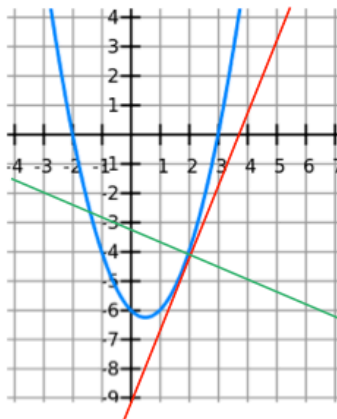


# Finding the Equation of a Normal

e.g. Find the equation of the normal to the  
curve  $y = x^2 - x - 6$  at the point  $(2, -4)$



Step 1: Differentiate the equation of the curve to find  $\frac{dy}{dx}$

$$\frac{dy}{dx} = 2x - 1$$

Step 2: Substitute the x-coordinate into  $\frac{dy}{dx}$   
to find the gradient of the tangent

$$\text{when } x = 2 \quad \frac{dy}{dx} = 2 \times (2) - 1 = 3$$

(gradient of tangent)

Step 3: Find the **negative reciprocal** of the gradient of the tangent to find the gradient of the normal

Since gradient of tangent is 3, the gradient of normal is  $-\frac{1}{3}$

Step 4: The equation of a normal will be in the form  $y = mx + c$ .

Replace m with the gradient of the normal.

$$y = -\frac{1}{3}x + c$$

Step 5: Substitute the coordinate into the equation of the normal to find c.

$$-4 = -\frac{1}{3} \times (2) + c$$

$$-4 = -\frac{2}{3} + c$$

$$c = -3\frac{1}{3}$$

$$\text{Answer: } y = -\frac{1}{3}x - 3\frac{1}{3}$$