π

B. 11π

C. 12π

D. 13π

Answer: C



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



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Miscellaneous Exercise

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



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2. 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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3. Find the area bounded by the curve $y = \sin x$ between $x = 0$ and $x = 2\pi$.



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4. 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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5. Area bounded by the curve $y = x^3$, the x-axis and the ordinates $x = 2$ and $x = 1$ is (A) -9 (B) $-\frac{15}{4}$ (C) $\frac{15}{4}$ (D) $\frac{17}{4}$



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6. 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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7. Find the area bounded by curves

$$\{(x, y) : y \geq x^2 \text{ and } y = |x|\}$$



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8. Find the area of the region

$$\{(x, y) : y^2 \leq 4x, 4x^2 + 4y^2 \leq 9\}$$



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9. 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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10. 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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11. Sketch the graph of $y = |x + 3|$ and evaluate

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



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



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



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14. 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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15. the area between the curves $y = x^2$ and $y = 4x$ is



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16. 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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17. Find the area of the region enclosed by the parabola $x^2 = y$ and the line $y = x + 2$.

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

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

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

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

Answer: C



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18. The area bounded by the curve $y = x|x|$, x-axis and the ordinates $x = -1$ and $x = 1$ is given by (A) 0 (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) $\frac{4}{3}$ [Hint : $y = x^2$ if $x > 0$ and $y = -x^2$ if $x < 0$].



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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) $\sqrt{2}$



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Solved Examples

1. Find the area bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and the ordinates $x = 0$ and $x = ae$, where, $b^2 = a^2(1 - e^2)$ and $e < 1$.



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



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



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5. Find the area enclosed by the circle

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



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



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7. Find the area enclosed by the ellipse

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



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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. In Figure, 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 the arc AB and the chord AB.



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



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



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12. 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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13. 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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14. Using integration, find the area of the region enclosed between the two circles $x^2 + y^2 = 4$ and $(x - 2)^2 + y^2 = 4$.



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



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



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



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4. The area bounded by curves $y^2 = 4x$ and $y=2x$ is
..... sq units

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5. 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) $2(\pi + 2)$

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6. 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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7. 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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