Problem 0580/41/M/J/21/ Q7C

A curve has equation $y = 2x^3 - 4x^2 + 6$.

(i) Find $\dfrac{dy}{dx}$, the derived function of y.

$$\frac{dy}{dx} = 2 \times 3x^2 - 4 \times 2x$$
$$= 6x^2 - 8x$$

(ii) Calculate the gradient of the curve $y = 2x^3 - 4x^2 + 6$ at $x = 4$.

$$\frac{dy}{dx} = 6x^2 - 8x$$
$$\frac{dy}{dx} = 6(4)^2 - 8(4) = 96 - 32 = 64$$

(iii) Find the coordinates of the two stationary points on the curve.

$$\frac{dy}{dx} = 6x^2 - 8x$$

$$\frac{dy}{dx} = 0 \quad \therefore \quad 6x^2 - 8x = 0$$
$$2x(3x - 4) = 0$$
$$x = 0 \qquad x = \frac{4}{3}$$

$$y = 2x^3 - 4x^2 + 6$$

$x = 0 \quad y = 6 \qquad (0, 6)$

$x = \dfrac{4}{3} \quad y = 2\left(\dfrac{4}{3}\right)^3 - 4\left(\dfrac{4}{3}\right)^2 + 6$

$$y = \frac{98}{27}$$

$$\left(\frac{4}{3}, \frac{98}{27}\right)$$