



MATHEMATICS CLASS XII

CHAPTER – 8 APPLICATIONS OF INTEGRALS

- Q.1. Find the area of the region bounded by $y^2 = 4x$, $x = 1$, $x = 4$ and the x-axis in the first quadrant.
- Q.2 Determine the area enclosed between the curve $y = 4x - x^2$ and the x – axis.
- Q.3. Draw a rough sketch of the graph of the function $y = 2\sqrt{1 - x^2}$, $x \in [0, 1]$ and evaluate the area enclosed between the curve and the axes.
- Q.4. Find the area of the smaller region bounded by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and the straight line $\frac{x}{a} + \frac{y}{b} = 1$.
- Q.5. Find the area of the region included between the curve $4y = 3x^2$ and the line $2y = 3x + 12$.
- Q.6. Find the area enclosed by the curve $y = -x^2$ and the straight line $x + y + 2 = 0$.
- Q.7. Find the area enclosed by the parabola $y^2 = x$ and the line $y + x = 2$.
- Q.8. Using integration, find the area of the triangular region whose vertices are $(-1, 1)$, $(0, 5)$ and $(3, 2)$.
- Q.9. Using the method of integration, find the area of the region bounded by the lines $2x + y = 4$, $3x - 2y = 6$ and $x - 3y + 5 = 0$.
- Q.10. Find the area of the region bounded by the parabolas $y^2 = 4ax$ and $x^2 = 4ay$, $a > 0$.



Q.11. Using integration, find the area of the region bounded by the following curves, after making a rough sketch :

$$Y = 1 + |x + 1|, x = -3, x = 3, y = 0.$$

Q.12. Find the area of the region bounded by $y = x^2$ and $y = |x|$.

Q.13. Find the area of the region in the first quadrant enclosed by the x – axis, the line $x = \sqrt{3}y$ and the circle $x^2 + y^2 = 4$.

Q.14. Find the area of the region enclosed between the two circles $x^2 + y^2 = 9$ and $(x - 3)^2 + y^2 = 9$.

Q.15. Find the smaller of the two areas in which the circle $x^2 + y^2 = 4$ is divided by the parabola $y^2 = 3(2x - 1)$.

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

Q.17. Find the area of the circle $4x^2 + 4y^2 = 9$ which is interior to the parabola $x^2 = 4y$.

Q.18. 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?

Q.19. Make a rough sketch of the region given below and find its area using methods of integration : $\{(x,y) ; 0 \leq y \leq x^2 + 3, 0 \leq y \leq 2x + 3, 0 \leq x \leq 3\}$.

Q.20. Find the area of the region bounded by $y = x^2 + 1, y = x, x = 0$ and $y = 2$.

Q.21. Find the area of the region $\{(x + y); x^2 + y^2 \leq 1 \leq x + \frac{y}{2}\}$.



- Q.22. Sketch the region bounded by the curve $y = \sqrt{5 - x^2}$ and $y = |x - 1|$ and find its area.
- Q.23. Prove that the curves $y^2 = 4x$ and $x^2 = 4y$ divide the area of the square bounded by $x = 0$, $x = 4$, $y = 0$ and $y = 4$ into three parts.
- Q.24. Find the area bounded by the axis of x , the curve $y = 2x^2$ and the tangent to the curve at the point whose abscissa is 2.
- Q.25. Using integration, find the area of the region bounded by the line $y - 1 = x$, the x - axis and the ordinates $x = -1$ and $x = 3$.
- Q.26. Find the area of the region bounded by $x = y^3$, the y - axis and the lines $y = -1$, $y = 2$.
- Q.27. Make a rough sketch of the curve $y = 9 - x^2$, $0 \leq x \leq 3$ and determine the area enclosed between the curve and the axes.
- Q.28. Using definite integrals, find the area of the triangular region whose sides have the equations $y = 2x + 1$, $y = 3x + 1$ and $x = 4$.
- Q.29. Find the area lying in the first quadrant and bounded by the circles $x^2 + y^2 = 4$ and the lines $x = 0$ and $x = 2$.
- Q.30. Using integration, find the area of the region enclosed the circles $x^2 + y^2 = 1$ and $(x+1)^2 + y^2 = 1$.
- Q.31. Find the area of the smaller region bounded by the curves $y^2 = 2x$ and $x^2 + y^2 = 4x$.
- Q.32. Find the area of the region bounded by the parabola $y = x^2 + 1$ and the lines $y = x$, $x = 0$ and $x = 2$.



Q.33. Sketch the graph of $y = |x + 3|$ and evaluate the area under the curve $y = |x + 3|$ above x – axis and between $x = -6$ to $x = 0$.

Q.34. Draw a rough sketch of the curves $y = (x - 1)^2$ and $y = |x - 1|$. Also find the area of the region bounded by these curves.

Q.35. Find the area of the region bounded by the line $y = 3x + 2$, the x -axis and the ordinates $x = -1$ and $x = 1$.

Q.36. Find the area bounded by the curves $y = x$ and $y = x^3$.

Q.37. Find the area bounded by the curve $y = x - 3\sqrt{x}$ and the x – axis.

Q.38. Find the area A bounded by the x – axis , part of the curve $y = 1 - \frac{8}{x^2}$ and the ordinates $x = 4$ and $x = 8$.

If the straight line passing through the point (a, k) and parallel to the y – axis divides the area A into two parts in the ratio $4 : 5$, find the value of a .

Q.39. Find the area of the region bounded by the curve $y = x(4 - x)$, the x - axis and the lines $x = 0$, $x = 5$.

Q.40. Find the area bounded by the curve $y = 2x + x^2 - x^3$, the x – axis and the lines $x = -1$ and $x = 1$.

Q.41. Find the area bounded by the curve $y = 6x - x^2$ and $y = x^2 - 2x$.

Q.42. Find the area of the region bounded by the curve $xy - 3y - 2y - 10 = 0$, the x – axis and the lines $x = 3$, $x = 4$.

Q.43. Find the area of the region enclosed by the curves $y = \log x$, $y = 2^x$ and the lines $x = \frac{1}{2}$, $x = 2$.



- Q.44. Find the area bounded by the curves $y^2 = 4a(x + a)$ and $y^2 = 4b(b - x)$.
- Q.45. Find the area enclosed between the curve $y = 2x - x^2$ and the $x -$ axis.
- Q.46. Find the area of the region bounded by the parabola $y^2 = 16x$ and its latus – rectum.
- Q.47. Find the smaller area cut from the circle $x^2 + y^2 = 25$ by the line $x = 3$.
- Q.48. Find the area bounded by the parabola $y^2 = 4x$ and the line $y = 2x - 4$.
- Q.49. Find the area bounded by the curve $y^2 = 4a^2(x - 3)$ and the lines $x = 3, y = 4a$.
- Q.50. Draw a rough sketch and find the area of the region bounded by the two parabolas $y^2 = 8x$ and $x^2 = 8y$ by using method of integration.
- Q.51. Using integration, find the area of the region = $\{(x,y) : x^2 + y^2 \leq 16, x^2 \leq 6y\}$.
- Q.52. Find the area common to the circles $x^2 + y^2 = 4$ and $x^2 + y^2 = 4x$.
- Q.53. Find the area of the region bounded by $y = x^2 + 2, y = x, x = 0$ and $y = 3$.
- Q.54. Sketch the graph of $y = |x + 1|$. Evaluate $\int_{-4}^2 |x + 1| dx$. What does the value of this integral represent on the graph?
- Q.55. Find the ratio in which the area bounded by the curves $y^2 = 12x$ and $x^2 = 12y$ is divided by the line $x = 3$.