

## APPLICATION OF INTEGRAL

1. Sketch the region bounded by  $y = 2x - x^2$  and  $x - axis$  and find its area using integration.

**Ans:**  $\frac{4}{3}$  sq.units .

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

**Ans:**  $\frac{13}{3}$  sq. units.

3. Using integration , find the area of the region bounded by the following curves , after making a rough sketch :  $y = 1 + |x + 1|$ ,  $x - 3x = 3$ ,  $y = 0$ .

**Ans:** 16 sq.units.

4. Using integration find the area of the triangle formed by positive  $x - axis$  and tangent and normal to the circle  $x^2 + y^2 = 4$  at  $(1, \sqrt{3})$

**Ans:**  $2\sqrt{3}$  sq. units

5. Find the area bounded by the curve  $y = x|x|$ ,  $x - axis$  and the ordinates  $x = -3$  and  $x = 3$

**Ans:** 18 sq. units

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

**Ans:** 2 sq. units

7. Find the area bounded by the curve  $y = \cos x$  ,  $x - axis$  and the ordinates  $x = 0$  and  $x = 2\pi$

**Ans:** 4 sq .units

8. Show that the areas under the curves  $y = \sin x$  and  $y = \sin 2x$  between  $x = 0$  and  $x = \frac{\pi}{3}$  are in the ratio 2:3

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

**Ans:**  $\frac{4}{3}$  sq . units .

10. Find the area of the region  $\{(x, y): 0 \leq y \leq x^2 + 1, 0 \leq y \leq x + 1, 0 \leq x \leq 2\}$ .

**Ans:**  $\frac{23}{6}$  sq.units .

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11. Find the area of the similar region bounded by the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  and the straight line  $\frac{x}{a} + \frac{y}{b} = 1$  Ans:  $\frac{1}{2} \left( \frac{\pi}{2} - 1 \right)$
12. Find the area of the region  $\{(x, y): x^2 + y^2 \leq 1 \leq x + y\}$ . Ans:  $\left( \frac{\pi}{4} - \frac{1}{2} \right)$  sq. units
13. Find the area of the region  $\{(x, y): y^2 \leq 4x, 4x^2 + 4y^2 \leq 9\}$ . OR Find the area of the circle  $4x^2 + 4y^2 = 9$  which is interior to the parabola  $y^2 = 4x$   
Ans:  $\left\{ \frac{\sqrt{2}}{6} + \frac{9\pi}{8} - \frac{9}{4} \sin^{-1} \left( \frac{1}{3} \right) \right\}$  sq. units
14. Find the area of the region enclosed between the two circles  $x^2 + y^2 = 1$  and  $(x - 1)^2 + y^2 = 1$  Ans:  $\left( \frac{2\pi}{3} - \frac{\sqrt{3}}{2} \right)$  sq. units
15. Using integration, find the area of triangle  $ABC$  whose vertices have coordinate  $A(2, 5) B(4, 7)$  and  $C(6, 2)$  Ans: 7 sq. units.
16. Compute the area bounded by the lines  $x + 2y = 2, y - x = 1$  and  $2x + y = 7$ . Ans: 6 sq. units
17. Find the area of the region  $\{(x, y): \frac{x^2}{a^2} + \frac{y^2}{b^2} \leq 1 \leq \frac{x}{a} + \frac{y}{b}\}$  Ans :  $(\pi - 2) \frac{ab}{4}$  sq. units.
18. Find the area of the region bounded by  $y = \sqrt{x}, x = 2y + 3$  in the first quadrant and  $x - axis$ . Ans : 9 sq. unit
19. Find the area of the region included between the parabolas  $y^2 = 4ax$  and  $x^2 = 4ay$ , where  $a > 0$  Ans :  $\frac{16a^2}{3}$  sq. units
20. Find the area of the region bounded by the curves  $y = x^2 + 2, y = x, x = 0$  and  $x = 3$  Ans :  $\frac{21}{2}$  sq. units
21. Find the area of the region  $\{(x, y): x^2 \leq y \leq |x|\}$ . Ans :  $\frac{1}{3}$  sq. units
22. Find the area of the region bounded by the curve  $y = x^3$  and  $y = x + 6$  is a root of the equation. Ans : 10 sq. units.
23. Find the area bounded by the curves  $y = x$  and  $y = x^3$ . Ans:  $\frac{1}{2}$  sq units .
24. 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 by them and  $x - axis$ . Ans :  $2 - \sqrt{2}$  sq. units.
25. Find the area bounded by the curve  $y = 2x - x^2$  and the straight line  $y = -x$  Ans :  $\frac{9}{2}$  sq units.

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26. Sketch the curves and identify the region bounded by the curves  $x = \frac{1}{2}$ ,  $x = 2$ ,  $y = \log x$  and  $y = 2^x$ . Find the area of this region . **Ans :**  $\left\{ \frac{(4-\sqrt{2})}{\log 2} - \frac{5}{2} \log 2 + \frac{3}{2} \right\}$  sq.units.
27. Make a sketch of the region  $\{(x, y): 0 \leq y \leq x^2 + 3; 0 \leq y \leq 2x + 3; 0 \leq x \leq 3\}$  and find its area using integration . **Ans :**  $\frac{50}{3}$  sq .units