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1) Simplify the following:

a) $x^4 \times x^6 \times x = x^{10}$

b) $2x^2 \times 3x^3 \times 2x = 12x^7$

c) $\frac{x^4 \times x^3 \times x^2}{x^9} = \frac{x^9}{x^9} = 1$

d) $(3x^2)^3 = 27x^6$

e) $\sqrt{x} \times \sqrt{x} = x$

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2) Solve the following linear equation for x :

a) $15x - 2 = 12x + 9$

$$15x - 12x = 9 + 2$$

$$\div 3 \left(\begin{array}{l} 3x = 11 \\ x = 3.67 \end{array} \right) \div 3$$

b) $3(7x - 1) = 6(x + 3)$

$$21x - 3 = 6x + 18$$

$$21x - 6x = 18 + 3$$

$$\div 15 \left(\begin{array}{l} 15x = 21 \\ x = 1.4 \end{array} \right) \div 15$$

c) $\frac{5x + 3}{4} = \frac{2x - 1}{9}$

$$9(5x + 3) = 4(2x - 1)$$

$$45x + 27 = 8x - 4$$

$$45x - 8x = 27 - 4$$

$$\div 37 \left(\begin{array}{l} 37x = 31 \\ x = 0.84 \end{array} \right) \div 37$$

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3) Solve the following quadratic equation by using the factorisation method:

a) $x^2 + 10x + 21 = 0$
 $(x+3)(x+7) = 0$

$-3(x+3=0) -3 -7(x+7=0) -7$
 $x = -3 \quad x = -7$

b) $x^2 - 3x + 2 = 0$
 $(x-2)(x-1) = 0$

$+2(x-2=0) +2 +1(x-1=0) +1$
 $x = 2 \quad x = 1$

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

$-10(x+10=0) -10 -2(x+2=0) -2$
 $x = -10 \quad x = -2$

d) $x^2 - 64 = 0$
 $(x+8)(x-8) = 0$

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

e) $2x^2 + 9x + 10 = 0$
 $(2x+5)(x+2) = 0$

$-5(2x+5=0) -5 \quad -2(x+2=0) -2$
 $\div 2 \quad x = -2.5 \quad \div 2$
 $x = -2.5 \quad x = -2$

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4) Use the formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ to find the two solutions of the following quadratic equation, giving your answer to two decimal places

$$\begin{aligned} 9) \quad 14x^2 + 3x &= 11 \\ 14x^2 + 3x - 11 &= 0 \\ x &= \frac{-3 \pm \sqrt{(3)^2 - 4(14)(-11)}}{2(14)} \\ x &= \frac{-3 \pm \sqrt{9 + 616}}{28} \\ x &= \frac{-3 \pm \sqrt{625}}{28} \\ x &= \frac{-3 \pm 25}{28} \end{aligned}$$

$$x = \frac{-3 + 25}{28}$$

$$x = \frac{22}{28}$$

$$x = 0.79$$

$$x = \frac{-3 - 25}{28}$$

$$x = \frac{-28}{28}$$

$$x = -1$$

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5) Solve the following simultaneous equations:

a) $5x + 3y = 39$ (1) $(8x)$
 $8x - 2y = 42$ (2) $(5x)$

$$40x + 24y = 312 \quad (3)$$
$$40x - 10y = 210 \quad (4)$$

(3) - (4)

$$\div 14 \left(\begin{array}{l} 14y = 102 \\ y = 7.28 \end{array} \right) \div 14$$

$$\begin{array}{r} 5x + 3(7.28) = 39 \\ 5x + 21.84 = 39 \\ -21.84 \\ \hline 5x = 17.16 \\ -21.84 \\ \hline -4.68 \\ \div 5 \\ x = 3.432 \end{array}$$

$$x = 3.432$$

$$y = 7.28$$

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b) Simplify the following as far as possible:

a) $5(2x^2 - y^2) - x^2(x^2 - y) - x^2y - x^4$
 $10x^2 + 8y^2 - x^4 + x^2y - x^2y - x^4$

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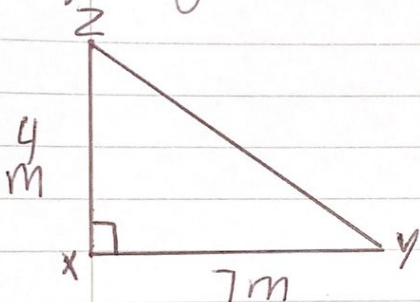
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7) In the following right-angle triangle, if XZ is 4 metres and XY is 7 metres, calculate:

A) Angle Y

B) Angle Z

C) Length YZ using Pythagoras' theorem.



a) $\tan Y = \frac{4}{7}$

$$Y = \tan^{-1}(0.571)$$

$$Y = 29.73^\circ$$

b) $\hat{Z} = 180^\circ - 90^\circ - 29.73^\circ$

$$\hat{Z} = 60.27^\circ$$

c) $ZY^2 = ZX^2 + XY^2$

$$ZY^2 = 4^2 + 7^2$$

$$ZY^2 = 16 + 49$$

$$ZY^2 = 65$$

$$ZY = 8.06$$

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8) Express the following x to a Power

A) $\sqrt[3]{x} = x^{\frac{1}{3}}$

B) $1 = x^0$