

Limits and Derivatives — CBSE Pattern Test 1

Class 11 Maths · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 1 — CBSE Pattern (90 minutes, 40 marks)

Class 11 Maths · Limits and Derivatives · 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)

1. The limit $x \rightarrow a$ means x approaches a
 - (A) from both sides
 - (B) only from the left
 - (C) only from the right
 - (D) equal to a
2. $\lim_{x \rightarrow 2} (x + 3)$ is
 - (A) 5
 - (B) 2
 - (C) 3
 - (D) 6
3. The left-hand limit of $f(x)$ at $x = a$ is denoted by
 - (A) $\lim_{x \rightarrow a^-} f(x)$
 - (B) $\lim_{x \rightarrow a^+} f(x)$
 - (C) $f(a)$
 - (D) $\lim_{x \rightarrow \infty} f(x)$
4. $\lim_{x \rightarrow 0} (\sin x)/x$ equals
 - (A) 1
 - (B) 0
 - (C) ∞
 - (D) undefined
5. A function f is continuous at $x = a$ if
 - (A) $\lim_{x \rightarrow a} f(x) = f(a)$
 - (B) $\lim_{x \rightarrow a} f(x) = 0$
 - (C) $f(a) = 0$
 - (D) $\text{LHL} \neq \text{RHL}$
6. The derivative of $f(x)$ from first principles is
 - (A) $\lim_{h \rightarrow 0} [f(x + h) - f(x)]/h$
 - (B) $\lim_{h \rightarrow 0} [f(x + h) + f(x)]/h$
 - (C) $f(x)/h$
 - (D) $f(x + h)$
7. $d/dx [f(x) + g(x)]$ equals
 - (A) $f'(x) + g'(x)$

- (B) $f'(x) g'(x)$
 (C) $f'(x) - g'(x)$
 (D) $f(x) g'(x)$
8. $d/dx (x^n)$ equals
 (A) $n x^{(n-1)}$
 (B) $x^{(n+1)}$
 (C) $n x^n$
 (D) x^n/n
9. What does $x \rightarrow a$ mean?
10. Write the notation for the left-hand limit of f at a .

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

11. Find $\lim_{x \rightarrow 3} (2x + 1)$.
12. State the condition for $\lim_{x \rightarrow a} f(x)$ to exist.
13. Evaluate $\lim_{x \rightarrow 0} (1 - \cos x)/x^2$.
14. Write the derivative of $\sin x$.

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

15. Evaluate $\lim_{x \rightarrow 2} (x^2 - 4)/(x - 2)$.
16. Evaluate $\lim_{x \rightarrow 0} (1 - \cos 2x)/x^2$.
17. Find LHL and RHL of $f(x) = |x - 2|$ at $x = 2$.
18. Differentiate $f(x) = x^3 + 2x^2 - 5x + 1$.

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

19. Find the derivative of $f(x) = x^3$ from first principles.
20. Find k so that $f(x) = kx + 1$ for $x \leq 2$ and $3x - 5$ for $x > 2$ is continuous at $x = 2$. Differentiate $f(x) = x \sin x$ using the product rule.

Answer Key (Marking Scheme)

- Q1 — (A) from both sides. Q2 — (A) 5. Q3 — (A) $\lim_{x \rightarrow a^-} f(x)$. Q4 — (A) 1.
 Q5 — (A) $\lim_{x \rightarrow a} f(x) = f(a)$. Q6 — (A) $\lim_{h \rightarrow 0} [f(x+h) - f(x)]/h$. Q7 — (A) $f'(x) + g'(x)$. Q8 — (A) $n x^{(n-1)}$.
 Q9 — x approaches a from both sides.
 Q10 — $\lim_{x \rightarrow a^-} f(x)$.
 Q11 — 7.
 Q12 — LHL = RHL.
 Q13 — $1/2$.
 Q14 — $\cos x$.
 Q15 — 4.
 Q16 — 2.
 Q17 — LHL = RHL = 0.
 Q18 — $3x^2 + 4x - 5$.

Q19 — $3x^2$.

Q20 — $k = 0$; $\sin x + x \cos x$.