# SmartKalike

CBSE Class 12 · Maths

## Application of Derivatives

10 most probable questions for Boards 2027

**Q1. 0.5 marks · Very short answer**

For y = −2x + 5, calculate dy/dx and determine whether y increases or decreases as x increases.

**Answer**

dy/dx = −2 < 0; therefore, y decreases as x increases.

**Q2. 1 mark · Multiple choice**

Which condition on f′(x) guarantees that a differentiable function f is strictly increasing on an interval (a, b)?

(A) f′(x) < 0 for every x ∈ (a, b)

(B) f′(x) > 0 for every x ∈ (a, b)

(C) f′(x) = 0 for every x ∈ (a, b)

(D) f(x) > 0 for every x ∈ (a, b)

**Answer**

(B) f′(x) > 0 for every x ∈ (a, b) — a positive derivative guarantees that f is strictly increasing on the interval.

**Q3. 2 marks · Short answer**

For $y = x^2 + 3x$, calculate the rate of change of y with respect to x at x = 2.

**Answer**

$y = x^2 + 3x$

$dy/dx = 2x + 3$

At x = 2,

$dy/dx = 2(2) + 3$

∴ dy/dx = 7

**Q4. 3 marks · Medium answer**

If $y = x^3 − 2x$, find the rate of change of y with respect to x at x = 2.

**Answer**

$y = x^3 − 2x$

$dy/dx = 3x^2 − 2$

At x = 2,

$dy/dx = 3(2)^2 − 2$

= 12 − 2

∴ dy/dx = 10

**Q5. 4 marks · Long answer**

The radius of a circle is increasing at 3 cm/s. Find the rate at which its area is increasing when the radius is 4 cm.

**Answer**

$A = \pi r^2$

$dA/dt = 2\pi r(dr/dt)$

At $r = 4$ cm and $dr/dt = 3$ cm/s,

$dA/dt = 2\pi(4)(3)$

$\therefore dA/dt = 24\pi$ cm$^2$/s

**Q6. 5 marks · Long answer**

Find the intervals in which $f(x) = 4x^3 - 6x^2 - 72x + 30$ is increasing and the intervals in which it is decreasing.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/application-of-derivatives

**Q7. 6 marks · Very long answer**

Suppose $x = t^2 + 1$ and $y = t^3 + 2t$. Find $dx/dt$ and $dy/dt$, and hence calculate $dy/dx$ when $t = 1$. Verify that the result agrees with $dy/dx = (dy/dt)/(dx/dt)$.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/application-of-derivatives

**Q8. 7 marks · Very long answer**

Show that $f(x) = \cos x$ is neither increasing nor decreasing on $(0, 2\pi)$.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/application-of-derivatives

**Q9. 1 mark · Multiple choice**

On a given interval, the absolute maximum and absolute minimum values of a function are, respectively:

(A) its least and greatest values

(B) its greatest and least values

(C) its values at the endpoints only

(D) its local maximum and local minimum values

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/application-of-derivatives

**Q10. 2 marks · Short answer**

The total cost of producing $x$ items is $C(x) = 2x^2 + 5x + 100$. Find the marginal cost when 3 items are produced.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/maths/application-of-derivatives



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