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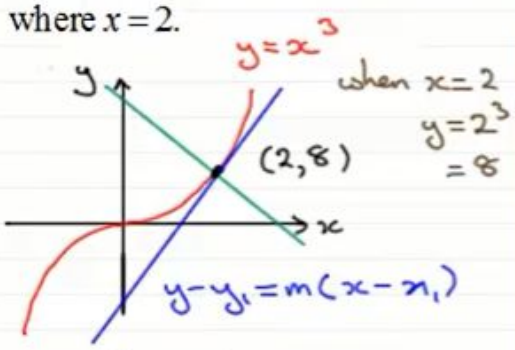
Example For Equations of Tangents and Normals

Find the equation of the tangent and normal to the curve $y = x^3$ at the point where $x = 2$.



$y = x^3$

when $x = 2$, $y = 2^3 = 8$

$y - y_1 = m(x - x_1)$

$y = x^3$, $\therefore \frac{dy}{dx} = 3x^2$

when $x = 2$

$\therefore \frac{dy}{dx} = 3(2)^2 = 12$

$\therefore$ gradient of tangent $= 12$ and normal $= -\frac{1}{12}$

$\therefore$ Equation of tangent at $(2,8)$ is

$\therefore y - 8 = 12(x - 2)$

$\therefore y - 8 = 12x - 24$

$\therefore y = 12x - 16$

Equation of normal is

$y - 8 = -\frac{1}{12}(x - 2)$

$\therefore y = -\frac{1}{12}x + \frac{49}{6}$

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