

1. Show that $(x+1)(x+2)(x+3)$ can be written in the form $ax^3 + bx^2 + cx + d$ where a , b , c and d are positive integers.

$$(x+1)(x+2) = x^2 + \underline{2x} + \underline{1x} + 2 = x^2 + 3x + 2 \quad \textcircled{1}$$

$$\begin{aligned} & (x+3)(x^2 + 3x + 2) \quad \textcircled{1} \\ &= ((x+3)(x^2)) + ((x+3)(3x)) + ((x+3)(2)) \\ &= (\underline{x^3} + \underline{3x^2}) + (\underline{3x^2} + \underline{9x}) + (\underline{2x} + \underline{6}) \\ & \underline{\underline{x^3 + 6x^2 + 11x + 6}} \quad \textcircled{1} \end{aligned}$$

(Total for Question is 3 marks)

No, because Trocey should multiply 8 and 7, rather than add ✓

Each team plays 11 games

$$12 \times 11 = 132 \checkmark$$

$$(\div 2)$$

$$= 66$$

66 ✓

2. Solve $(x - 2)^2 = 3$

Give your solutions correct to 3 significant figures.

$$(x - 2)^2 = 3$$

$$\sqrt{\quad} \quad \sqrt{\quad}$$

$$x - 2 = \pm\sqrt{3} \checkmark$$

$$(+2) \quad (+2)$$

$$x = 2 \pm\sqrt{3}$$

$$\therefore x = 2 + \sqrt{3} = 3.732 \dots$$

$$x = 2 - \sqrt{3} = 0.2679 \dots$$

3.73, 0.27 ✓

(Total for Question is 2 marks)

3. (a) Factorise $a^2 - b^2$ Difference of two squares (D.O.T.S)

$$\begin{aligned} (a+b)(a-b) &= a^2 + ab - ab - b^2 \\ &= a^2 - b^2 \end{aligned}$$

$$\frac{(a+b)(a-b)}{(1)}$$

Use information from part a

- (b) Hence, or otherwise, simplify fully $(x^2 + 4)^2 - (x^2 - 2)^2$

$$a^2 - b^2$$

$$a = x^2 + 4$$

$$b = x^2 - 2 \quad (1)$$

$$a^2 - b^2 = (a+b)(a-b) \quad \leftarrow \text{Seen in part a}$$

$$= ((x^2 + 4) + (x^2 - 2))((x^2 + 4) - (x^2 - 2)) \quad (1)$$

$$= (2x^2 + 2) \times 6$$

$$= 12x^2 + 12$$

$$= 12(x^2 + 1)$$

$$\frac{12(x^2 + 1)}{(3)}$$

(Total for Question is 4 marks)

It is not in line with the trend of the other points.
 doesn't fit trend - far from other points / line of best fit

It is not in line with the trend of the other points.

Extrapolation -> extending graph beyond plotted points is unreliable as we can't be sure that the trend will continue.

The point would be outside of the range of the scatter diagram

4. Expand and simplify $5(p+3) - 2(1-2p)$

$$\begin{aligned} & ((5 \times p) + (5 \times 3)) + ((-2 \times 1) + (-2 \times -2p)) \\ &= (5p + 15) + (-2 + 4p) \quad \textcircled{1} \text{ Expanding 1 bracket} \\ &= (5p + 4p) + (15 - 2) \\ &= 9p + 13 \quad \leftarrow (13 \text{ is prime}) \end{aligned}$$

9 and 13 have no common factors, so this can't be simplified further.

$$9p + 13 \quad \textcircled{1}$$

(Total for Question is 2 marks)

5. (a) Expand and simplify $(x + 5)(x - 9)$

F O I L
 ↑ ↑ ↑
 Front Outside Inside

$$(x+5)(x-9) = x^2 - 9x + 5x - 45$$

$$= x^2 - 4x - 45$$

$$\textcircled{2}$$

$$\underline{x^2 - 4x - 45}$$

(2)

(b) Factorise fully $9x^2 + 6x$

$$9x^2 + 6x = 3x(3x + 2)$$

$$\textcircled{2}$$

$$\underline{3x(3x + 2)}$$

(2)

$$\frac{29^2 - 4.6}{\sqrt{35 - 1.9^2}}$$

$$\textcircled{2}$$

$$\underline{157.668255}$$

← round up
 157.668255 sig 6 \gg 5
 $= 157.7$ (4 sf)

$$\textcircled{1}$$

$$\underline{157.7}$$

DO NOT WRITE IN THIS AREA