INTERNATIONAL INDIAN SCHOOL BURAIADAH

WORK SHEET-2025-26

SUBJECT: MATHS

CHAPTER: APPLICATION OF DERIVATIVES

1-Find the interval in which the function f given by f(x) = $\mathbf{7 - 4x - x^2}$ $\boldsymbol{is\ strictly\ increasing}$.(CBSE 2020)

2-An edge of a variable cube is increasing at the rate of 5 cm per second .How fast is the volume increasing when the side is 15 cm ?

3-Find the values of a for which the function f(x)=sinx -ax +b increϵase on R .

4-Find the values of x for which the function $\boldsymbol{f(x) = 2 + 3x - x^3 isdecreasing}$.(CBSE-2020).

5-Find the value of x for which y= $[x(x-2)]^2$ is an increasing function. (CBSE-2014)

6-Prove that y = $\frac{\mathbf{4\sin\theta}}{\mathbf{(2+\cos\theta)}}$ $-$ $\boldsymbol{\theta}$ is an increasing function of $\boldsymbol{\theta}$ in [0 , $\frac{\pi}{2}$]. (CBSE-2011)

7-A particle moves along the curves $\boldsymbol{3y = ax^3}$+ 1 such that a point with x-coordinate 1 , y-coordinate is changing twice the as fast at x-coordinate .Find the value of a .(CBSE-2023).

8-The amount of pollutions content added in air in a city due to x-diesel vehicles is given by P(x) = 0.005$\boldsymbol{x^3}$ + 0.02$\boldsymbol{x^2}$ + $\boldsymbol{30x. Find\ the\ marginal\ increase\ in\ pollution\ content\ when\ 3\ diesel\ vehicles\ are\ added}$. (CBSE-2013)

9-Show that the function f(x) = $\frac{\mathbf{16sinx}}{\mathbf{(4+cosx)}}$ $-$ $\boldsymbol{x}$ is strictly decreasing in ($\frac{\pi}{2}$, $\boldsymbol{\pi}$).(CBSE-2023)

10-Show that the function f defined by $f(x) = (x-1)e^x + 1$ is an increasing function for all x > 0. (CBSE 2020).

11-Show that the function f(x) = $\frac{x}{3} + \frac{3}{x}$ decreases in the intervals (-3,0) ∪ (0,3) (CBSE-2020)

12-Find the intervals in which the function f given by (CBSE-2021)

F(x) =tanx -4x , x∈ (0 , $\frac{\pi}{2}$) is

Strictly increasing (b) Strictly decreasing

13- Find the minimum value of (ax +by) , where xy = c^2 (CBSE-2015 , 2020)

14- Sum of two numbers is 5 .If the sum of the cubes of these numbers is least,then find the sum of the squares of these numbers. (CBSE-2023)

15- The median of an equilateral triangle is increasing at the rate of $2\sqrt{3}$ cm/s. Find the rate at which its side is increasing. (CBSE-2023)

16- Find the absolute maximum and absolute minimum values of the function f given by

$f(x) = \sin^2 x - \cos x , x \in [0 , \pi]$.(CBSE-2015)

17-Prove that the surface area of a solid cuboid , of square base and given volume ,is minimum when it is a cube . (CBSE-2017 , 2009)

18-If the sum of hypotenuse and a side of a right angled triangle is given ,show that the area of the triangle is maximum when the angle between them is $\frac{\pi}{3}$. (CBSE-2014, 2017)

19-Show that the semi-vertical angle of the cone of the maximum volume and a of given slant height is $\cos^{-1}\frac{1}{\sqrt{3}}$. (CBSE-2014,2016)

20-The sum of the perimeter of a circle and a square is k , where k is some constant .Prove that the sum of their areas is least when the side of the square is double the radius of the circle. (CBSE-2010,2014).