

MATHEMATICAL TOOLS IN PHYSICS

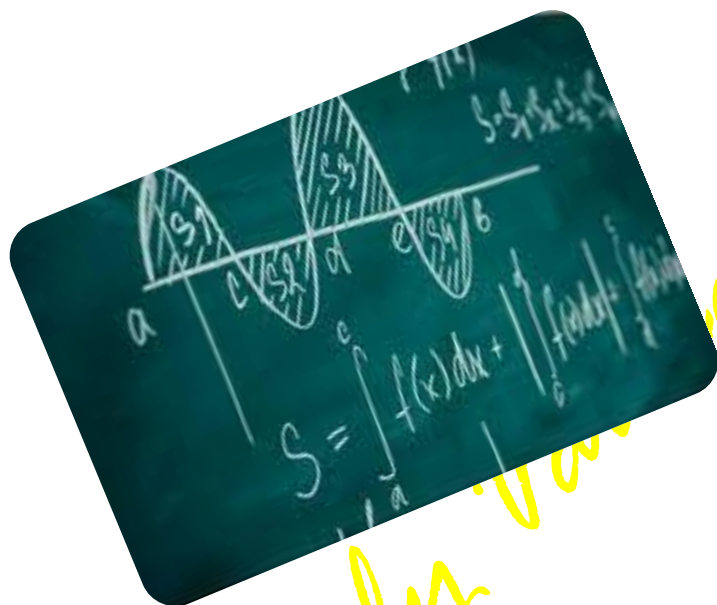
SRISHTI

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CALCULUS

Lecture 1

Lecture Code: MT01

Functions

WORK BOOK**Calculus in Physics - 01****Code: MT01**1. If $f(x) = x^2 + 3x - 4$, find:

(a) $f(a)$

(b) $f(-5)$

(c) $f(\sqrt{x})$

(d) $f(0)$

2. If $f(x) = 2x + 5$, find:

(a) $f(a)$

(b) $f(b)$

(c) $f(a+b)$

(d) Is $f(a+b) = f(a) + f(b)$? If not, what is the difference in meaning in two sides?3. If $f(x) = x^2$. Find:

(a) $f(-3)$

(b) $f(1)$

(c) $f(k)$

(d) $f(\sqrt{k})$

4. If $g(x) = 3x^2 - 2x + 8$, find

(a) $g(0)$

(b) $g(-5)$

(c) $g(-1)$

5. If $f(x) = 2x^2 + 5a$ and $f(2) = 0$, find the value of a .6. If $f(x) = x^3 - \frac{1}{x^3}$, then $f(x) + f\left(\frac{1}{x}\right)$ is equal to:

(a) $2x^3$

(b) $\frac{2}{x^3}$

(c) 0

(d) 1

WORK BOOK**Calculus in Physics - 01****Code: MT01**

7. Consider two functions $f(x) = x^2 + 7$ and $g(x) = 3x + 5$, find:

- (a) $f(3) + g(-5)$ (b) $f(3) \times g(-5)$ (c) $f(3) - g(-5)$

8. Let $f(x) = 2x + 1$ and $g(x) = 4x - 7$

- (a) For what real numbers x , $f(x) = g(x)$?
(b) For what real numbers x ; $f(x) < g(x)$?

9. If $f(x) = ax + b$, where a and b are integers, $f(-1) = -5$ and $f(3) = 3$, then a and b are equal to:

- (a) $a = -3$, $b = -2$ (b) $a = 2$, $b = -3$ (c) $a = 0$, $b = 2$ (d) $a = 2$, $b = 3$

10. If $f(x) = \begin{cases} 3x + 5, & \text{when } x \leq 2 \\ 2x^2 & \text{when } x > 2 \end{cases}$

Find:

- (a) $f(-1)$ (b) $f(0)$ (c) $f(2)$ (d) $f(3)$

11. If $g(x) = \begin{cases} 3x, & \text{when } x \leq 2 \\ 4x - 8, & \text{when } 2 < x < 5 \\ x^2 & \text{when } x \geq 5 \end{cases}$

Find:

- (a) $g(1)$ (b) $g(4)$ (c) $g(2)$ (d) $g(5)$

WORK BOOK**Calculus in Physics - 01****Code: MT01**12. If $f(x, z) = 3x^2 + 4z$, find:

(a) $f(1, 2)$

(b) $f(2, 1)$

(c) $f(1, 0)$

(d) $f(1, 1)$

13. If $g(x, y) = 3x^3y + 2ax$ and $g(1, 2) = 3$, find the value of a .**ANSWERS**

1. (a) $a^2 + 3a - 4$

(b) 6

(c) $x + 3\sqrt{x} - 4$

(d) -4

2. (a) $2a + 5$

(b) $2b + 5$

(c) $2(a+b) + 5$

(d) No. LHS is the value of function when $x = a+b$ while RHS is the sum of values of functions when $x=a$ and when $x=b$.

3. (a) 9

(b) 1

(c) k^2

(d) k

4. (a) 8

(b) 93

(c) 13

5. $a = -8/5$

6. Option (c), i.e. 0

7. (a) 6

(b) -160

(c) 26

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Physics:

VAIBHAV PANDIYA

WORK BOOK

Calculus in Physics - 01

Code: MT01

8. (a) $x = 4$ (b) $x > 4$

9. Option (b), i.e. $a = 2$, $b = -3$

10.(a) 2 (b) 5 (c) 11 (d) 18

11.(a) 3 (b) 8 (c) 6 (d) 25

12.(a) 11 (b) 16 (c) 3 (d) 7

13. $a = -3/2$

Physics by Vaibhav Pandiya