

Application of Integrals — CBSE Pattern Test 1

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

Test 1 — 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 under the curve $y = f(x)$ from $x = a$ to $x = b$ ($f(x) \geq 0$) is
 - $\int_a^b f(x) \, dx$
 - $\int_a^b f'(x) \, dx$
 - $f(b) - f(a)$
 - $f(a) - f(b)$
- Area is always
 - non-negative
 - negative
 - zero
 - undefined
- The area between $y = f(x)$ and $y = g(x)$ with $f(x) \geq g(x)$ is
 - $\int (f - g) \, dx$
 - $\int (f + g) \, dx$
 - $\int (g - f) \, dx$
 - $\int f g \, dx$
- The area between $y = x$ and $y = x^2$ from 0 to 1 is
 - $1/6$
 - $1/2$
 - $1/3$
 - 1
- The area of the circle $x^2 + y^2 = r^2$ is
 - πr^2
 - $2\pi r$
 - $\pi r^2/2$
 - $4r^2$
- The area of the ellipse $x^2/a^2 + y^2/b^2 = 1$ is
 - πab
 - $\pi a^2 b^2$
 - $\pi(a + b)$
 - $\pi ab/2$
- If a region is easier to describe as functions of y , we integrate with respect to
 - y

- (B) x
 (C) both
 (D) neither
8. The area under $y = \sin x$ from 0 to π is
 (A) 2
 (B) 1
 (C) 0
 (D) π
9. Write the formula for the area under $y = f(x)$ from $x = a$ to $x = b$.
10. Write the area of the ellipse.

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

11. Is area positive or negative?
12. How are the limits found for the area between two curves?
13. Write the formula for the area between $y = f(x)$ and $y = g(x)$, $f(x) \geq g(x)$.
14. Does changing the variable change the area?

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

15. Find the area under $y = x^2$ from $x = 0$ to $x = 1$.
16. Find the area between $y = x$ and $y = x^2$ from $x = 0$ to $x = 1$.
17. Find the area under $y = \sin x$ from 0 to π .
18. Find the area bounded by $x = y^2$ and the y -axis from $y = 0$ to $y = 2$.

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

19. Find the area of the region bounded by $y = x^2$ and the line $y = x + 2$.
20. Find the area of the ellipse $x^2/16 + y^2/9 = 1$. Find the area of the region bounded by $x = y^2$ and $x = 4$.

Answer Key (Marking Scheme)

- Q1 — (A) $\int_a^b f(x) dx$. Q2 — (A) non-negative. Q3 — (A) $\int (f - g) dx$. Q4 — (A) $1/6$.
 Q5 — (A) πr^2 . Q6 — (A) πab . Q7 — (A) y . Q8 — (A) 2.
 Q9 — $\int_a^b f(x) dx$.
 Q10 — πab .
 Q11 — Always non-negative.
 Q12 — By solving $f(x) = g(x)$.
 Q13 — $\int (f - g) dx$.
 Q14 — No.
 Q15 — $1/3$.
 Q16 — $1/6$.
 Q17 — 2.
 Q18 — $8/3$.
 Q19 — $9/2$.

Q20 — 12π ; $32/3$.