MATHS

BOOKS - ARIHANT MATHS (HINGLISH)

APPLICATIONS OF THE INTEGRALS

Frequently Asked Questons Faqs Example

1. Find the area enclosed by the circle $x^2 + y^2 = a^2$.

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

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3. Find the area of the region bouonded by $y^2 = 4x, x = 1, x = 4$ and x-axis in the first quadrant.

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

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

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

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7. Find the area bounded by the region given by:

$$A=\left\{(x,y):(x,y):\frac{x^2}{25}+\frac{y^2}{9}\leq 1<\frac{x}{5}+\frac{y}{3}\right\}.$$

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8. 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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9. Using integration, find the area of the triangle ABC whose vertices are $A(-1, 1), B(0, 5)$ and $C(3, 2)$.

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10. Using the method of integration, find the area of the triangular region whose vertices are $(2, -2), (4, 3)$ and $(1, 2)$.

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11. Using the method of integration, find the area of the region bounded by the lines $3x - 2y + 1 = 0, 2x + 3y - 21 = 0$ and $x - 5y + 9 = 0$.

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12. Find the smaller area enclosed by the circle $x^2 + y^2 = 4$ and the line $x + y = 2$.

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13. 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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14. Using integration find the area of the region bounded by the parabola $y^2 = 4x$ and the circle $4x^2 + 4y^2 = 9$

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

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16. Find the area of the region included between the parabolas $y^2 = 4axandx^2 = 4ay, wherea > 0.$

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17. Draw a rough sketch of the curves $y^2 = x + 1$ and $y^2 = -x + 1$ and find the area enclosed between them,

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18. Find the area of the region bounded by the curces:

$y = 6x - x^2$ and $y = x^2 - 2x$.

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

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20. Find the area bounded by the curves $y = \sqrt{x}, 2y + 3 = x$ and x-axis.

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

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22. Sketch the region bounded by the curves $y = \sqrt{5 - x^2}$ and $y = |x - 1|$ and find its area.

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23. The area of the triangle formed by the positive x-axis with the normal and the tangent to the circle $x^2 + y^2 = 4$ at $\left(1, \sqrt{3}\right)$ is

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24. Sketch the graph of :

$$f(x) = \begin{cases} |x-2|+2, x \leq 2 \\ x^2 - 2, x > 2 \end{cases}.$$

Evaluate $\int_0^4 f(x)dx$. What does the value of this integral represent on the graph ?

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Exercise 8 A

1. Using integration,

(i) find the area of the first quadrant of the circle :

$x^2 + y^2 = 4$

(ii) find the area of the circle :

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

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

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3. Using integration, find the area bounded between the parabola $x^2 = 4y$ and the line $y = 4$.

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4. Examples: Find the area of the region bounded by the curve $y^2 = 2y - x$ and the y-axis.

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5. (i) Find the area bounded by $y = 3x + 2$, the x-axis and the ordinates $x = -2$ and $x = 1$.

(ii) Find the area bounded by $y = x$, the x-axis and the line $x = -1$ and $x = 2$.

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

(ii) $y = x^2, x = 0, x = 2$ and x-axis

(iii) $y = x^2 - 4, x = 0, x = 3$ and x-axis

(iv) $y = x^2, x = 2, x = 4$ and x-axis.

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7. 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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8. Find the area bounded by the curve $y = 4x^2, x = 0, x = 1$ and $y = 4$ in first quadrant.

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9. Find the area under the curve $y = \left(x^2 + 2\right)^2 + 2x$ between the ordinates x =0 and x=2`

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10. 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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11. Prove that area of the smaller part of the cirlce $x^2 + y^2 = a^2$ cut off by the line $x = \frac{a}{\sqrt{2}}$ is $\frac{a^2}{4}(\pi - 2)$ sq. units.

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12. Determine the area under the curve $y = \sqrt{a^2 - x^2}$ included between the lines x =0 and x = a.

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13. Determine the area enclosed between the curve $y = \cos 2x, 0 \leq x \leq \frac{\pi}{4}$ and the co-ordinate axes.

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14. Calculate the area bounded by the curve:

$f(x) = \sin^2 \frac{x}{2}$, axis of x and the ordinates: $x = 0, x = \frac{\pi}{2}$.

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15. Draw a rough sketch of the curve $y = \cos^2 x$ in $[0, 1]$ and find the area enclosed by the curve,the lines $x = 0, x = \pi$ and the x-axis.

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16. (i) Make a rough sketch of the graph of the function $y = \sin x, 0 \leq x \leq \frac{\pi}{2}$ and determine the area enclosed between the curve, the x-axis and the line $x = \frac{\pi}{2}$.

(ii) Find the area bounded by the curve:

$(I) y = \sin x \quad (II) y = \cos x$

bewtween $x = 0$ and $x = 2\pi$.

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17. Make a rough sketch of the graph of the function $y = 2\sin x, 0 \leq x \leq \frac{\pi}{2}$ and determine the area enclosed between the curve, the x-axis and the line $x = \frac{\pi}{2}$.

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18. (i) Draw a rough sketch of $y = \sin 2x$ and determine the area enclosed by the curve, x-axis and the lines $x = \frac{\pi}{4}$ and $x = \frac{3\pi}{4}$.

(ii) Draw the graph of $y = \cos 3x, 0 < x \leq \frac{\pi}{6}$ and find the area between the curve and the axes.

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19. Make a rough sketch of the graph of $y = \cos^2 x, 0 \leq x \leq \frac{\pi}{2}$ and find the area enclosed between the curve and the axes.

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20. Find the area bounded by the cirxle $x^2 + y^2 = 16$ and the line y=x in the first quadrant .

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21. 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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22. 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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23. Draw the rough sketch of $y^2 + 1 = x, x \leq 2$. Find the area enclosed by the curve and the line $x = 2$.

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24. Find the area of the region bounded by the ellipse :

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

(b)$(i) 16x^2 + 9y^2 = 144$

(ii) $4x^2 + 25y^2 = 1.$

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25. Find the area between the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and the x-axis between $x = 0$ and $x = a$. Draw rough sketch of the curve also.

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

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27. Sketch the region $\{(x, y) : 4x^2 + 9y^2 = 36\}$ and find its area, using integration.

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28. Find the area bounded by the circle x 2 + y2 = 16 and the line 3y = x in the first quadrant, using integration.

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Exercise 8 B

1. Draw a rough sketch of the curves y=sin x and y= cos x as x varies from 0 to $\frac{\pi}{2}$ and find the area of the region enclosed between them and the x-axis

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

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3. Using integration, find the area of the region bounded by :

(i)$(1, 0), (4, 5)$ and $(6, 3)$

(ii) $(1, 0), (2, 2)$ and $(3, 1)$

(iii)$(-1, 2), (1, 5)$ and $(3, 4)$

(iv) $(2, 3), (3, 5)$ and $(3, 4)$

(v) $(-1, 0), (1, 3)$ and $(3, 2)$

(vi) $(1, 3), (2, 5)$ and $(3, 4)$

(vii) $(4, 1), (6, 6)$ and $(8, 4)$

(viii) $(2, 5), (4, 7)$ and $(6, 2)$

(ix) $(-2, 1), (0, 4)$ and $(2, 3)$

(x) $(2, 1), (3, 4)$ and $(5, 2)$.

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4. Using the method of integration, find the area of the region bounded by the following lines $3x - y - 3 = 0, 2x + y - 12 = 0, x - 2y - 1 = 0.$

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5. 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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6. Find the area of the region:

(i) $\{(x, y) : x^2 \leq y \leq x\}$

(ii) $\{(x, y) : x^2 \leq y \leq |x|\}.$

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7. Consider the fractions:

$f(x) = |x| - 1$ and $g(x) = 1 - |x|$.

(a) Find their graphs and shade the closed region between them

(b) Find the area of their shaded region.

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8. Using integration, find the area of the region bounded between :

(i) the line $x = 2$ and the parabola $y^2 = 8x$

(ii) the line $x = 3$ and the parabola $y^2 = 4x$.

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9. Find the ara of the region bounded by :

(i) the parabola $y = x^2$ and the line $y = x$

(ii) the parabola $y^2 = x$ and line $x + y = 2$

(iii) the curve $x^2 = 4y$ and the straight line $x = 4y - 2$

(iv) the parabola $y^2 = 4ax$ and the chord $y = mx$

(v) the parabola $y^2 = 4ax$ and its latus-rectum

(vi) the parabola $(I)y^2 = 8x(II)y^2 = 6x$ and the latus rectum.

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

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11. 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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12. Draw a rough sketch of the region enclosed between the curve $y^2 = 4x$ and the line $y = 2x$. Also, determine the area of the region.

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

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14. Find the area enclosed between the straight line $y = x + 2$ and the curve $x^2 = y$.

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15. 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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16. Draw the rough sketch and find the area of the region:

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

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17. (a) Draw the rough sketch and find the area of the region included between the parabolas :

(i) $y^2 = 4x$ and $x^2 = 4y$

(ii) $y^2 = 9x$ and $x^2 - 9y$

(iii) $y^2 = 16x$ and $x^2 = 16y$.

(b) Find the ratio in which the area bounded by the curves $y^2 = 12x$ and $x^2 = 12y$ is divided by the line $x = 3$.

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18. Using integration calculate the area of the region bounded by the two parabolas $y = x^2$ and $x = y^2$

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19. Using integration, find the area of the region enclosed between the circles $x^2 + y^2 = 1$ *and* $(x-1)^2 + y^2 = 1$

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20. Show that the areas under the curves $f(x) = \cos^2 x$ and $f(x) = \sin^2 x$ between $x = 0$ and $x = \pi$ are $1:1$.

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21. Find the area of that part of the circle $x^2 + \backslash y^2 = 16$ which is exterior to the parabola $y^2 = 6x$.

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22. Calculate the area enclosed in the region

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

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

(iii) $\{(x, y): x^2 + y^2 \leq 16, x^2 \leq 6y\}$

(iv) $\{(x, y): y^2 \leq 6ax, x^2 + y^2 \leq 16a^2\}$

(v) $\{(x, y): x^2 + y^2 \leq 8, x^2 \leq 2y\}$.

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23. Find the area of 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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24. Find the area of the region given by :

$\{(x, y): x^2 \leq y \leq |x|\}$.

(ii) Find the area bounded by thte curves :

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

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

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25. Using integration, find the area of the region bounded by the following curves, after making a rough sketch:

(i) $y = 1 + |x + 1|, x = -3, x = 3, y = 0$

(ii) $y = 1 + |x + 1|, x = -2, x = 3, y = 0$.

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Objective Type Questions

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

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

Answer: A

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

A. 2

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

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

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

Answer: B

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3. 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) $2(\pi + 2)$

A. $2(\pi - 2)$

B. $\pi - 2$

C. $2\pi - 1$

D. $2(\pi + 2)$

Answer: B

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

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

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

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

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

Answer: B

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5. Area bounded by the curve $y = x^2$, 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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6. 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 $x < 0$].

A. 0

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

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

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

Answer: C

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7. The area of the circle $x^2 + y^2 = 16$exterior to the parabola $y^2 = 6x$is(A) $\frac{4}{3}\left(4\pi - \sqrt{3}\right)$ (B) $\frac{4}{3}\left(4\pi + \sqrt{3}\right)$(C) $\frac{4}{3}\left(8\pi - \sqrt{3}\right)$ (D) $\frac{4}{3}\left(8\pi + \sqrt{3}\right)$

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

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

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

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

Answer: C

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8. Find the area enclosed by the circle $x^2 + y^2 = 25$

A. 4π sq. units

B. $2\sqrt{2}\pi$ sq. units

C. $4\pi^2$ sq. units

D. 2π sq. units

Answer: D

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

A. $\pi^2 ab$

B. πab

C. $\pi a^2 b$

D. πab^2

Answer: B

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10. The area of the region bounded by the curve $y = x^2$ and the line $y = 16$ is :

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

B. $\frac{256}{3}$

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

D. $\frac{128}{3}$

Answer: B

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11. The area of the region bounded by the y-axis, $y = \cos x$ and $y = \sin x, 0 \leq x \leq \frac{\pi}{2}$ is:

A. $\sqrt{2}$ sq. units

B. $\left(\sqrt{2}+1\right)$ sq. units

C. $\sqrt{2}\left(\sqrt{2}-1\right)$ sq. units

D. $\left(2\sqrt{2}-1\right)$ sq. units

Answer: C

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12. The area of the region bounded by the curve $x^2 = 4y$ and the straight line $x = 4y - 2$ is

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

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

C. $\frac{7}{8}$ sq. units

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

Answer: D

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13. Area bounded by the curve $y = f(x)$ and the lines $x = a, = b$ and the x axis is :

A. $\int_a^b x dy$

B. $\int_a^b x^2 dx$

C. $\int_a^b x dx$

D. $\int_a^b y dx$

Answer: D

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14. The area enclosed by the :

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

A. $\frac{\pi ab}{4}$

B. $4\pi ab$

C. πab

D. None of these

Answer: C

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15. Find the area enclosed by the circle $x^2 + y^2 = a^2$.

A. $\frac{\pi a^2}{4}$

B. πa^2

C. $4\pi a^2$

D. None of these

Answer: B

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16. Find the area of the region bounded by the curve $y^2 = x$and the lines $x = 1, x = 4$and the x-axis.

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

B. $\frac{14}{3}$

C. 7

D. None of these

Answer: B

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17. The area of the circle $x^2 + y^2 = a^2$ is :

A. πa^2

B. $2\pi a$

C. $2\pi a^2$

D. None of these

Answer: A

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18. The area between the curve $y = x^2$, x-axis and the lines $x = 0$ and $x = 2$ is :

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

B. 4 sq. units

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

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

Answer: C

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19. The area of the region bounded by the parabola $y^2 = 9x$ and the line $y = 3x$ is :

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

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

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

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

Answer: A

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20. The area bounded by the curve $y = 4\sin x,$ x-axis from $x = 0$ to $x = \pi$ is equal to :

A. 1 sq. units

B. 2 sq. units

C. 4 sq. units

D. 8 sq units

Answer: D

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Objective Type Questions Fill In The Blanks

1. The area of the quadrant of the circle $x^2 + y^2 = 4$ is _____.

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2. Find the area enclosed by the circle $x^2 + y^2 = a^2$.

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3. The area of the parabola $y^2 = 4ax$ bounded by the latusrectum is _____.

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4. The area bounded by $y = x^2, x = 0, x = 2$ and x-axis is _____.

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5. Calculate the area under the curve $y = 2\sqrt{x}$ included between the lines x = 0 and x = 1.

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Objective Type Questions True False

1. The area of the region bounded by $y = x^4, x = 1, x = 5$ and x-axis is 625 sq. units.

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2. Find the area under the curve $y = \left(x^2 + 2\right)^2 + 2x$ between the ordinates x =0 and x=2`

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3. The area enclosed by the curvey $y = \cos 2x, 0 \leq x \leq \frac{\pi}{4}$ and co-ordinate axes is $\frac{1}{4}$ sq. unit.

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4. Area bouinded by $|x| + |y| = 1$ is 2 sq. units.

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5. Area bounded by $y = x^2$ and line $y = x$ is $\frac{1}{4}$ sq unit.

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Objective Type Questions Short Answer Type Questions

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

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2. Find the area bounded by the parabola $y^2 = 4ax$, latus-rectum and x-axis.

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

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

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5. Find the area under the curve $y = 2\sqrt{x}$ between the ordinates $y = 0$ and $x = 1$.

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6. The area in square units of the region bounded by the curve $x^2 = 4y$, the line x=2 and the x-axis, is

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7. Find the area bounded by the parabola $x = 4 - y^2$ and y-axis.

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8. Find the area bounded by the parabola $x = 4 - y^2$ and y-axis.

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9. The area bounded by the parabola $y^2 = 8x$, the x-axis and the latusrectum, is

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10. Find the area enclosed between the curve $y = \cos x, 0 \leq x \leq \frac{\pi}{4}$ and the co-ordinate axes.

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11. Find the area enclosed between the curve $y = \cos^2 x, 0 \leq x \leq \frac{\pi}{2}$ and the co-ordinate axes.

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12. Area between the x-axis and the curve $y = \cos x$, when $0 \leq x \leq 2\pi$ is (A) 0 (B) 2 (C) 3 (D) 4

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13. The ratio of the areas between the curves $y = \cos x$ and $y = \cos 2x$ and x-axis from $x = 0$ to $x = \frac{\pi}{3}$ is

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14. Find the area of the region bounded by the points $(3, 0), (4, 5)$ and $(5, 1)$.

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

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Questions From Ncert Book 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.

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2. Find the area of the region bounded by $y^2 = 8x, x = 2, x = 4$ and the x-axis in the first quadrant.

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3. The area of the region bounded by $x^2 = y - 2, y = 4, y = 6$ and the Y-axis in the first quadrant is

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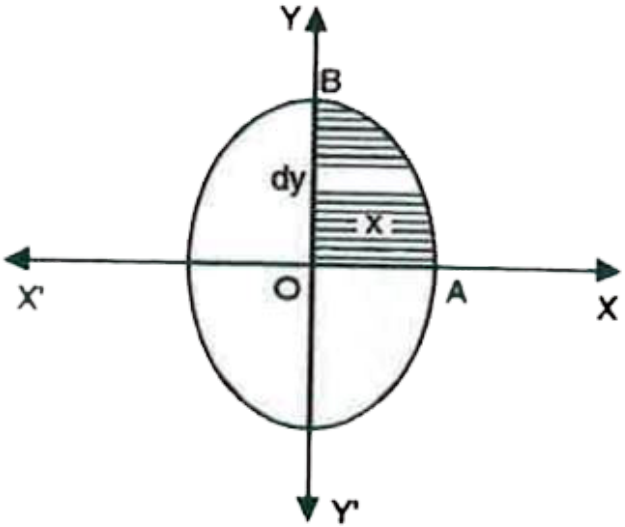
5. Find the area of the region bounded by the ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1.$



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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 ara 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 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 straight 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) $\frac{9}{2}$

A. 2

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

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

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

Answer: B

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Questions From Ncert Book 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 $(x-1)^2+y^2=1$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 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. Find 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 On Chapter

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 curve $y = x$ 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 $\int_{-60}^{} |x + 3| dx.$

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5. Find the area bounded by the curve $y = s \in x$ between $x = 0$ and $x = 2\pi$.

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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 parabola $4y = 3x^2$ 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.

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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:$2x + y = 4$, $3x2y = 6$and $x3y + 5 = 0$

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

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 $y = x|x|$, 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 $x < 0$].

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) $\frac{4}{3}\left(4\pi - \sqrt{3}\right)$ (B) $\frac{4}{3}\left(4\pi + \sqrt{3}\right)$(C) $\frac{4}{3}\left(8\pi - \sqrt{3}\right)$ (D) $\frac{4}{3}\left(8\pi + \sqrt{3}\right)$

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

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

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

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

Answer: C

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

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

B. $\sqrt{2}-1$

C. $\sqrt{2}+1$

D. $\sqrt{2}$

Answer: B

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Questions From Ncert Examplar

1. The area of the region bounded by the curve $ay^2 = x^3$, the Y-axis and the lines y = a and y = 2a, is

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2. Find the area of the region bounded by the parabola $y^2 = 2x$ and straight line $x - y = 4$.

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Exercise

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

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2. Find the area of the region bounded by the curve $x = at^2$ and $y = 2at$ between the ordinates corresponding to t = 1 and t = 2.

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3. Find the area enslosed by the curve:

$x = 3\cos t, y = 2\sin t.$

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Revision Exercise

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

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

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3. 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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4. Draw the diagram to show the area enclosed by the curves :

$y^2 = 16x$ and $x^2 = 16y$.

The straight line $x = 4$ divides the area into two parts. Find the area of the larger portion by integration.

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

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6. Sketch the region enclosed between the circles $x^2 + y^2 = 1$ and $(x-1)^2 + y^2 = 1$, which lies in the first quadrant. Also, find the area of the region.

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7. Draw a rough sketch of the following region and find the area enclosed by the region, using method of integration :

$\{(x, y) : y^2 \leq 5x, 5x^2 + 5y^2 \leq 36\}$.

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8. Find the area bounded by $y = 1 + 2\sin^2 x$, X-axis, $X = 0$ and $x = \pi$.

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Check Your Understanding

1. Is the parabola $y^2 = 4x$ symmetrical about x-axis ?

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2. Is the circle $x^2 + y^2 = r^2$ symmetrical about the line $y = x$?

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3. Find the area enclosed by the circle $x^2 + y^2 = 9$.

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4. Find the area of the semi-portion of the circle $x^2 + y^2 = 4$.

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5. Find the area of the region bounded by $y = x^4$, $x = 1$, $x = 5$ and x-axis.

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Competition File

1. The area of the plane region bounded by the curves $x + 2y^2 = 0$ and $x + 3y^2 = 1$ is equal to

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

B. $\frac{5}{3}$

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

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

Answer: A

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2. The area of the region bounded by the parabola $(y-2)^2 = x - 1$, the tangent to the parabola at the point $(2, 3)$ and the x-axis is

A. 6

B. 9

C. 12

D. 3

Answer: C

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3. The area bounded by the curves $y = \cos x$ and $y = \sin x$ between the ordinates $x = 0$ and $x = \frac{3\pi}{2}$ is

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

B. $4\sqrt{2} + 2$

C. $4\sqrt{2} - 1$

D. $4\sqrt{2} + 1.$

Answer: A

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4. The area of the region enclosed by the curves $y = x, x = e, y = \frac{1}{x}$ and the positive x-axis is

A. $\frac{1}{2}$ square units

B. 1 square units

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

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

Answer: C

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5. The area bounded by the curves $y^2 = 4x$ and $x^2 = 4y$

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

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

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

D. 0

Answer: B

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6. The area bounded between the parabolas $x^2 = \frac{y}{4}$ and $x^2 = 9y$ and the straight line y=2 is

A. $20\sqrt{2}$

B. $\frac{10\sqrt{2}}{3}$

C. $20\frac{\sqrt{2}}{3}$

D. $10\sqrt{2}$

Answer: C

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7. The area (in square units) bounded by the curves $y = \sqrt{x}, 2y - x + 3 = 0,$ x-axis, and lying in the first quadrant is

A. 36

B. 18

C. $\frac{27}{4}$

D. 9

Answer: D

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8. The area of the region described by $A = \{(x, y) : x^2 + y^2 \leq 1$ and $y^2 \leq 1 - x\}$ is :

A. $\frac{\pi}{2} - \frac{4}{3}$

B. $\frac{\pi}{2} - \frac{2}{3}$

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

D. $\frac{\pi}{2} + \frac{4}{3}$

Answer: D

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9. The area (in sq. units) of the region described by $\{(x, y) : y^2 \leq 2x \text{ and } y \geq 4x - 1\}$ is-

A. $\frac{4}{32}$

B. $\frac{5}{64}$

C. $\frac{15}{64}$

D. $\frac{9}{32}$

Answer: D

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10. The area (in sq. units) of the region

$\{(x, y) : y^2 \leq 2x \text{ and } x^2 + y^2 \leq 4x, x \geq 0, y \leq 0\}$, is

A. $\pi - \frac{8}{3}$

B. $\pi - \frac{4\sqrt{2}}{3}$

C. $\frac{\pi}{2} - \frac{2\sqrt{2}}{3}$

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

Answer: A

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11. The area (in sq. units) of the region $\{(x, y) : x \geq 0, x + y \leq 3, x^2 \leq 4y \text{ and } y \leq 1 + \sqrt{x}\}$ is :

A. $\frac{7}{3}$

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

C. $\frac{59}{12}$

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

Answer: B

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12. Let $g(x) = x^2, f(x) = \sqrt{x},$ and $\alpha, \beta(\alpha < \beta)$ be the roots of the quadratic equation $18x^2 - 9\pi x + \pi^2 = 0$. Then the area (is sq. units) bounded by curve $y = (gof)(x)$ and the lines $x = \alpha, x = \beta$ and $y = 0$ is :

A. $\frac{\pi^2}{24}$

B. $\frac{\pi^2}{9}$

C. $\frac{\pi^2}{36}$

D. $\frac{\pi^2}{72}$

Answer: A

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13. The area of the region bounded by the parabola $y = x^2 + 2$ and the lines y = x, x = 0 and x = 3 is

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

B. $\frac{21}{2}$

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

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

Answer: A

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14. Find the area bounded by the curves $x^2 \leq y \leq x + 2$:

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

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

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

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

Answer: C

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Chapter Test

1. Find area lying between the curves $y^2 = 4x \quad \text{and} \quad y = 2x$ is

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

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

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

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

Answer: B

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2. The area of the region bounded by the curve $x^2 = 4y$ and the straight line $x = 4y - 2$ is

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

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

C. $\frac{7}{8}$ sq. units

D. $\frac{9}{8}$ sq. units

Answer: D

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3. The area bounded by the line y = x, X-axis and the lines x = -1, x = 2 is

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4. Using integration, find the area of the quadant of the circle $x^2 + y^2 = 4$.

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5. Calculate the area under the curve $y = 2\sqrt{x}$ included between the lines x = 0 and x = 1.

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

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

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8. Using integration, find the area of the triangle ABC whose vertices are $A(-1, 1), B(0, 5)$ and $C(3, 2)$.

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

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10. Find the area of the region enclosed between the two circles $x^2 + y^2 = 1$ and $(x-1)^2 + y^2 = 1$

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11. 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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12. 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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