

Charles Brewster
2004733

i) a)

$$\frac{3x-1}{5} = \frac{6x+5}{9}$$

$$9(3x-1) = 5(6x+5)$$

$$27x - 9 = 30x + 25$$

$$27x - 30x = 9 + 25$$

$$-3x = 34$$

$$x = \frac{34}{-3}$$

$$x = -11.3$$

ii)

$$1 + \frac{5}{x} = \frac{-6}{x^2}$$

$$1 + 5(x^2) = x(-6)$$

$$1 + 5x^2 = -6x$$

$$5x^2 + 6x = -1$$

$$11x^2 = 1$$

$$x^2 = \frac{11}{1}$$

$$x^2 = 11$$

$$x = \sqrt{11}$$

$$x = 3.3$$

$$\text{iii} \quad 2\log(3x+1) = \log(x+3) + \log(x+7)$$

$$\log(3x+1)^2 = (x+3)(x+7)$$

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

$$9x^2 + 6x + 1 = x^2 + 10x + 21$$

$$9x^2 + 6x + 1 - x^2 - 10x - 21 = 0$$

$$8x^2 - 4x - 20 = 0$$

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$$8x^2 - 4x - 20 = 0$$

$$ax^2 + b + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4 \times 8 \times (-20)}}{2 \times 8}$$

$$x = \frac{4 \pm \sqrt{12 + 640}}{16}$$

$$x = \frac{4 \pm \sqrt{652}}{16}$$

$$x = \frac{4 \pm 25.5}{16}$$

$$x = \frac{4 + 25.5}{16}$$

$$x = 1.84$$

$$x = \frac{4 - 25.5}{16}$$

$$x = -1.34$$

b)

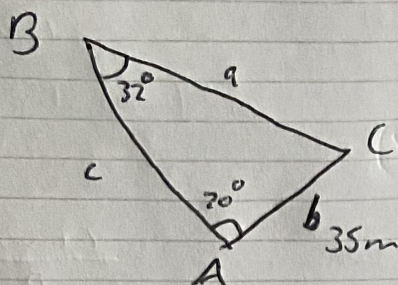
$$1) 8p^3q^2 - 4p^2q^3 + 2p^3q$$
$$= 6p^2q^2$$

c)

$$1) x^2 + 12x + 20 = 0$$
$$(x + 2)(x + 10)$$

$$ii) 2x^2 + x - 15 = 0$$
$$(2x - 5)(x + 3)$$

2)



i)

$$\begin{aligned} C &= 70 + 32 \\ &= 102 \\ &= 180 - 102 \\ C &= 78^\circ \end{aligned}$$

ii)

$$\begin{aligned} \frac{a}{\sin A} &= \frac{b}{\sin B} = \frac{c}{\sin C} \\ \frac{AB}{\sin 78} &= \frac{35}{\sin 32} \\ AB &= \frac{35 \times \sin(78)}{\sin(32)} \\ AB &= 64.6 \text{ m} \end{aligned}$$

211)

~~$$\begin{aligned} \frac{a}{\sin A} &= \frac{b}{\sin B} = \frac{c}{\sin C} \\ \frac{35}{\sin 32} &= \frac{BC}{\sin 70} \\ BC &= \frac{35 \times \sin(70)}{\sin(32)} \\ BC &= 61.9 \text{ m} \end{aligned}$$~~

iii)

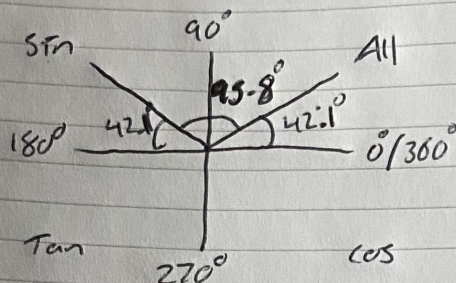
$$\begin{aligned} a^2 &= b^2 + c^2 - 2bc \cos A \\ BC^2 &= 35^2 + 64.6^2 - 2 \times 35 \times 64.6 \cos(70) \\ &= 1225 + 4147.36 - 4508 \times 0.34 \\ BC^2 &= 5372.36 - 1532.72 \\ BC^2 &= 3839.64 \\ BC &= \sqrt{3839.64} \\ BC &= 61.9 \text{ m} \end{aligned}$$

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3) a)

$$\begin{aligned} \text{i) } \sin x &= 0.67 \\ x &= \sin^{-1}(0.67) \\ x &= 42.1^\circ \end{aligned}$$

$$0^\circ \leq x \leq 360^\circ$$



$$\begin{aligned} 180 - 42.1 &= 138.8 \\ x &= 138.8^\circ \end{aligned}$$

4)

$$\begin{aligned} y &= 5x^2 + 12x - 14 \\ y &= 4x^2 + 3x - 4 \end{aligned}$$

$$\begin{aligned} &= x^2 + 9x - 18 \\ &= (x+3)(x+6) \end{aligned}$$

2-1

$$\begin{aligned} x+3 &= 0 & x+6 &= 0 \\ x &= -3 & x &= -6 \end{aligned}$$

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$$\begin{aligned} y &= 5x^2 + 12x - 14 \\ y &= 15 + 24 - 14 \\ y &= 25 \end{aligned}$$

$$\begin{aligned} y &= 5x^2 + 12x - 14 \\ y &= 30 + 24 - 14 \\ y &= 40 \end{aligned}$$

6) a)

$$\begin{aligned} \text{i) } y &= 9x^3 + 7x^2 - x + 4 \\ &= 9x^3 + 7x^2 - 4x \\ \frac{dy}{dx} &= 9(3x^2) + 7(2x) - 4 \\ &= 27x^2 + 14x - 4 \end{aligned}$$

$$\begin{aligned} \text{ii) } y &= (2x+3)(3x-5) \\ y &= 6x^2 - 10x + 9x - 15 \\ y &= 6x^2 - x - 15 \\ \frac{dy}{dx} &= 12x - 1 \end{aligned}$$