



ChapterNotes

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CHAPTER NOTES

Applications of Derivatives Class 12 Notes — CBSE Maths Chapter 6

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Applications of Derivatives Class 12 Notes — CBSE Maths Chapter 6

Chapter 6 — **Applications of Derivatives** — covers rate of change, tangents/normals, increasing/decreasing functions, maxima/minima, and approximations. Carries **8-10 marks**.

Key Concepts

Rate of Change

dy/dx represents rate of change of y with respect to x .

If $s = f(t)$ is displacement, then $ds/dt = \text{velocity}$, $d^2s/dt^2 = \text{acceleration}$

Tangent and Normal

Slope of tangent at (x_1, y_1) : $m = dy/dx$ at (x_1, y_1)

Equation of tangent: $y - y_1 = m(x - x_1)$

Slope of normal = $-1/m$

Equation of normal: $y - y_1 = (-1/m)(x - x_1)$

Increasing and Decreasing Functions

$f'(x) > 0$ on $(a, b) \rightarrow f$ is **strictly increasing** on (a, b)

$f'(x) < 0$ on $(a, b) \rightarrow f$ is **strictly decreasing** on (a, b)

$f'(x) = 0$ at a point $\rightarrow$ possible turning point (check sign change)

Maxima and Minima

First Derivative Test:

If $f'(x)$ changes from $+$ to $-$ at $x = c \rightarrow$ local maximum

If $f'(x)$ changes from $-$ to $+$ at $x = c \rightarrow$ local minimum

If no sign change $\rightarrow$ neither (inflection point)

Second Derivative Test:

At critical point ($f'(c) = 0$):

$f''(c) < 0 \rightarrow$ local maximum

$f''(c) > 0 \rightarrow$ local minimum

$f''(c) = 0 \rightarrow$ test fails (use first derivative test)

For absolute max/min on $[a,b]$: Find critical points in (a,b) , evaluate f at critical points AND at endpoints a, b . Compare all values.

Approximations

$$f(x + \Delta x) \approx f(x) + f'(x) \cdot \Delta x$$

Quick Revision Points

- Tangent slope = dy/dx ; Normal slope = $-dx/dy$
- $f'(x) > 0 \rightarrow$ increasing; $f'(x) < 0 \rightarrow$ decreasing
- Critical points: where $f'(x) = 0$ or doesn't exist
- 1st derivative test: check sign change of $f'(x)$
- 2nd derivative test: $f''(c) < 0 \rightarrow$ max; $f''(c) > 0 \rightarrow$ min
- Absolute extrema on closed interval: check critical points + endpoints

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