



Mathom Dot In
by Jai Ram Sir



Exact 5 Types of Questions
CBSE Repeats Every Year
from



DIFFERENTIAL CALCULUS

12th Board Math Paper

2023 • 2024 • 2025



Just One Type Out of Five
REPEATED

22 Times

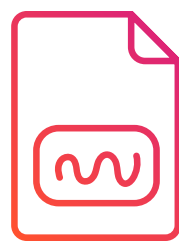


ONLY:

- Function or Values Change
- Wording Changes



SEE THE ACTUAL PROOF



By Jai Ram Sir



✗ Not Chapter-wise

✗ Not Year-wise



This PDF is Arranged



TYPE-WISE

Because CBSE does NOT change
the types of questions.



They only change:
numbers / values / functions



That's why the same TYPES repeat
Every Year in Every Set

Increasing–Decreasing Questions

TYPE $\rightarrow$ 1 **(2025)**

Question 1: 2025 - Set 1 - (65-1-1) - Q22 - 2 M - Increasing–Decreasing

Q : Find the values of a for which $f(x) = x^2 - 2ax + b$ is an **increasing function** for $x > 0$.

Question 2: 2025 - Set 2 - (65-2-1) - Q10 - 1 M - Increasing–Decreasing

Q : The function $f(x) = x^2 - 4x + 6$ is **increasing** in the interval

- (A) $(0, 2)$ (B) $(-\infty, 2]$ (C) $[1, 2]$ (D) $[2, \infty)$

Question 3: 2025 - Set 2 - (65-2-1) - Q21 - 2 M - Increasing–Decreasing

Q : Find the values of a for which $f(x) = \sin x - ax + b$ is **increasing on $\mathbb{R}$** .

Question 4: 2025 - Set 3 - (65-3-1) - Q11 - 1 M - Increasing–Decreasing

Q : If $f : \mathbb{R} \rightarrow \mathbb{R}$ is defined as $f(x) = 2x - \sin x$, then f is:

- (A) a decreasing function
(B) an **increasing function**
(C) maximum at $x = \pi/2$
(D) maximum at $x = 0$

Question 5: 2025 - Set 4 - (65-4-1) - Q5 - 1 M - Increasing–Decreasing

Q : The values of λ so that $f(x) = \sin x - \cos x - \lambda x + C$ **decreases for all real x** are:

- (A) $1 < \lambda < \sqrt{2}$ (B) $\lambda \geq 1$ (C) $\lambda \geq \sqrt{2}$ (D) $\lambda < 1$

Increasing–Decreasing Questions

TYPE → 1 (2025)

Question 6: 2025 - Set 4 - (65-4-1) - Q13 - 1 M - Increasing–Decreasing

Q : If $f(x) = 2x + \cos x$, then $f(x)$:

- (A) has a maxima at $x = \pi$
- (B) has a minima at $x = \pi$
- (C) is an **increasing function**
- (D) is a decreasing function

Question 7: 2025 - Set 4 - (65-4-1) - Q22(a) - 2 M - Increasing–Decreasing

Q : Find the least value of a so that $f(x) = 2x^2 - ax + 3$ is an **increasing function** on $[2, 4]$.

Question 8: 2025 - Set 4 - (65-4-1) - R22(b) - 2 M - Increasing–Decreasing

Q : If $f(x) = x + 1/x$, $x \geq 1$, show that f is an **increasing function**.

Question 9: 2025 - Set 5 - (65-5-1) - Q26 - 3 M - Increasing–Decreasing

Q : Show that $f(x) = \tan^{-1}(\sin x + \cos x)$ is an **increasing function** in $[0, \pi/4]$.

Question 10: 2025 - Set 6 - (65-6-1) - Q23 - 2 M - Increasing–Decreasing

Q : Determine the values of x for which $f(x) = (x - 4)/(x + 1)$, $x \neq -1$, is an **increasing or a decreasing function**.

Increasing–Decreasing Questions

TYPE → 1 (2024)

Question 1: 2024 - Set 1 - (65-1-1) - Q4 - 1 M - INCREASING–DECREASING

Q : $f(x)$ is strictly **increasing** on (a,b) if:

- A) $f'(x) < 0$ B) $f'(x) > 0$ C) $f'(x) = 0$ D) $f(x) > 0$

Question 2: 2024 - Set 2 - (65-2-1) - Q5 - 1 M - I INCREASING–DECREASING

Q : The function $f(x) = x^3 - 3x^2 + 12x - 18$ is:

- A) strictly decreasing on $\mathbb{R}$
B) strictly **increasing** on $\mathbb{R}$
C) neither strictly increasing nor decreasing
D) strictly decreasing on $(-\infty, 0)$

Question 3: 2024 - Set 2 - (65-2-1) - Q25 - 2 M - INCREASING–DECREASING

Q : Show that $f(x) = e^x - e^{-x} + x - \tan^{-1}(x)$ is strictly **increasing** in its domain.

Question 4: 2024 - Set 3 - (65-3-1) - Q27(a) - 3 M - INCREASING–DECREASING

Q : Find intervals where $f(x) = (\log x)/x$ is strictly **increasing** or strictly decreasing.

Question 5: 2024 - Set 4 - (65-4-1) - Q18 - 1 M - INCREASING–DECREASING

Q : The function $f(x) = kx - \sin x$ is strictly **increasing** for:

- A) $k > 1$ B) $k < 1$ C) $k > -1$ D) $k < -1$

Question 6: 2024 - Set 4 - (65-4-1) - Q23 - 2 M - INCREASING–DECREASING

Q : Find the interval where $f(x) = x^4 - 4x^3 + 10$ is strictly **decreasing**.

Increasing–Decreasing Questions

TYPE $\rightarrow$ 1 (2023)

Question 1: 2023 - Set 1 - (65-1-1) - Q16 - 1 M - Increasing–Decreasing

Q : If $f(x) = a(x - \cos x)$ is strictly decreasing in $\mathbb{R}$, then 'a' belongs to

- (a) $[0]$ (b) $(0, \infty)$ (c) $(-\infty, 0)$ (d) $(-\infty, \infty)$

Question 2: 2023 - Set 1 - (65-1-1) - Q25 - 2 M - Increasing–Decreasing

Q : Show that the function $f(x) = 16 \sin x / (4 + \cos x) - x$ is strictly decreasing in $(\pi/2, \pi)$.

Question 3: 2023 - Set 2 - (65-2-1) - Q37 - 4 M - Increasing–Decreasing

Q : Case Study – 2

The use of electric vehicles will curb air pollution in the long run. The use of electric vehicles is increasing every year and the estimated EV count at time t is

$$V(t) = (1/5) t^3 - (5/2) t^2 + 25 t - 2$$

where $t = 1, 2, 3, \dots$ correspond to years 2001, 2002, 2003, ...

(i) Can the above function estimate vehicle count for year 2000? Justify.

(ii) Prove that $V(t)$ is an increasing function.

Question 4: 2023 - Set 3 - (65-3-1) - Q23 - 2 M - Increasing–Decreasing

Q : If $f(x) = a(\tan x - \cot x)$, where $a > 0$, determine whether $f(x)$ is increasing or decreasing in its domain.

Increasing–Decreasing Questions

TYPE → 1 (2023)

Question 5: 2023 - Set 3 - (65-3-1) - R37 - 4 M -

Increasing–Decreasing

Q : Case Study – 2

A rainwater harvesting tank with square base and capacity 250 m^3 is to be built.

Land cost = ₹ 5000 per m^2

Digging cost = ₹ 40000 h^2 , where h is depth in meter. Let x = side of square base in meter.

(i) Find total cost C in terms of x .

(ii) Find dC/dx .

(iii) Check whether $C(x)$ is **increasing** for $x > 0$.

Question 6: 2023 - Set 5 - (65-5-1) - Q9 - 1 M -

Increasing–Decreasing

Q : The interval in which the function

$f(x) = 2x^3 + 9x^2 + 12x - 1$ is **decreasing** is

(a) $(-1, \infty)$ (b) $(-2, -1)$ (c) $(-\infty, -2)$ (d) $[-1, 1]$



You saw one type.

JUST ONE TYPE OUT OF FIVE



Increasing–Decreasing
Questions



2025 → 10 Q From All Sets

2024 → 6 Q From All Sets

2023 → 6 Q From All Sets



Total - 22 Q

Get Instant Access For
All 5 TYPES PDF
with Answer Keys
& Complete Solutions

Use this PDF to finish your
Differential Calculus
Board Preparation

Based on CBSE 12th Board Papers
2023 • 2024 • 2025

One PDF. One Topic
Board Ready

Covers only
Differential Calculus
(Class 12 Board)

Price: ₹ 39

Buy Now

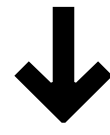
Save this PDF for your
Increasing-Decreasing
questions.

Please don't share it.



Topic Wise PDF For 12th Board Math

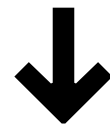
@ Rs 99 Per Topic



Vector & 3-D Geometry
(14 Marks)



Probability
(8 Marks)



Matrices & Determinant
(10 Marks)



Inverse Trigo. Function
(4 Marks)



Integral Calculus
(20 Marks)

**Have
Query?**

WHATSAPP US



By Jai Ram Sir

Awarded By the Honorable
Chief Minister Bihar for
"Excellence in Math" Coaching - Mathom
www.mathom.in

Top Institute in Math



Jai Ram Sir
Awarded by CM Nitish Kumar
Bihar in Patna

Visit : www.mathom.in

© 2023 All Rights Reserved