

Question 1

a) (i) $3(x-1) = 4(2x+3)$

$$3x - 3 = 8x + 12$$

$$-3 - 12 = 8x - 3x$$

$$-15 = 5x$$

$$\boxed{-3 = x}$$

③

(ii) $\frac{5}{(2x-1)} = \frac{2}{(8x+1)}$

$$5(8x+1) = 2(2x-1)$$

$$40x + 5 = 4x - 2$$

$$40x - 4x = -2 - 5$$

$$36x = -7$$

$$\boxed{x = -7/36 = 0.19.}$$

④

(iii) $(x+3)(x+1) = (x+7)(x-1)$

$$x^2 + 4x + 3 = x^2 + 6x - 7$$

$$3 + 7 = 6x - 4x$$

$$10 = 2x$$

$$\boxed{5 = x}$$

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$$b) (i) = x^8$$

$$(ii) = \sqrt{x^5}$$

$$= x^{5/2}$$

$$(iii) = \frac{x^9}{x}$$

$$= x^8$$

$$(iv) = x^{-3}$$

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$$c) (i) x^2 + 6x + 8 = 0$$

$$(x+4)(x+2) = 0$$

$$x+4=0 \quad x+2=0$$

$$x = -4$$

$$x = -2$$

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$$(ii) x^2 + 2x - 3 = 0$$

$$(x+3)(x-1) = 0$$

$$x+3=0 \quad x-1=0$$

$$x = -3$$

$$x = 1$$

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$$(iii) 2x^2 + 11x = -5$$

$$2x^2 + 11x + 5 = 0$$

$$(2x+1)(x+5) = 0$$

$$2x+1=0 \quad x+5=0$$

$$x = -1/2$$

$$x = -5$$

$$(iv) x^2 - 64 = 0$$

$$(x+8)(x-8) = 0$$

$$x = \pm 8$$

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d)

$$(i) \quad 2^{x+3} = 9^x$$

$$\log 2^{x+3} = \log 9^x$$

$$(x+3)\log 2 = x\log 9$$

$$0.30x + 0.90 = 0.95x$$

$$0.90 = 0.95x - 0.30x$$

$$0.90 = 0.65x$$

$$1.38 = x$$

(5)

$$(ii) \quad 2\log(x+4) = \log(x+1) + \log(x+2)$$

$$\log(x+4)^2 = \log(x+1)(x+2)$$

$$x^2 + 8x + 16 = x^2 + 3x + 2$$

$$8x - 3x = 2 - 16$$

$$5x = -14$$

$$x = \frac{-14}{5} = -2.8$$

(4)

e)

$$7x^2 + 13x - 9 = 0$$

$\uparrow$ $\uparrow$ $\uparrow$
 a b c

$$x = \frac{-13 \pm \sqrt{(13)^2 - 4(7)(-9)}}{2(7)}$$

$$x = \frac{-13 \pm \sqrt{169 + 252}}{14}$$

$$x = \frac{-13 \pm \sqrt{421}}{14}$$

$$x = \frac{-13 \pm 20.52}{14}$$

$$x = \frac{-13 + 20.52}{14}$$

$$x = \frac{-13 - 20.52}{14}$$

$$x = 0.54$$

$$x = -2.39$$

$$f) \quad 3x + 2y = 14 \quad (1) \times 3$$

$$4x + 3y = 20 \quad (2) \times 2$$

$$9x + 6y = 42 \quad (3)$$

$$8x + 6y = 40 \quad (4) \quad -$$

$$\underline{x = 2} \rightarrow \text{in } (1)$$

$$6 + 2y = 14$$

$$2y = 8$$

$$\underline{y = 4}$$

(5)

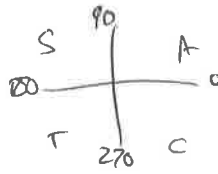
$$g) \quad 3x + 4t = \sqrt{\frac{2}{y}} \quad [y]$$

$$(3x + 4t)^2 = \frac{2}{y}$$

$$\underline{y = \frac{2}{(3x + 4t)^2}}$$

(3)

Question 2



a) (i) $\sin x = 0.46$

$$x = \sin^{-1} 0.46$$

$$x = 27.39^\circ, 152.61^\circ$$

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(ii) $6 \cos x = 5$

$$\cos x = 5/6$$

$$x = 33.56^\circ, 326.44^\circ$$

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(iii) $-7 \tan x = 8$

$$\tan x = -\frac{8}{7}$$

$$x = \tan^{-1} (8/7)$$

$$x = 48.81 \leftarrow \text{not answer}$$

$$x = 131.19^\circ, 311.19^\circ$$

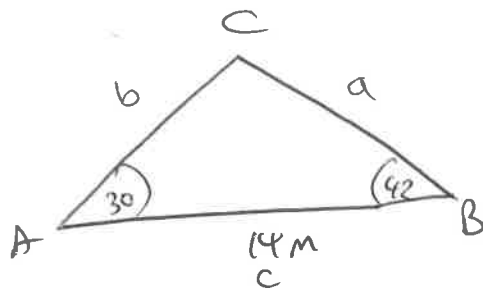
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b)



$$C = 108^\circ$$

Sine Rule :

$$\frac{BC}{\sin 30} = \frac{AC}{\sin 42} = \frac{14}{\sin 108}$$

$$AC = \frac{14 \sin 42}{\sin 108}$$

$$AC = \frac{9.37}{0.95}$$

$$AC = 9.86 \text{ m}$$

$$BC = \frac{14 \sin 30}{\sin 108}$$

$$BC = \frac{7}{0.95}$$

$$BC = 7.37 \text{ m}$$

Question 3

a)

$$(i) \quad y = 6x^3 + 2x - 3$$

$$\frac{dy}{dx} = 18x^2 + 2$$

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$$(ii) \quad y = x^2 + 5x - 6$$

$$\frac{dy}{dx} = 2x + 5$$

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1 1

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$$(iii) \quad y = e^{2x} \tan 5x$$

$$\frac{dy}{dx} = e^{2x} (5 \sec^2 5x) + \tan 5x (2e^{2x})$$

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$$(iv) \quad y = \frac{\sin 2x}{x^4 - 2x + 1} \quad \begin{matrix} \leftarrow u \\ \leftarrow v \end{matrix}$$

$$\frac{du}{dx} = 2 \cos 2x \quad \frac{dv}{dx} = 4x^3 - 2$$

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$$\frac{dy}{dx} = \frac{(x^4 - 2x + 1)(2 \cos 2x) - (\sin 2x)(4x^3 - 2)}{(x^4 - 2x + 1)^2}$$

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$$b) \quad y = (7x^2 + 3x + 5)^{1/2}$$

$$\frac{dy}{dx} = \frac{1}{2} (7x^2 + 3x + 5)^{-1/2} (14x + 3)$$

1 1

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$$c) \quad \frac{dy}{dx} = 4x$$

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$$(i) \quad 12$$

1

$$(ii) \quad 0$$

1

$$(iii) \quad -8$$

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Total 93
Marks

