TERM – 1 MATHS
CLASS: XII
CHAPTER : APPLICATION OF DERIVATIVES
WORKSHEET: 6

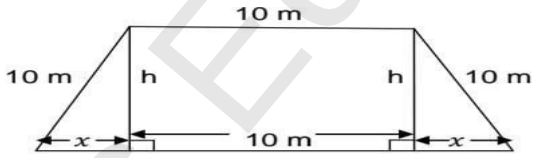
Q1	The function f(x) ,defined as $f(x) = 4 - 3x + 3x^2 - x^3$ is: (a) Decreasing on R (b) Increasing on R (c) strictly increasing on R (d) Strictly decreasing on R
Q2	The interval in which function $y=x^2e^{-x}$ is increasing is: (a) $(-\infty,\infty)$ (b)(-2,0) (c) $(2,\infty)$ (d) (0,2)
Q3	The function f(x)= cos x-sin x has maximum or minimum value at x= (a) $\frac{\pi}{4}$ (b) $\frac{3\pi}{4}$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{3}$
Q4	The interval in which the function f(x) = $\sin^4 x + \cos^4 x$, $0 \le x \le \frac{\pi}{2}$ is strictly increasing is: (a) $(\frac{\pi}{3}, \frac{\pi}{2})$ (b) $(\frac{\pi}{4}, \frac{\pi}{2})$ (c) $(\frac{\pi}{6}, \frac{\pi}{2})$ (d) $(0, \frac{\pi}{2})$
Q 5	The function f(x)=ax+b is strictly decreasing for all $x \in R$ iff: (a) a=0 (b) a<0

	(c) a>0 (d) none of these
Q 6	The function $f(x)=x^x$ is decreasing in the interval:. (a) (0,e) (b) (0,1/e) (c) (0,1) (d) none of these
Q 7	The function $f(x)= [x(x-3)^2]$ is increasing in: (a) (0,∞) (b)(-∞,0) (c) (1,3) (d)(0,3/2)U(3,∞)
Q 8	The function f(x)=tan x-4x is strictly decreasing on the interval: (a)$(\frac{-\pi}{3},\frac{\pi}{3})$ (b)$(\frac{\pi}{3},\frac{\pi}{2})$ (c)$(-\frac{\pi}{3},\frac{\pi}{2})$ (d)$(\frac{\pi}{2},\pi)$
Q 9	Tangents to the curve $y=x^3+3x$ at x=1 and x=-1 are: (a) parallel (b) intersecting obliquely but not at an angle of 45^0 (c) intersecting at right angle (d) intersecting at an angle of 60^0
Q10	The equation of normal to the curve $3x^2-y^2=8$ which is parallel to the line x+3y=8 is: (a) x+3y=8 (b) x+3y+8=0 (c) x+3y=0 (d)x+3y±8=0
Q11	The point on curve $y=(x-3)^2$, where the tangent is parallel to the chord joining (3,0) and (4,1) is: (a) (-7/2,1/4) (b) (5/2,1/4)

	(c) (-5/2,1/4) (d)(7/2,1/4)
Q 12	The line y=x+1 is a tangent to the curve $y^2=4x$ at the point (a)(1,2) (b)(2,1) (c) (1,-2) (d)(-1,2)
Q13	The point on the curve $y^2=x$ where tangent makes an angle of $\frac{\pi}{4}$ with x-axis is: (a) (1/2,1/4) (b) (1/4,1/2) (c) (4,2) (d) (1,1)
Q14	The slope of the normal to the curve: x= a(cos $\theta + \theta sin\theta$) , $y = a(\sin\theta - \theta\cos\theta)$ at any point θ is (a) cot θ (b) -tan θ (c) -cot θ (d) tan θ
Q15	.The equation of all lines having slope 2 which are tangent to the curve y=$\frac{1}{x-3}, x \neq 3$ is (a) y=2 (b)y=2x (c)y=2x+3 (d)none of these
Q16	If y=4x-5 is a tangent to the curve $y^2=px^3+q$ at (2,3) then (a) p=-2,q=-7 (b) p=-2,q=7 (c) p=2,q=-7 (d) p=2,q=7
Q 17	The angle of intersection of curves $y=x^2$ and $6y=7-x^3$ at (1,1) is: (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$

	(d)π
Q 18	The greatest value of $f(x)=(x+1)^{1/3}-(x-1)^{1/3}$ on [0,1] is (a) 1 (b) 2 (c) 3 (d)1/3
Q 19	Twenty meters of wire is available for fencing off a flower bed in the form of a circular sector. Then the maximum area in sq. meters of the flower bed is: (a) 25 (b)30 (c) 12.5 (d)10
Q 20	The shortest distance of the point (0,a) from the curve $y=x^2$ is (a)$\frac{\sqrt{4a+1}}{2}$ (b) $\frac{\sqrt{1-4a}}{2}$ (c) $\frac{\sqrt{4a-1}}{2}$ (d) $\frac{\sqrt{4a+1}}{3}$
Q 21	Two positive numbers x and y whose sum is 35 and product is x^2y^5 is maximum are (a) 11,24 (b)10,25 (c) 0,35 (d)17,18
Q 22	The minimum value of $f(x)=e^{(2x^2-2x+1)sin^2x}$ (a) 0 (b)1 (c) 2 (d)3
Q 23	If the curves $x^2=9A(9-y)$ and $x^2=A(y+1)$ intersect orthogonally, then the value of A is

	(a) 3 (b)4 (c) 5 (d)7
Q 24	If y= $\frac{ax-b}{(x-1)(x-4)}$ has a turning point P(2,-1),then the value of a and b respectively are (a) 1,2 (b)2,1 (c) 0,1 (d)1,0
Q 25	The height of cylinder of maximum volume that can be inscribed in a sphere of radius a is: (a) 2a/3 (b) 2a/$\sqrt{3}$ (c) a/3 (d) a/5
Q 26	The maximum value of $(\frac{1}{x})^x$ is (a) e (b)e^e (c)$1/e^e$ (d)$(\frac{1}{e})^{\frac{1}{e}}$
Q 27	If a point on the hypotenuse of a triangle is at a distance a and b from the sides of a triangle , then the minimum length of hypotenuse is (a) $(a^{\frac{2}{3}}+b^{\frac{2}{3}})$ (b) $(a^{\frac{2}{3}}+b^{\frac{2}{3}})^{3/2}$ (c) $(a^{\frac{1}{3}}+b^{\frac{1}{3}})^{3/2}$ (d)none of these
Q 28	If a cone of maximum volume is inscribed in a given sphere, then the ratio of height of the cone to diameter of sphere is (a)3/4 (b)1/3 (c) 1/4 (d)2/3

Q 29	If $f(x)=a \log x+bx^2+x$ has its extremum values at x=-1 and x=2 then (a) a=-1/2,b=2 (b) a=1,b=-1 (c) a=-1,b=1 (d) a=2,b=-1/2
Q 30	Semi vertical angle of a right circular cone of given total surface area and maximum volume is (a) $\cos^{-1}\frac{2}{3}$ (b) $\sin^{-1}\frac{1}{3}$ (c) $\tan^{-1}\sqrt{2}$ (d) $\tan^{-1}\frac{1}{3}$
	CASE STUDY : 1 The front gate of a building is in the shape of a trapezium as shown below. Its three sides other than base are 10m each. The height of the gate is h meter. On the basis of this information and figure given below, answer the following questions:   
Q 1	The area A of the gate expressed as a function of x is (a) $(10+x)\sqrt{(100+x^2)}$ (b) $(10-x)\sqrt{(100+x^2)}$ (c) $(10+x)\sqrt{(100-x^2)}$ (d) $(10-x)\sqrt{(100-x^2)}$
Q 2	The value of $\frac{dA}{dx}$ is (a) $\frac{2x^2+10x-100}{\sqrt{100-x^2}}$

	(b) $\frac{2x^2-10x-100}{\sqrt{100-x^2}}$ (c) $\frac{2x^2+10x+100}{\sqrt{100-x^2}}$ (d) $\frac{-2x^2-10x+100}{\sqrt{100-x^2}}$
Q 3	Value of x, for which $\frac{dA}{dx} = 0$ (a) 10 (b) 5 (c) 20 (d) 15
Q 4	If at the value of x ,where $\frac{dA}{dx}$ =0,area of trapezium is maximum, then maximum area of trapezium is given by: (a) $25\sqrt{3}$ sq. m (b) $100\sqrt{3}$ sq. m (c) $75\sqrt{3}$ sq. m (d) $50\sqrt{3}$ sq. m
Q 5	If area of trapezium is maximum, then value of $\frac{d^2y}{dx^2}$ is: (a) Positive (b) Negative (c) Zero (d) None of these
	CASE STUDY : 2 A company which is located in Surat, Gujarat is manufacturing toys for the kids. If P(x) = $-5x^2 + 125x + 37500$ is the total profit function of a company, where x is the production of the company.

	 Based on above information, answer the following questions:
Q 1	What will be the production when the profit is maximum? a. 37500 b. 12.5 c. -12.5 d. –37500
Q 2	What will be the maximum profit? a. Rs 38,28,125 b. Rs 38281.25 c. Rs 39,000 d. None
Q 3	Check in which interval the profit is strictly increasing . a. (12.5,∞) b. for all real numbers c. for all positive real numbers d. (0, 12.5)
Q 4	When the production is 2 units what will be the profit of the company? a. 37,500 b. 37,730 c. 37,770 d. None
Q 5	What will be production of the company when the profit is Rs 38250? a. 15

	b. 30 c. 2 d. data is not sufficient to find
	CASE STUDY : 3 A student of class XII wants to construct a rectangular tank for his house that can hold 80 cubic feet of water. The top of the tank is open. The width of tank will be 5 ft but length and heights are variables. Building the tank cost Rs 20 per sq. foot for the base and Rs. 10 per square foot for the side.  Based on above information, answer the following :
Q 1	In order to make a least expensive water tank, Student need to minimize its: (a) Cost (b) Curved surface area (c) Volume (d) Base
Q 2	Total cost of tank as a function of h can be represented as (a) C(h)= 100h-320 h-720 h^2 (b) C(h)= 100+320 h+1600 h^2 (c) C(h)=100 h-320-1600 h (d) C(h)=100 h+320+$\frac{1600}{h}$
Q 3	Range of h is (a) (0,8) (b) (0,∞) (c) (0,3) (d) (3,5)

Q 4	Value of h at which c(h) is minimum is (a) 6 (b) 6,7 (c) 4 (d) 5
Q 5	The cost of least expensive tank is (a) 1120 (b) 1220 (c) 1100 (d) 1020

ANSWER KEY

1	a
2	a
3	a
4	b
5	b
6	b
7	d
8	a
9	a
10	d
11	d
12	a
13	b
14	c
15	d
16	c

17	a
18	b
19	a
20	c
21	b
22	b
23	b
24	d
25	b
26	c
27	b
28	d
29	c
30	b
	CASE STUDY 1
1	C
2	d
3	b
4	C
5	b
	CASE STUDY 2
1	b
2	b
3	*a*
4	*b*

5	*a*
	CASE STUDY 3
1	a
2	d
3	b
4	c
5	a