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①

Introduction to Mathematics and Science
(ACHA3000)

i) $x^6 \times x^8 \times x^2 \times x = x^{17}$

ii) $(2x^2)^4 \times 3x^3$

$16x^8 \times 3x^3 = 48x^{11}$

iii) $\frac{x^2 \times x^{10} \times x}{x^3} = \frac{x^{13}}{x^3} = x^{10}$

iv) $2\sqrt{x} \times 3\sqrt{x} = 2x^{1/2} \times 3x^{1/2} = 6x$

v) $1 = x^0$

2 i) $7x - 1 = 5x + 4 \rightarrow 7x - 5x = 4 + 1$
 $2x = 5$
 $x = \frac{5}{2}$

ii) $10(3x + 2) = 7(-2x - 1) \rightarrow$
 $30x + 20 = -14x - 7$
 $30x + 14x = -7 - 20$
 $44x = -27$

$x = -\frac{27}{44}$

or $x = -0.614 \text{ 3.dp}$

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2 iii) $\frac{3}{(2x+1)} = \frac{4}{(x-1)} \rightarrow 3(x-1) = 4(2x+1)$

$$3x - 3 = 8x + 4$$

$$8x - 3x = -3 - 4$$

$$5x = -7$$

$$x = -\frac{7}{5}$$

iv) $(x+2)^2 = (x+3)(x+5)$ $(x+2)(x+2)$

$$x^2 + 2x + 2x + 4 = x^2 + 5x + 3x + 15$$

$$4x + 4 = 8x + 15$$

$$4x = 4 - 15$$

$$4x = -11$$

$$x = -\frac{11}{4}$$

$$\text{or } x = -2.75$$

3 i) $x^2 + 9x + 14 = 0$ 7 and 2

$$(x + 7)(x + 2)$$

$$x = -7 \quad x = -2$$

ii) $x^2 - 7x + 10 = 0$ 5 and 2

$$(x - 5)(x - 2)$$

$$x = 5 \quad x = 2$$

iii) $x^2 + 8x - 20 = 0$ 10 and 2

$$(x - 2)(x + 10)$$

$$x = 2 \quad x = -10$$

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3 iv) $x^2 - 49 = 0$

$(x + 7)(x - 7)$

$\sqrt{49} = 7$

7 and 7

$x = 7 \quad x = -7$

v) $2x^2 - 3x - 20 = 0$

5 and 4

$(2x + 5)(x - 4)$

$x = -\frac{5}{2} \quad x = 4$

4 $17x^2 = -5x + 14 \rightarrow 17x^2 + 5x - 14 = 0$

$a = 17 \quad b = 5 \quad c = -14$

calc. $x = \frac{-(5) \pm \sqrt{(5)^2 - (4)(17)(-14)}}{(2)(17)}$

$+= 0.77 \text{ 2.dp}$
 $- = 1.07 \text{ 2.dp}$

$x = 0.77 \text{ (2.dp)} \quad x = 1.07 \text{ (2.dp)}$

5 $6x + 5y = 35$
 $7x - 4y = 31$

$\textcircled{\times 7} \quad 42x + 35y = 245$
 $\textcircled{\times 6} \quad 42x - 24y = 186 \quad \ominus$

$6x + 5(1) = 35$

$59y = 59$

$6x + 5 = 35$

$y = 1$

$6x = 30$

$x = 5$

$x = 5$
 $y = 1$

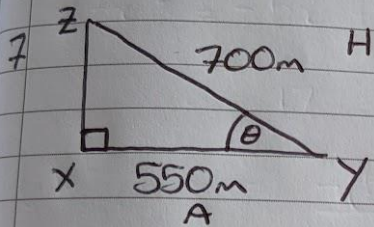
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$$6i) 10p^3q^2 - 5p^2q + 15p^4q$$

ii) $2x^2y - 4xy^2$

$2xy(1x - 2y)$



$$\begin{aligned} \text{i)} \quad X \rightarrow Z &= 433.3 \text{ (to nearest m)} \\ \text{ii)} \quad \hat{Y} &= 38.21 \text{ (2.d.p)} \end{aligned}$$

i) $a^2 + b^2 = c^2$

$$\text{ii) } S_H^O \quad C_H^A \quad T_A^O$$

$$550^2 + b^2 = 700^2$$

$$\cos(\theta) = \frac{550}{700}$$

Bozenernibiz

$$\cos^{-1}\left(\frac{550}{700}\right) = \theta$$

$$b^2 = 700^2 - 550^2$$

$$b^2 = 187500$$

$$\theta = 38.2132 \dots$$

$$b = \sqrt{187500}$$

$$b = 433 \text{ m}, 0.127 \dots$$