GRADE XII
Question Bank (MATHEMATICS)
Chapter-8 Applications of Integrals

1 Marks:

1. The area (in sq. units) of the region bounded by the curve $y = x, x = 0, x = 2$ and x-axis is **[BOARD 2024]**

   a) $\frac{3}{2}$ b) $\frac{1}{2}\log 2$ c) 2 d) 4

2. The area of the region enclosed by the curve $y = \sqrt{x}$ and the lines $x = 0, x = 4$ and x-axis is **[BOARD 2025]**

   a) $\frac{16}{9}$ sq. units b) $\frac{32}{9}$ sq. units c) $\frac{16}{3}$ sq. units d) $\frac{32}{3}$ sq. units

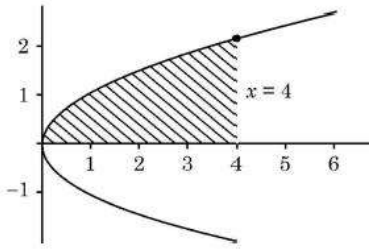
3. The area of the region enclosed between the curve $y = x|x|$, x-axis, $x = -2$ and $x = 2$ is **[BOARD 2025]**

   a) $\frac{8}{3}$ b) $\frac{16}{3}$ c) 0 d) 8

4. The area of the region bounded by the curve $y^2 = x$ between $x = 0$ and $x = 1$ is **[BOARD 2025]**

   a) $\frac{3}{2}$ b) $\frac{2}{3}$ c) 3 d) $\frac{4}{3}$

5. The area of the shaded region bounded by the curves $y^2 = x, x = 4$ and the x-axis is given by **[BOARD 2025]**



   a) $\int_0^4 x\,dx$ b) $\int_0^2 y^2 dy$ c) $2\int_0^4 \sqrt{x}\,dx$ d) $\int_0^4 \sqrt{x}dx$

6. The area of the shaded region bounded by the curves $y = x^2, 0 \le x \le 2$ and the y-axis is given by **[BOARD 2025]**

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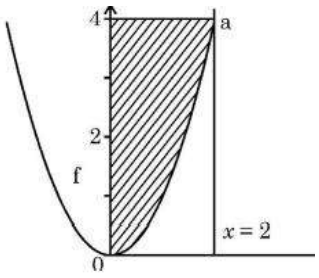

a) $\int_0^2 x^2 dx$ b) $\int_0^2 \sqrt{y} dy$ c) $\int_0^4 x^2 dx$ d) $\int_0^4 \sqrt{y} dy$

2 Marks:

1. Calculate the area of the region bounded by the curve $\frac{x^2}{9} + \frac{y^2}{4} = 1$ and x-axis using integration. **[BOARD 2025]**

3 Marks:

1. Find the area of the following region using integration: $\{(x, y): y^2 \leq 2x \text{ and } y \geq x - 4\}$ **[BOARD 2023]**
2. Find the area of the minor segment of the circle $x^2 + y^2 = 4$ cut off by the line $x = 1$, using integration. **[BOARD 2023]**
3. Using integration, find the area of the region bounded by $y = mx$ $(m > 0)$, $x = 1, x = 2$ and the x-axis. **[BOARD 2023]**
4. Sketch the graph of $y = |x + 3|$ and find the area of the region enclosed by the curve, x-axis, between $x = -6$ and $x = 0$, using integration. **[BOARD 2025]**

5 Marks:

1. Find the area of the triangle ABC bounded by the lines rep[resented by the equations $5x - 2y - 10 = 0, x - y - 9 = 0$ and $3x - 4y - 6 = 0$ using integration method. **[BOARD 2023]**
2. Using integration, find the area of the region bounded by the triangle ABC when its side are given by the lines $4x - y + 5 = 0, x + y - 5 = 0$ and $x - 4y + 5 = 0$. **[BOARD 2023]**
3. Find the area of the region bounded by the lines $y = 4x + 5, x + y = 5$ and $4y = x + 5$ using integration. **[BOARD 2023]**
4. Find the area of the region bounded by the lines $x - 2y = 4, x = -1, x = 6$ and x-axis, using integration. **[BOARD 2024]**

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5. Using integration, find the area of the region bounded by the line $y = 5x + 2$, the x-axis and the ordinates $x = -2$ and $x = 2$. **[BOARD 2025]**
6. Using integration, find the area of the region bounded by the triangle whose vertices are $(-1, 2), (1, 5)$ and $(3, 4)$. **[BOARD 2023]**
7. Using integration, find the area of the region bounded by the triangle whose vertices are $(-1, 1), (0, 5)$ and $(3, 2)$. **[BOARD 2023]**
8. Sketch a graph of $y = x^2$. Using integration, find the area of the region bounded by $y = 9, x = 0$ and $y = x^2$. **[BOARD 2025]**
9. Use integration to find the area of the region bounded by curve $y = -x^2$ and the straight lines $x = -3, x = 2$ and $y = 0$. Sketch a rough figure to illustrate the bounded region. **[BOARD 2025]**
10. Sketch a graph of $y = \sqrt{x}$. Using integration, find the area of the region bounded by $y = \sqrt{x}, x = 4$ and x-axis in the first quadrant. **[BOARD 2025]**
11. Find the area of the region bounded by the curves $x^2 = y, y = x + 2$ and x-axis using integration. **[BOARD 2023]**
12. Using integration, evaluate the area of the region bounded by the curve $y = x^2$, the lines $y = 1$ and $y = 3$ and the y-axis. **[BOARD 2024]**
13. Using integration, find the area of the region bounded by the parabola $y^2 = 4ax$ and its latus rectum. **[BOARD 2023]**
14. If A_1 denotes the area of region bounded by $y^2 = 4x, x = 1$ and x-axis in the first quadrant and A_2 denotes the area of region bounded by $y^2 = 4x, x = 4$. Find $A_1 : A_2$. **[BOARD 2024]**
15. Using integration, find the area of the region bounded by the circle $x^2 + y^2 = 16$, the line $y = x$ and y-axis but lying in the first quadrant. **[BOARD 2023]**
16. Using integration, find the area of the region bounded by the circle $x^2 + y^2 = 16$ and the lines $x = -2$ and $x = 2$. **[BOARD 2024]**
17. Using integration, find the area of the region enclosed between the curve $y = \sqrt{4 - x^2}$ and the lines $x = -1, x = 1$ and the x-axis. **[BOARD 2024]**
18. Using integration, find the area of the region bounded by the curve $y = \sqrt{4 - x^2}$ the lines $x = -\sqrt{2}, x = \sqrt{3}$ and x-axis. **[BOARD 2024]**
19. Using integration, find the area of region bounded by line $y = \sqrt{3}x$ and the curve $y = \sqrt{4 - x^2}$ and y-axis in the first quadrant. **[BOARD 2023]**

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

[BOARD 2023]

21. The area of the region bounded by the line $y = mx$ $(m > 0)$, the curve $x^2 + y^2 = 4$ and the x-axis in the first quadrant is $\frac{\pi}{2}$ units. Using integration, find the value of m. **[BOARD 2023]**

22. Find the area of region bounded by the curve $4x^2 + y^2 = 36$ using integration.

[BOARD 2024]

23. Using integration, find the area of the ellipse $\frac{x^2}{16} + \frac{y^2}{4} = 1$ included between the lines $x = -2$ and $x = 2$. **[BOARD 2024]**

24. Using integration, find the area of the region bounded by the ellipse $9x^2 + 25y^2 = 225$, the lines $x = -2, x = 2$ and the x-axis. **[BOARD 2024]**

25. Using integration, find the area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ bounded between the lines $x = -\frac{a}{2}$ to $x = \frac{a}{2}$. **[BOARD 2025]**

26. Find the area of the smaller region bounded by the curves $\frac{x^2}{25} + \frac{y^2}{16} = 1$ and $\frac{x}{5} + \frac{y}{4} = 1$ using integration. **[BOARD 2023]**

27. Sketch the graph of $y = x|x|$ and hence find the area bounded by this curve, x-axis and the ordinates $x = -2$ and $x = 2$, using integration. **[BOARD 2024]**

28. In a rough sketch, mark the region bounded by $y = 1 + |x + 1|, x = -2, x = 2$ and $y = 0$. Using integration, find the area of the marked region. **[BOARD 2025]**

29. Draw the rough sketch for the curve $y = 2 + |x + 1|$. Using integration, find the area of the region bounded by the curve $y = 2 + |x + 1|, x = -4, x = 3$ and $y = 0$.

[BOARD 2025]

30. A woman discovered a scratch along a straight line on a circular table top of radius 8 cm. She divided the table top into 4 equal quadrants and discovered the scratch passing through the origin inclined at an angle $\frac{\pi}{4}$ anticlockwise along the positive direction of x-axis. Find the area of the region enclosed by the x-axis, the scratch and the circular table top in the first quadrant, using integration. **[BOARD 2025]**

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