

C1 Jan 2009

$$\textcircled{3} \quad y = x^2 - 9x + 13$$

Gradient of Tangent $\frac{dy}{dx} = 2x - 9$.

At $P(6, -5)$ $\left. \frac{dy}{dx} \right|_{x=6} = 2(6) - 9 = 3$

Equation of Tangent at P is $y - (-5) = 3(x - 6)$
 $y + 5 = 3x - 18$
 $y - 3x + 23 = 0$

b) Gradient of normal at $Q = \frac{1}{7}$

Gradient of Tangent at $Q = -7$

$$\left. \frac{dy}{dx} \right|_{x=x_q} \text{ when } x = x_q \text{ is } -7 = 2x_q - 9$$

$$-7 + 9 = 2x_q$$

$$2 = 2x_q$$

$$x_q = 1$$

Find y_q using $y = x^2 - 9x + 13$ (equation of curve)

$$\begin{aligned} y_q &= (1)^2 - 9(1) + 13 \\ &= 1 - 9 + 13 \\ &= 5 \end{aligned}$$

so Q is $(1, 5)$