

# Application of Integrals

Question 1.

The area bounded by the curves  $y = -\sqrt{4 - x^2}$ ,  $x^2 = -\sqrt{2}y$  and  $x = y$  is

- (a)  $\left(\pi + \frac{1}{3}\right)$  sq. units
- (b)  $\left(\pi - \frac{1}{3}\right)$  sq. units
- (c)  $\left(\pi + \frac{2}{3}\right)$  sq. units
- (d)  $\left(\pi - \frac{2}{3}\right)$  sq. units

Answer:

- (a)  $\left(\pi + \frac{1}{3}\right)$  sq. units

Question 2.

The area common to the ellipses  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  and  $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$ ,  $0 < b < a$  is

- (a)  $(a + b)^2 \tan^{-1} \frac{b}{a}$
- (b)  $(a + b)^2 \tan^{-1} \frac{a}{b}$
- (c)  $4ab \tan^{-1} \frac{b}{a}$
- (d)  $4ab \tan^{-1} \frac{a}{b}$

Answer:

- (c)  $4ab \tan^{-1} \frac{b}{a}$

Question 3.

The area enclosed by the parabola  $y^2 = 2x$  and tangents through the point  $(-2, 0)$  is

- (a) 3 sq. units
- (b) 4 sq. units
- (c)  $\frac{4}{3}$  sq. units
- (d)  $\frac{8}{3}$  sq. units

Answer:

- (d)  $\frac{8}{3}$  sq. units

Question 4.

The area bounded by the lines  $y = 4x + 5$ ,  $y = 5 - x$  and  $4y = x + 5$  is

- (a)  $\frac{15}{2}$  sq. units  
(b)  $\frac{9}{2}$  sq. units  
(c)  $\frac{13}{2}$  sq. units  
(d) None of these

Answer:

- (a)  $\frac{15}{2}$  sq. units

Question 5.

The area bounded by the curves  $x + 2y^2 = 0$  and  $x + 3y^2 = 1$  is

- (a) 1 sq. units  
(b)  $\frac{1}{3}$  sq. units  
(c)  $\frac{2}{3}$  sq. units  
(d)  $\frac{4}{3}$  sq. units

Answer:

- (d)  $\frac{4}{3}$  sq. units

Question 6.

The area bounded by  $y = (2x)^{1/2}$  and  $x = (2y)^{1/2}$  is

- (a)  $\frac{4}{3}$  sq. units  
(b)  $\frac{13}{2}$  sq. units  
(c)  $\frac{12}{5}$  sq. units  
(d)  $\frac{4}{25}$  sq. units

Answer:

- (a)  $\frac{4}{3}$  sq. units

Question 7.

The area of the region  $\{(x, y) : y^2 = x, x^2 + y^2 = 2\}$  is

- (a)  $\left(\frac{\pi}{4} - \frac{1}{3}\right)$  sq. units  
(b)  $\left(\frac{\pi}{4} + \frac{1}{3}\right)$  sq. units  
(c)  $\left(\frac{\pi}{4} - \frac{1}{6}\right)$  sq. units

(d)  $\left(\frac{\pi}{2} + \frac{1}{3}\right)$  sq. units

Answer:

(d)  $\left(\frac{\pi}{2} + \frac{1}{3}\right)$  sq. units

Question 8.

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

(a)  $\frac{\sqrt{2}}{6} + \frac{9}{4} \sin^{-1} \left( \frac{2\sqrt{2}}{3} \right)$  sq. units

(b)  $\frac{\sqrt{2}}{6} - \frac{1}{4} \sin^{-1} \left( \frac{2\sqrt{2}}{3} \right)$  sq. units

(c)  $\frac{3}{2}$  sq. units

(d)  $\frac{7}{2}$  sq. units

Answer:

(a)  $\frac{\sqrt{2}}{6} + \frac{9}{4} \sin^{-1} \left( \frac{2\sqrt{2}}{3} \right)$  sq. units

Question 9.

The area bounded by the curve  $x^2 = 4y = 4y + 4$  and line  $3x + 4y = 0$  is

(a)  $\frac{25}{4}$  sq. units

(b)  $\frac{125}{8}$  sq. units

(c)  $\frac{125}{16}$  sq. units

(d)  $\frac{125}{24}$  sq. units

Answer:

(d)  $\frac{125}{24}$  sq. units

Question 10.

The area enclosed between the graph of  $y = x^3$  and the lines  $x = 0$ ,  $y = 1$ ,  $y = 8$  is

(a)  $\frac{45}{4}$

(b) 14

(c) 7

(d) none of these

Answer:

(a)  $\frac{45}{4}$

Question 11.

The area enclosed by the curve  $y = \sqrt{x}$  and  $x = -\sqrt{y}$ , the circle  $x^2 + y^2 = 2$  above the x-axis is

(a)  $\frac{\pi}{4}$  sq. units

(b)  $\frac{3\pi}{2}$  sq. units

- (c)  $\pi$  sq. units
- (d)  $\frac{\pi}{2}$  sq. units

Answer:

- (d)  $\frac{\pi}{2}$  sq. units

Question 12.

The ratio in which the x-axis divides the area of the region bounded by the curves  $y = x^2 - 4x$  and  $y = 2x - x^2$

- (a) 4 : 23
- (b) 4 : 27
- (c) 4 : 19
- (d) none of these

Answer:

- (a) 4 : 23

Question 13.

Area bounded by the lines  $y = |x|$  and  $y = 1 - |x - 1|$  is equal to

- (a) 4 sq. units
- (b) 6 sq. units
- (c) 2 sq. units
- (d) 8 sq. units

Answer:

- (a) 4 sq. units

Question 14.

The area bounded by the lines  $y = |x - 1|$  and  $y = 3 - |x|$  is

- (a) 2 sq. units
- (b) 3 sq. units
- (c) 4 sq. units
- (d) 6 sq. units

Answer:

- (c) 4 sq. units

Question 15.

The area bounded by the line  $y = 2x - 2$ ,  $y = -x$  and x-axis is given by

- (a)  $\frac{9}{2}$  sq. units
- (b)  $\frac{43}{6}$  sq. units
- (c)  $\frac{35}{6}$  sq. units
- (d) None of these

Answer:

- (d) None of these

Question 16.

The area of smaller portion bounded by  $|y| = -x + 1$  and  $y^2 = 4x$  is

- (a) 1 sq. units
- (b) 2 sq. units
- (c) 3 sq. units
- (d) none of these

Answer:

- (d) none of these

Question 17.

The area lying above x-axis and included between the circle  $x^2 + y^2 = 8x$  and inside of parabola  $y^2 = 4x$  is

- (a)  $\frac{1}{3} (2 + 3\pi)$  sq. units
- (b)  $\frac{2}{3} (4 + 3\pi)$  sq. units
- (c)  $(6 + 3\pi)$  sq. units
- (d)  $\frac{4}{3} (8 + 3\pi)$  sq. units

Answer:

- (d)  $\frac{4}{3} (8 + 3\pi)$  sq. units

Question 18.

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

- (a) 27 sq. units
- (b) 28 sq. units
- (c) 54 sq. units
- (d) 30 sq. units

Answer:

- (a) 27 sq. units

Question 19.

The area included between the curves  $x^2 = 4by$  and  $y^2 = 4ax$

- (a)  $16ab$  sq. units
- (b)  $\frac{16ab}{3}$  sq. units
- (c)  $4ab$  sq. units
- (d)  $16\pi ab$  sq. units

Answer:

- (b)  $\frac{16ab}{3}$  sq. units

Question 20.

Area of the region between the curves  $x^2 + y^2 = \pi^2$ ,  $y = \sin x$  and y-axis in first quadrant is

- (a)  $\left(\frac{\pi^3-8}{4}\right)$  sq. units
- (b)  $\left(\frac{\pi^3-4}{8}\right)$  sq. units
- (c)  $\left(\frac{\pi^2-8}{4}\right)$  sq. units
- (d)  $\left(\frac{\pi^2-4}{8}\right)$  sq. units

Answer:

- (a)  $\left(\frac{\pi^3-8}{4}\right)$  sq. units

Question 21.

If  $y = 2 \sin x + \sin 2x$  for  $0 \leq x \leq 2\pi$ , then the area enclosed by the curve and x-axis is

- (a)  $\frac{9}{2}$  sq. units
- (b) 8 sq. units
- (c) 12 sq. units
- (d) 4 sq. units

Answer:

- (c) 12 sq. units

Question 22.

The area bounded by the curve  $y = x^2 + 4x + 5$ , the axes of coordinates and minimum ordinate is

- (a)  $3\frac{2}{3}$  sq. units
- (b)  $4\frac{2}{3}$  sq. units
- (c)  $5\frac{2}{3}$  sq. units
- (d) None of these

Answer:

- (b)  $4\frac{2}{3}$  sq. units

Question 23.

The area of the ellipse  $\frac{x^2}{4^2} + \frac{y^2}{9^2} = 1$  is

- (a)  $6\pi$  sq. units
- (b)  $\frac{\pi(a^2+b^2)}{4}$  sq. units
- (c)  $\pi(a+b)$  sq. units
- (d) none of these

Answer:

- (d) none of these

Question 24.

The area bounded by the curve  $2x^2 + y^2 = 2$  is

- (a)  $\pi$  sq. units
- (b)  $\sqrt{2}\pi$  sq. units
- (c)  $\frac{\pi}{2}$  sq. units
- (d)  $2\pi$  sq. units

Answer:

- (b)  $\sqrt{2}\pi$  sq. units

Question 25.

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

- (a)  $4\pi ab$  sq. units
- (b)  $2\pi ab$  sq. units
- (c)  $\pi ab$  sq. units
- (d)  $\frac{\pi ab}{2}$  sq. units

Answer:

- (c)  $\pi ab$  sq. units

Question 26.

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

- (a)  $\frac{\pi a^a}{4}$
- (b)  $\frac{\pi a^3}{4}$
- (c)  $\frac{\pi a^2}{8}$
- (d) None of these

Answer:

- (a)  $\frac{\pi a^a}{4}$

Question 27.

The area enclosed by curve  $\frac{x^2}{25} + \frac{y^2}{16} = 1$  is

- (a)  $10\pi$  sq. units
- (b)  $20\pi$  sq. units
- (c)  $5\pi$  sq. units
- (d)  $4\pi$  sq. units

Answer:

- (b)  $20\pi$  sq. units

Question 28.

The area bounded by the curve  $y = x^2 - 1$  and the straight line  $x + y = 3$  is

- (a)  $\frac{9}{2}$  sq. units
- (b) 4 sq. units
- (c)  $\frac{7\sqrt{17}}{2}$  sq. units

(d)  $\frac{17\sqrt{17}}{6}$  sq. units

Answer:

(d)  $\frac{17\sqrt{17}}{6}$  sq. units

Question 29.

The area of the region  $R = \{(x, y) : |x| \leq |y| \text{ and } x^2 + y^2 \leq 1\}$  is

(a)  $\frac{3\pi}{8}$  sq. units

(b)  $\frac{5\pi}{8}$  sq. units

(c)  $\frac{\pi}{2}$  sq. units

(d)  $\frac{\pi}{8}$  sq. units

Answer:

(c)  $\frac{\pi}{2}$  sq. units

Question 30.

The area enclosed between the curve  $y^2 = 4x$  and the line  $y = x$  is

(a)  $\frac{8}{3}$  sq. units

(b)  $\frac{4}{3}$  sq. units

(c)  $\frac{2}{3}$  sq. units

(d)  $\frac{1}{2}$  sq. units

Answer:

(a)  $\frac{8}{3}$  sq. units

Question 31.

The area bounded by the curves  $x^2 + y^2 = 9$  and  $y^2 = 8x$  is

(a) 0 sq. units

(b)  $\left(\frac{2\sqrt{2}}{3} + \frac{9\pi}{2} - 9\sin^{-1} \frac{1}{3}\right)$  sq. units

(c)  $16\pi$  sq. units

(d) None of these

Answer:

(b)  $\left(\frac{2\sqrt{2}}{3} + \frac{9\pi}{2} - 9\sin^{-1} \frac{1}{3}\right)$  sq. units

Question 32.

The area bounded by the curves  $y = \sin x$ ,  $y = \cos x$  and  $x = 0$  is

(a)  $(\sqrt{2} - 1)$  sq. units

(b) 1 sq. units

(c)  $\sqrt{2}$  sq. units

(d)  $(1 + \sqrt{2})$  sq. units



Answer:

- (a)  $(\sqrt{2} - 1)$  sq. units

Question 33.

The area common to the circle  $x^2 + y^2 = 16a^2$  and the parabola  $y^2 = 6ax$  is

- (a)  $\frac{4a^2}{3}(4\pi - \sqrt{3})$  sq. units  
(b)  $\frac{4a^2}{3}(8\pi - 3)$  sq. units sq. units  
(c)  $\frac{4a^2}{3}(4\pi + \sqrt{3})$  sq. units  
(d) None of these

Answer:

- (c)  $\frac{4a^2}{3}(4\pi + \sqrt{3})$  sq. units

Question 34.

The area included between curves  $y = x^2 - 3x + 2$  and  $y = -x^2 + 3x - 2$  is

- (a)  $\frac{1}{6}$  sq. units  
(b)  $\frac{1}{2}$  sq. units  
(c) 1 sq. units  
(d)  $\frac{1}{3}$  sq. units

Answer:

- (d)  $\frac{1}{3}$  sq. units

Question 35.

The area bounded by  $x = -4y^2$  and  $x - 1 = -5y^2$  is

- (a) 1 sq. unit  
(b)  $\frac{2}{3}$  sq. units  
(c)  $\frac{2}{3}$  sq. units  
(d) 2 sq. units

Answer:

- (c)  $\frac{2}{3}$  sq. units

Question 36.

The area bounded by the lines  $y = |x - 2|$ ,  $x = 1$ ,  $x = 3$  and the x-axis is

- (a) 1 sq. units  
(b) 2 sq. units  
(c) 3 sq. units  
(d) 4 sq. units

Answer:

- (b) 2 sq. units

Question 37.

Area of the region bounded by the curve  $y = x^2$  and the line  $y = 4$  is

- (a)  $\frac{11}{3}$  sq. units
- (b)  $\frac{32}{3}$  sq. units
- (c)  $\frac{43}{3}$  sq. units
- (d)  $\frac{47}{3}$  sq. units

Answer:

- (b)  $\frac{32}{3}$  sq. units

Question 38.

Area of the smaller region bounded by  $x^2 + y^2 = 9$  and the line  $x = 1$  is

- (a)  $(2 - 3 \sec^{-1} 3)$  sq. units
- (b)  $(\sqrt{8} - 3 \sec^{-1} 3)$  sq. units
- (c)  $(9 \sec^{-1} 3 - \sqrt{8})$  sq. units
- (d)  $(\sec^{-1} 3 - 3\sqrt{8})$  sq. units

Answer:

- (c)  $(9 \sec^{-1} 3 - \sqrt{8})$  sq. units

Question 39.

The area bounded by the curve  $y^2 = x$ , line  $y = 4$  and y-axis is

- (a)  $\frac{16}{3}$  sq. units
- (b)  $\frac{64}{3}$  sq. units
- (c)  $7\sqrt{2}$  sq. units
- (d) none of these

Answer:

- (b)  $\frac{64}{3}$  sq. units

Question 40.

The area bounded by the curve  $x = 3y^2 - 9$  and the line  $x = 0$ ,  $y = 0$  and  $y = 1$  is

- (a) 8 sq. units
- (b)  $\frac{8}{3}$  sq. units
- (c)  $\frac{3}{8}$  sq. units
- (d) 3 sq. units

Answer:

- (a) 8 sq. units

Question 41.

Area bounded by the curve  $y^2 = 16x$  and line  $y = mx$  is  $\frac{2}{3}$  then m is equal to

- (a) 3
- (b) 4
- (c) 1
- (d) 2

Answer:

- (b) 4

Question 42.

Find the area enclosed by parabola  $y^2 = x$  and the line  $y + x = 2$  and the x-axis.

- (a)  $\frac{5}{6}$  sq. units
- (b)  $\frac{7}{6}$  sq. units
- (c)  $\frac{6}{7}$  sq. units
- (d)  $\frac{4}{7}$  sq. units

Answer:

- (b)  $\frac{7}{6}$  sq. units

Question 43.

The area bounded by the curve  $x^2 + y^2 = 1$  and 1st quadrant is

- (a)  $\frac{\pi}{4}$  sq. units
- (b)  $\frac{\pi}{2}$  sq. units
- (c)  $\frac{\pi}{3}$  sq. units
- (d)  $\frac{\pi}{6}$  sq. units

Answer:

- (a)  $\frac{\pi}{4}$  sq. units

Question 44.

Area bounded by the curve  $y = \cos x$  between  $x = 0$  and  $x = \frac{3\pi}{2}$  is

- (a) 1 sq. units
- (b) 2 sq. units
- (c) 3 sq. units
- (d) 4 sq. units

Answer:

- (c) 3 sq. units

Question 45.

The area of the region bounded by the curve  $y = \sqrt{4 - x^2}$  and x-axis is

- (a)  $8\pi$  sq. units
- (b)  $2\pi$  sq. units
- (c)  $16\pi$  sq. units
- (d)  $6\pi$  sq. units

Answer:

(b)  $2\pi$  sq. units