

Key

Final answer

1a. $\sin x = 0.82$

$$\therefore x = \sin^{-1}(0.82)$$

$$\therefore \underline{\underline{x = 55.08^\circ, 124.92^\circ}}$$

b. $7 \tan x = 3$

$$\therefore x = \tan^{-1}\left(\frac{3}{7}\right)$$

$$\therefore x = ~~23.20^\circ~~ \underline{\underline{23.20^\circ, 203.20^\circ}}$$

c. $\cos x = -0.53$

$$\therefore x = \cos^{-1}(-0.53)$$

$$\therefore x = \underline{\underline{122.01^\circ, 237.99^\circ}}$$

2a $y = 8x^5 - 4x^3 + 2x + 5$

$$\frac{dy}{dx} = \frac{40}{40}x^4 - 12x^2 + 2$$

b. $y = (x+10)(x-1)$

$$y = x^2 + 9x - 10$$

$$\frac{dy}{dx} = \underline{\underline{2x + 9}}$$

c. $y = 5x^3(2x^2 + 5x + 1)$

$$y = 10x^5 + 25x^4 + 5x^3$$

$$\frac{dy}{dx} = \underline{\underline{50x^4 + 100x^3 + 15x^2}}$$

d. $y = \tan 5x - \cos x$

$$\frac{dy}{dx} = \cancel{5 \tan 5x} \underline{\underline{5 \sec^2 5x + \sin x}}$$

e. $y = \frac{1}{x^3}$

$$y = x^{-3}$$

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

f. $y = x^3 \sin 5x$

$$u = x^3$$

$$v = \sin 5x$$

$$du = 3x^2$$

$$dv = 5 \cos 5x$$

$$\frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$\therefore \frac{dy}{dx} = \underline{\underline{(x^3)(5 \cos 5x) + (\sin 5x)(3x^2)}}$$

$$g. y = \frac{e^{6x}}{\sin x}$$

$$u = e^{6x}$$

$$v = \sin x$$

$$du = 6e^{6x}$$

$$dv = \cos x$$

$$\frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

$$\therefore \frac{dy}{dx} = \frac{(\sin x)(6e^{6x}) - (e^{6x})(\cos x)}{(\sin x)^2}$$

$$h. y = (6x^3 + 2x + 3)^5$$

$$\frac{dy}{dx} = \underline{\underline{5(6x^3 + 2x + 3)^4(18x^2 + 2)}}$$

$$3a. \int 5x^2 + 6x + 5 \, dx$$

$$= \frac{5x^3}{3} + \frac{6x^2}{2} + 5x + c$$

$$= \underline{\underline{\frac{5x^3}{3} + 3x^2 + 5x + c}}$$

$$b. \int \frac{1}{x^8} dx$$

$$= \int x^{-8}$$

$$= \underline{\underline{-\frac{x^{-7}}{7} + C}}$$

$$c. \int 3 \sin 4x dx$$

$$= \cancel{\text{minus sign}} \underline{\underline{-\frac{3 \cos 4x}{4} + C}}$$

$$d. \int_2^5 (x+5)(x+2) dx$$

$$= \int_2^5 x^2 + 7x + 10 dx$$

$$= \left[\frac{x^3}{3} + \frac{7x^2}{2} + 10x + C \right]_2^5$$

$$\therefore \left[\frac{5^3}{3} + \frac{7(5)^2}{2} + 10(5) \right] - \left[\frac{(2)^3}{3} + \frac{7(2)^2}{2} + 10(2) \right]$$

$$= \left[\frac{125}{3} + \frac{175}{2} + 50 \right] - \left[\frac{8}{3} + 14 + 20 \right]$$

$$= \frac{1075}{6} - \frac{110}{3}$$

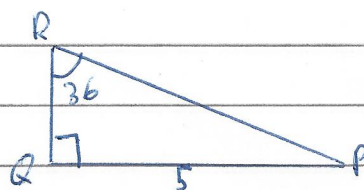
$$= \frac{285}{2} = \underline{\underline{142.5}}$$

4a. ~~cosine rule~~

$$\sin x = \left(\frac{\text{OPP}}{\text{hyp}} \right)$$

$$\therefore \sin 36 = \left(\frac{5}{\text{hyp}} \right)$$

$$\text{hyp} = \frac{5}{\sin 36} = \underline{\underline{8.51 \text{ m (2dp)}}}$$



$$b. \quad a^2 = b^2 + c^2 - 2bc \cos(A)$$

$$BC^2 = 12^2 + 7^2 - 2(12)(7) \cos(105)$$

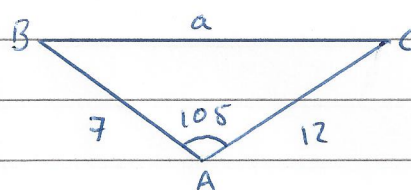
$$= 144 + 49 - 2(68) \cos(105)$$

$$= 193 - 136 \cos(105)$$

$$BC^2 = a^2 = 236.4815996$$

$$\therefore BC = \sqrt{236.48...}$$

$$= \underline{\underline{15.38 \text{ m (2dp)}}}$$

c. ~~cosine rule~~

$$a^2 = b^2 + c^2 - 2bc \cos(A)$$

$$\therefore \cos(A) = \frac{b^2 + c^2 - a^2}{2bc}$$

$$= \frac{(21)^2 + (20)^2 - (25)^2}{2(21)(20)} = \frac{216}{840} = \frac{9}{35} = \underline{\underline{0.257...}}$$

$$A = \cos^{-1}(0.257...) = \underline{\underline{75.10^\circ (2dp)}}$$

