

2.5.3 Solutions (2.4 Homework)

GCSE Mathematics Differentiation I

Answer 1

(i) $y = 13(x^3 + 2)$

$$y = 13x^3 + 26$$

$$\therefore \frac{dy}{dx} = 39x^2$$

(ii) $y = x^3(x^2 + 1)$

$$y = x^5 + x^3$$

$$\therefore \frac{dy}{dx} = 5x^4 + 3x^2$$

(iii) $y = 3x^3(2x + 5)$

$$y = 6x^4 + 15x^3$$

$$\therefore \frac{dy}{dx} = 24x^3 + 45x^2$$

(iv) $y = (x + 5)(x + 3)$

$$y = x^2 + 8x + 15$$

$$\therefore \frac{dy}{dx} = 2x + 8$$

(v) $y = (4x^3 + 3)(x^2 + 7)$

$$y = 4x^5 + 28x^3 + 3x^2 + 21$$

$$\therefore \frac{dy}{dx} = 20x^4 + 84x^2 + 6x$$

[10 marks]

Answer 2

(i) $y = -7x + 12$

$$\therefore \frac{dy}{dx} = -7$$

(ii) $y = x^{-3}$

$$\therefore \frac{dy}{dx} = -3x^{-4} \Rightarrow \frac{dy}{dx} = -\frac{3}{x^4}$$

(iii) $y = 6x^{-5} + 19x^5$

$$\therefore \frac{dy}{dx} = -30x^{-6} + 95x^4 \Rightarrow \frac{dy}{dx} = -\frac{30}{x^6} + 95x^4$$

$$\text{(iv)} \quad y = \frac{1}{x^7} \Rightarrow y = x^{-7}$$

$$\therefore \frac{dy}{dx} = -7x^{-8} \Rightarrow \frac{dy}{dx} = -\frac{7}{x^8}$$

$$\text{(v)} \quad y = \frac{4}{5x^3} \Rightarrow y = \frac{4}{5}x^{-3}$$

$$\therefore \frac{dy}{dx} = -\frac{12}{5}x^{-4} \Rightarrow \frac{dy}{dx} = -\frac{12}{5x^4}$$

$$\text{(vi)} \quad y = x^{2.5} - 8x^{1.5}$$

$$\therefore \frac{dy}{dx} = 2.5x^{1.5} - 12x^{0.5}$$

$$\text{(vii)} \quad y = 6x^{\frac{5}{2}} + x^{\frac{1}{3}}$$

$$\therefore \frac{dy}{dx} = 15x^{\frac{3}{2}} + \frac{1}{3}x^{-\frac{2}{3}} \Rightarrow \frac{dy}{dx} = 15x^{\frac{3}{2}} + \frac{1}{3x^{\frac{2}{3}}}$$

$$\text{(viii)} \quad y = \sqrt{x} \Rightarrow y = x^{\frac{1}{2}}$$

$$\therefore \frac{dy}{dx} = \frac{1}{2}x^{-\frac{1}{2}} \Rightarrow \frac{dy}{dx} = \frac{1}{2\sqrt{x}}$$

[16 marks]