INDIAN SCHOOL DARSAIT

Class XII — **Mathematics Worksheet**

Worksheet # 14 Application of Derivatives # 3

Tangents & Normals

(Chapter – 6 : Application of Derivatives)

CLASS WORK	
1.	Find the slope of the tangent to the curve $y = x^3 - x$ at $x = 2$.
2.	Find the slope of the tangent to curve $y = x^3 - x + 1$ at the point whose x-coordinate is 2.
3.	Find the slope of the normal to the curve $x = a\,\text{Cos}^3\theta,\ y = b\,\text{Sin}^3\theta$ at $\theta = \frac{\pi}{4}$.
4.	Find the point at which the tangent to the curve $Y = \sqrt{4x-3} - 1$ has its slope $\frac{2}{3}$
5.	Find the equation of all lines having slope 2 and being tangent to the curve $y + \frac{2}{x-3} = 0$
6.	Find points on the curve $\frac{x^2}{4} + \frac{y^2}{25} = 1$ at which the tangents are (i) parallel to x-axis (ii) parallel to y-axis.
7.	Find a point on the curve $y = (x-2)^2$ at which the tangent is parallel to the chord joining the points (2, 0) and (4, 4).
8.	Find the points on the curve $y = x^3$ at which the slope of the tangent is equal to the y-coordinate of the point.
9.	Find the points on the curve $x^2 + y^2 - 2x - 3 = 0$ at which the tangents are parallel to the x-axis.
10.	Find the equations of the tangent and normal to the curve $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$ at (1, 1).
11.	Find the equation of tangent to the curve given by $x = a\sin^3 t$, $y = b\cos^3 t$ at a point where $t = \frac{\pi}{2}$
12.	Find the equations of the tangent and normal to the given curves at the indicated points: (i) $y = x^4 - 6x^3 + 13x^2 - 10x + 5$ at (0, 5) (ii) $y = x^4 - 6x^3 + 13x^2 - 10x + 5$ at (1, 3) iii) x = cost, y = sint at $t = \frac{\pi}{4}$
13.	Find the equation of all lines having slope –1 that are tangents to the curve $y = \frac{1}{x-1}, x \neq 1$
14.	Find the equation of the tangent line to the curve $y = x^2 - 2x + 7$ which is (a) parallel to the line $2x - y + 9 = 0$ (b) perpendicular to the line $5y - 15x = 13$.
15.	Find the equation of the tangent to the curve $y = \sqrt{3x-2}$ which is parallel to the line $4x - 2y + 5 = 0$
16.	Find the equation of the normals to the curve $y = x^3 + 2x + 6$ which are parallel to the line $x + 14y + 4 = 0$.
17.	Find the equations of the tangent and normal to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ at the point (x_0, y_0).

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18.	Show that the curves $4x = y^2$ and 4xy = k cut at right angles if $k^2 = 512$
19.	Prove that the curves $x = y^2$ and xy = k cut at right angles if $8k^2 = 1$.
20.	The curve $y = ax^3 + bx^2 + cx + 5$ touches the x -axis at $P(-2,0)$ and cuts the y – axis at the point Q where the gradient is 3. Find the equation of the curve.
21.	Show that the curves $xy = a^2$ and $x^2 + y^2 = 2a^2$ touch each other.
	HOME WORK
22.	Find the slope of the tangent to the curve $y = 3x^4 - 4x$ at x = 4.
23.	Find the slope of the tangent to the curve $y = x^3 - 3x + 2$ at the point whose x-coordinate is 3.
24.	Find the slope of the normal to the curve $x = 1 - a\sin\theta$, $y = b\cos^2\theta$ at $\theta = \frac{\pi}{2}$
25.	Show that the tangents to the curve $y = 7x^3 + 11$ at the points where x = 2 and x = – 2 are parallel.
26.	Find points at which the tangent to the curve $y = x^3 - 3x^2 - 9x + 7$ is parallel to the x-axis.
27.	Find points on the curve $\frac{x^2}{4} + \frac{y^2}{25} = 1$ at which the tangents are (i) parallel to x-axis (ii) parallel to y-axis.
	Find a point on the curve $y = (x-2)^2$ at which the tangent is parallel to the chord joining the points (2, 0) and (4, 4).
28.	Find the equation of all lines having slope 2 which are tangents to the curve $y = \frac{1}{x-3}, x \neq 3$.
29.	Find the equations of all lines having slope 0 which are tangent to the curve $y = \frac{1}{x^2 - 2x + 3}$
30.	Find the equation of the normal at the point (am^2, am^3) for the curve $ay^2 = x^3$.
31.	Find the equations of the tangent and normal to the parabola $y^2 = 4ax$ at the point $(at^2, 2at)$.
32.	Determine the quadratic curve $y = f(x)$ if it touches the line y=x at the point x = 1and passes through the point $(-1,0)$.