

Application of Integrals — CBSE Pattern Test 2

Class 12 Maths · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 2 — CBSE Pattern (90 minutes, 40 marks)

Class 12 Maths · Application of Integrals · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.

(2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.

(3) For MCQ questions choose the single correct option; for VSA answers write a single line.

(4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

- The area bounded by the x-axis and $y = f(x)$ where $f(x) < 0$ is
 - $-\int_a^b f(x) \, dx$
 - $\int_a^b f(x) \, dx$
 - 0
 - always positive without sign
- The area under $y = x$ from $x = 0$ to $x = 1$ is
 - $1/2$
 - 1
 - 2
 - 0
- The limits of integration for the area between two curves are found by
 - solving $f(x) = g(x)$
 - differentiating
 - $f(0)$
 - $g(0)$
- For the region between two curves, we subtract the
 - lower curve from the upper curve
 - upper curve from the lower curve
 - areas directly
 - x-axis
- The area enclosed by a parabola and a line is found using
 - definite integrals
 - derivatives
 - limits only
 - matrices
- The area using y-limits is
 - $\int (\text{right} - \text{left}) \, dy$
 - $\int (\text{left} - \text{right}) \, dy$
 - $\int (\text{top} - \text{bottom}) \, dx$
 - $\int dx \, dy$ only
- Choosing the correct variable
 - simplifies the computation

- (B) is irrelevant
 (C) is impossible
 (D) changes the area
8. For the region between $x = f(y)$ and $x = g(y)$, we integrate with respect to
 (A) y
 (B) x
 (C) xy
 (D) 0
9. Find the area under $y = x$ from $x = 0$ to $x = 1$.
10. Find the points of intersection of $y = x$ and $y = x^2$.

Section B — Short Answer I ($4 \times 2 = 8$ marks)

11. Write the area of the circle $x^2 + y^2 = r^2$ using integration ideas.
12. Find the area under $y = \sin x$ from 0 to π .
13. When do we integrate with respect to y ?
14. Write the formula for area using y -limits when $x = f(y)$ is right of $x = g(y)$.

Section C — Short Answer II ($4 \times 3 = 12$ marks)

15. Find the area under $y = x$ from $x = 0$ to $x = 2$.
16. Find the area between $y = 2x$ and $y = x^2$.
17. Find the area of the region bounded by the circle $x^2 + y^2 = 4$ (in the first quadrant).
18. Find the area between $x = y^2$ and $x = y$ (integrate with respect to y).

Section D — Long Answers ($2 \times 5 = 10$ marks)

19. Find the area bounded by $y = x^2$, the x -axis and the lines $x = 1$ and $x = 3$.
20. Find the area of the circle $x^2 + y^2 = 9$ using integration. Find the area bounded by the curves $x = y^2 - 1$ and $x = 1 - y^2$ using y -integration.

Answer Key (Marking Scheme)

- Q1 — (A) $-\int_a^b f(x) dx$. Q2 — (A) $1/2$. Q3 — (A) solving $f(x) = g(x)$. Q4 — (A) lower curve from the upper curve.
 Q5 — (A) definite integrals. Q6 — (A) $\int$ (right – left) dy . Q7 — (A) simplifies the computation. Q8 — (A) y .
 Q9 — $1/2$.
 Q10 — $(0, 0)$ and $(1, 1)$.
 Q11 — πr^2 .
 Q12 — 2 .
 Q13 — When the region is easier to describe as functions of y .
 Q14 — $\int (f(y) - g(y)) dy$.
 Q15 — 2 .
 Q16 — $4/3$.
 Q17 — π .
 Q18 — $1/6$.

Q19 — $26/3$.

Q20 — 9π ; $8/3$.