PRACTICE PAPER 01 (2026-27)
CHAPTER 08 : APPLICATION OF INTEGRALS

SUBJECT: MATHEMATICS	**MAX. MARKS:** 40
CLASS: XII	**DURATION:** 1½ hrs

General Instructions:

(i) All questions are compulsory.

(ii) This question paper contains 20 questions divided into five Sections A, B, C, D and E.

(iii) Section A comprises 10 MCQs of 1 mark each (Q9 and Q10 are Assertion–Reason questions). Section B comprises 4 questions of 2 marks each. Section C comprises 3 questions of 3 marks each. Section D comprises 1 question of 5 marks with an internal choice. Section E comprises 2 case study based questions of 4 marks each, with internal choice in the last sub-part.

(iv) There is no overall choice. Internal choices have been provided where indicated.

(v) Use of calculators is not permitted.

SECTION – A

Questions 1 to 10 carry 1 mark each.

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

(a) 26/3 sq. units (b) 9 sq. units (c) 8/3 sq. units (d) 28/3 sq. units

2. The area under the curve $y = \sin x$ between $x = 0$ and $x = \pi/2$ is

(a) 2 sq. units (b) 1 sq. unit (c) 4 sq. units (d) π/2 sq. units

3. The area enclosed by the circle $x^2 + y^2 = 16$ is

(a) 4π sq. units (b) 8π sq. units (c) 16π sq. units (d) 32π sq. units

4. The area of the region bounded by the parabola $y^2 = 4x$ and the line $x = 1$ is

(a) 4/3 sq. units (b) 8/3 sq. units (c) 16/3 sq. units (d) 4 sq. units

5. The area of the region enclosed between the curves $y = x$ and $y = x^2$ is

(a) 1/3 sq. unit (b) 1/2 sq. unit (c) 1/6 sq. unit (d) 1/12 sq. unit

6. The area bounded by the curve $y = \cos x$, the x-axis and the lines $x = 0$ and $x = \pi$ is

(a) 0 (b) 1 sq. unit (c) 2 sq. units (d) 4 sq. units

7. The area of the region bounded by $y = |x|$ and the line $y = 2$ is

(a) 2 sq. units (b) 4 sq. units (c) 8 sq. units (d) 1 sq. unit

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

(a) 18 sq. units (b) 9 sq. units (c) 12 sq. units (d) 36 sq. units

For Q9 and Q10, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

9. Assertion (A): The area bounded by $y = x^3$, the x-axis and the lines $x = -1$ and $x = 1$ is 0.

Reason (R): $\int_{-1}^{1} x^3\,dx = 0$.

10. Assertion (A): The area of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is πab.

Reason (R): The area of the ellipse is $4\int_0^a \frac{b}{a}\sqrt{a^2 - x^2}\,dx$.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. Find the area of the region bounded by the line y = 3x + 2, the x-axis and the lines x = 1 and x = 3, using integration.

12. Find the area of the region bounded by the curve y = 1/x, the x-axis and the lines x = 1 and x = e.

13. Using integration, find the area of the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$.

14. Find the area of the region enclosed by the parabola y = x² and the line y = 2x.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. Find the area of the region bounded by the parabola y² = 4x and the line y = x.

16. Using integration, find the area of the region bounded by the parabola y = x² and the line y = x + 2.

17. Using integration, find the area of the region bounded by the curve y = |x + 1|, the x-axis and the lines x = −4 and x = 2.

SECTION – D

Question 18 carries 5 marks.

18. Find the area of the smaller region bounded by the circle x² + y² = 4 and the line x + y = 2.

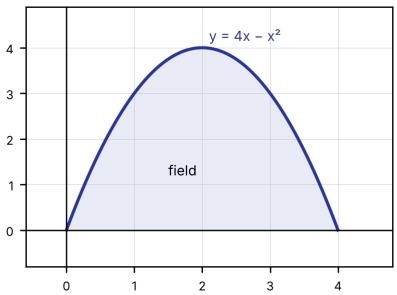
OR

Using integration, find the area of the triangle whose vertices are (1, 0), (2, 2) and (3, 1).

SECTION – E (Case Study Based Questions)

Questions 19 and 20 carry 4 marks each.

19. A farmer's field is bounded by the curve y = 4x − x² and the x-axis, as shown in the figure. Here 1 square unit of the grid represents 300 m² of land.



Based on the above information, answer the following questions:

(i) Find the points where the curve meets the x-axis. (1)

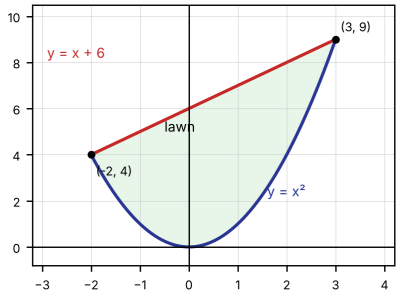
(ii) Write the integral that gives the area of the field. (1)

(iii) Find the area of the field in m² and the cost of sowing it at ₹5 per m². (2)

OR

(iii) A straight path along the line y = x cuts the field. Find the area (in square units) of the part of the field lying between the curve and this line. (2)

20. A lawn is enclosed between a curved boundary $y = x^2$ and a straight path $y = x + 6$, as shown in the figure (units in metres).



Based on the above information, answer the following questions:

(i) Find the points of intersection of the curve and the path. (1)

(ii) Write the integral that gives the area of the lawn. (1)

(iii) Find the area of the lawn. (2)

OR

(iii) Find the area of the part of the lawn lying to the right of the y-axis ($x \geq 0$). (2)

— End of Question Paper —