

1/4

1/11/21

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Foundation Mathematics

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

i) $(2x^2)^4 \times 3x^3 = 16x^8 \times 3x^3 = 48x^{11}$

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

iv) $2\sqrt{x} \times 3\sqrt{x} = \cancel{2x} \times 3 = 6x$

v) $1 = x^1$

2) i) $7x - 1 = 5x + 4$

$$7x - 5x = 1 + 4$$

$$2x = 5$$

$$x = 2.5$$

ii) $10(3x+2) = 7(-2x-1)$

$$30x + 20 = -14x - 7$$

$$30x + 14x = \cancel{20} - 7 - 20 = -27$$

$$44x = -27$$

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

$$x = -0.61$$

2/4

1/11/21

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

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

$$\cancel{3x-3} \quad 3x-3 = 4(2x+1)$$

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

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

$$-5x = 4+3 = -5x = 7$$

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

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

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

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

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

$$4x + 4 = \cancel{8x} \quad 15 - 4$$

$$-4x = \cancel{8x} \quad 11$$

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

$$3i) \quad \begin{aligned} \cancel{x^2 + 9x + 14} &= 0 \\ \cancel{x^2 + 7x + 3x + 14} &= 0 \\ \cancel{x(x+7) + 2(x+7)} &= 0 \\ \cancel{(x+7)(x+2)} &= 0 \end{aligned}$$

$$ii) \quad \cancel{x^2 + 9x + 14} =: x^2 - 7x + 10 = 0$$

$$x^2 - 2x - 5x + 10 = 0$$

$$x(x-2) - 5x + 10 = 0$$

$$x(x-2-5(x-2)) = 0$$

$$(x-2)(x-5) = 0$$

$$x = -2$$

$$x = -5$$

3/4

1/11/21

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$$\begin{aligned} 3 \text{ iii) } x^2 + 8x - 20 &= 0 \\ x^2 + 10x - 2x - 20 &= 0 \\ x(x + 10) - 2x - 20 &= 0 \\ x(x + 10) - 2(x + 10) &= 0 \\ (x + 10)x(x - 2) &= 0 \\ x + 10 &= 0 \\ x - 2 &= 0 \\ x &= -10 \\ x &= 2 \end{aligned}$$

$$\begin{aligned} \text{iv) } x^2 - 49 &= 0 \\ x^2 &= 49 \end{aligned}$$

$$\begin{aligned} \text{v) } 2x^2 - 3x - 20 &= 0 \\ 2x^2 + 5x - 8x - 20 &= 0 \\ x(2x + 5) - 4(2x + 5) &= 0 \\ (2x + 5)(x - 4) &= 0 \\ 2x + 5 &= 0 & x &= -\frac{5}{2} \\ x - 4 &= 0 & x &= 4 \end{aligned}$$

4)

4/4

1/11/21

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$$5) \quad \begin{aligned} 6x + 5y &= 35 \\ 7x - 4y &= 31 \end{aligned}$$

$$24x + 20y = 140$$

$$35x + 20y = 155$$

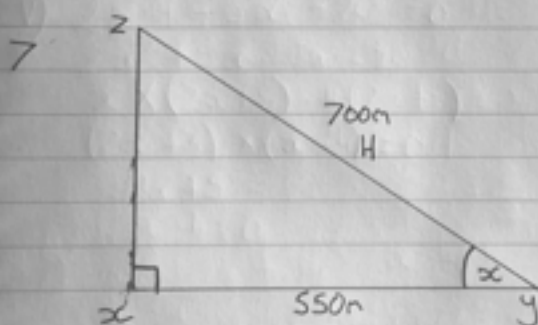
$$59x = 295$$

$$x = 5$$

$$\begin{aligned} 7 \times 5 - 4y &= 31 \\ y &= 1 \end{aligned}$$

$$(x=5 \quad y=1)$$

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



$$i) \quad \begin{aligned} z &= \sqrt{700^2 - 550^2} = 433 \\ \text{height} &= 433 \end{aligned}$$

$$ii) \quad \begin{aligned} 433 \div 550 &= 0.78 \\ \tan^{-1}(0.78) &= 37.95^\circ \end{aligned}$$

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