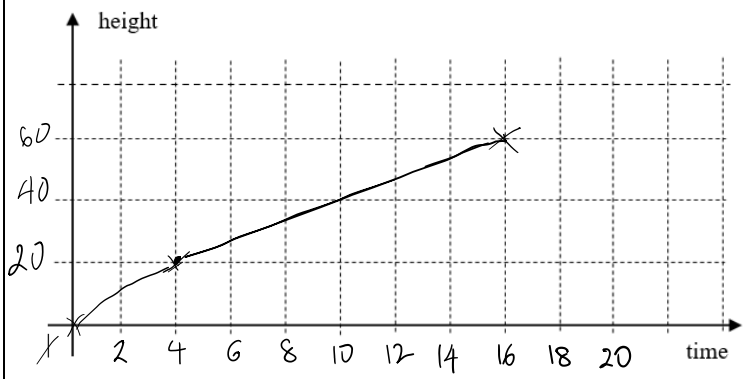
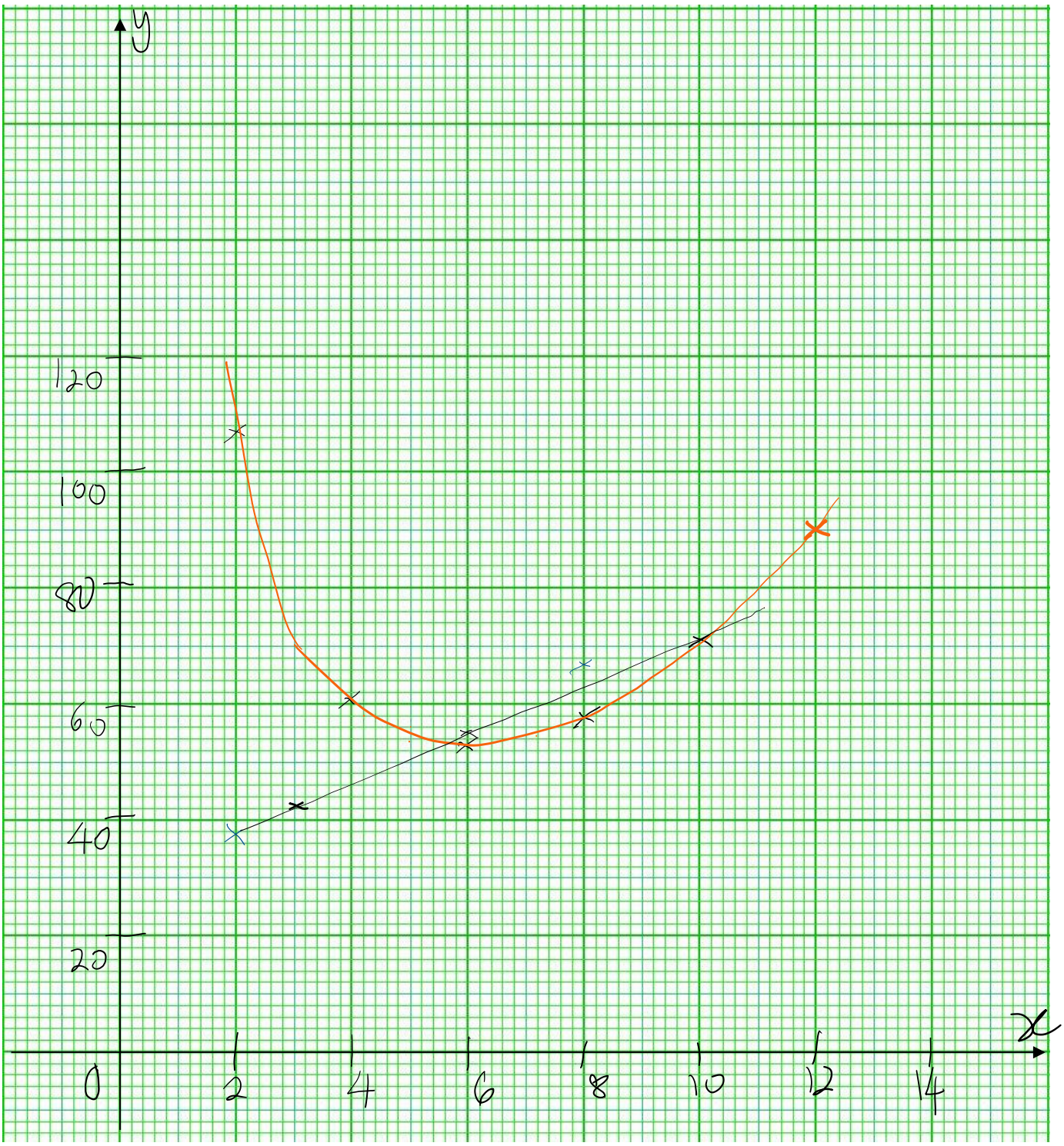
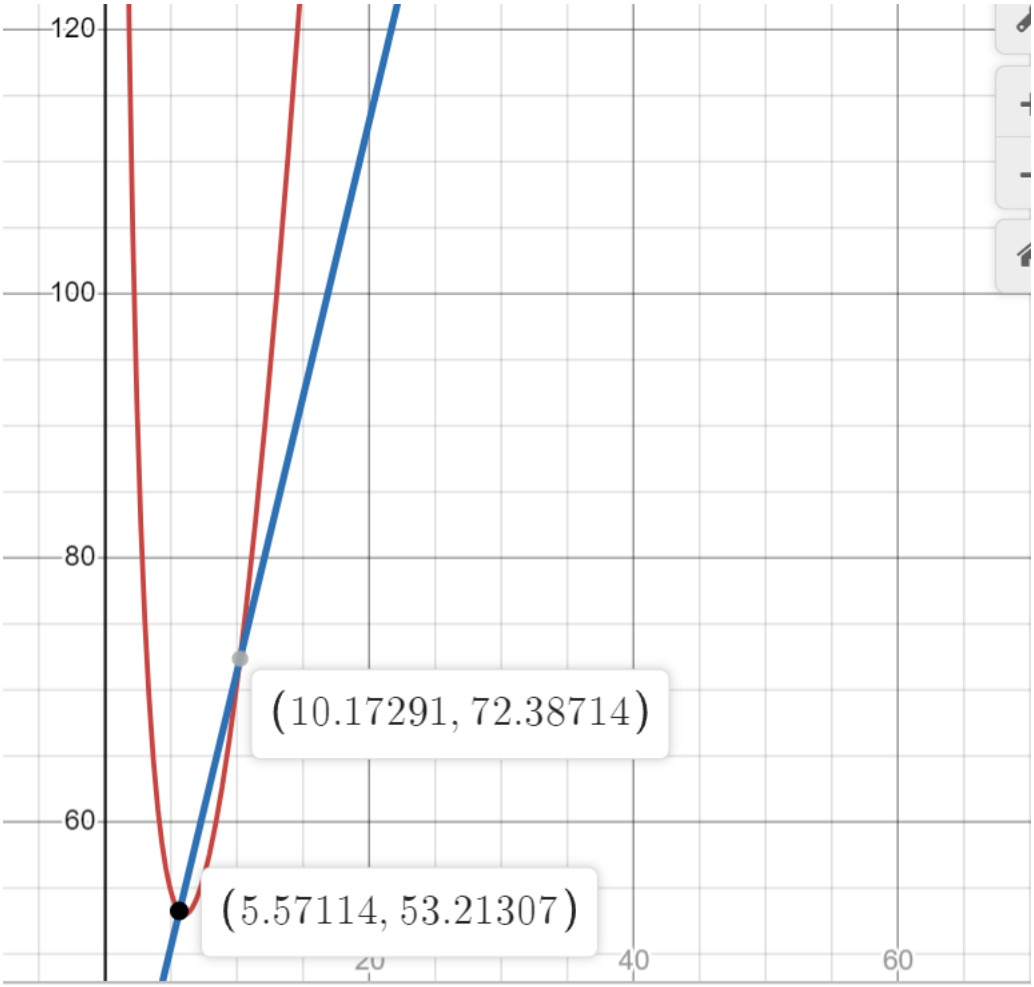
1.	a)	(i) 1000 (ii) 0.573mg × 2 = 1.146mg = 1146μg Yes, he met the daily recommended intake.
	b)	(i) 2.55km (ii) Area scale $1cm^2$: $0.09km^2$ Area on map = 0.36 ÷ 0.09 = 4 cm^2 (iii) 0.5625 cm^2 : 0.36 km^2 1 cm^2 : 0.64 km^2 1 cm : 0.8 km n = 80000
2.	a)	$2xz = \frac{4y - z^2}{3z}$ (i) $2(3)(-1) = \frac{4y - (-1)^2}{3(-1)}$ $y = \frac{19}{4}$ or 4.75
		(ii) $2xz = \frac{4y - z^2}{3z}$ $2xz(3z) = 4y - z^2$ $6xz^2 + z^2 = 4y$ $z^2(6x+1) = 4y$ $z = \pm\sqrt{\frac{4y}{6x+1}}$
	b)	$3 - x < \frac{7-3x}{2} \leq 6$ $6 - 2x < 7 - 3x$ and $7 - 3x \leq 12$ $x < 1$ and $-3x \leq 5$ $x \leq -\frac{5}{3}$

	c)	$\frac{2}{x+1}+\frac{5}{2x-5}=1$ $2(2x-5)+5(x+1)=(x+1)(2x-5)$ $4x-10+5x+5=2x^2-3x-5$ $2x^2-12x=0$ $2x(x-6)=0$ $x=0$ or 6
3.	a)	Slant height of cone $=\sqrt{(0.8h)^2+(1.5h)^2}$ $=\sqrt{2.89h^2}$ $=1.7h$ Curved area of cone $=\pi\times0.8h\times1.7h$ $=1.36\pi h^2$ (shown)
	b)	Total surface area $=1.36\pi h^2+2\pi(0.8h)(1.5h)$ $=3.76\pi h^2=1504\pi$ $h^2=\frac{1504}{3.76}$ $h=20$cm
	c)	Radius = 16 cm, full height = 60 cm Length of rod $=\sqrt{16^2+60^2}$ $=62.097$ Length outside funnel = 2.1cm
	d)	
4	a)	$107=a(2)^2+\frac{210}{2}$ $a=\frac{1}{2}$
	b)	$p=\frac{1}{2}(12)^2+\frac{210}{12}$ $p=89.5$
	c)	Refer to graph
	d)	(i) 5.9 ±0.2 (ii) $3.2 < x < 9.9$ ±0.2
	e)	(i) refer to graph (ii) x = 5.6 or 10.2 ±0.2

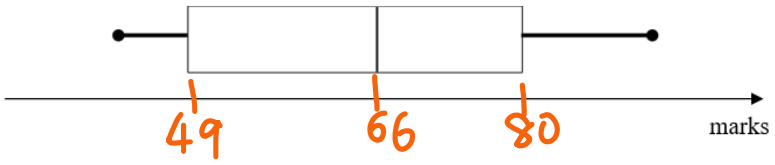
		(iii) $6y = 25x + 180 \rightarrow y = \frac{25}{6}x + 30$ $y = \frac{1}{2}x^2 + \frac{210}{x}$ $\frac{1}{2}x^2 + \frac{210}{x} - \frac{25}{6}x - 30 = 0$ $\frac{1}{2}x^3 - \frac{25}{6}x^2 - 30x + 210 = 0$ $x^3 - \frac{25}{3}x^2 - 60x + 420 = 0$ By comparing coefficients with $x^3 + Ax^2 + Bx + C = 0$, $A = \frac{25}{3}, B = -60, C = 420$
5	a)	(i) Angle CBD = CED, angles in the same segment Angle DFE = 90°, OE bisects chord BD Angle FDE = 30°, angle sum in a triangle DFE Angle CDE = 90°, angle in a semi circle Angle BDC = 90 – 30 = 60° Angle CBD = 60°, angle sum in triangle BCD Hence Triangle BCD is an equilateral triangle.
		OR Angle CBD = CED, angles in the same segment Angle BED = 2×60 = 120° (OE bisects chord BD, Triangle DEF and BEF are congruent) Angle CBD = 60°, angle sum in triangle BCD Hence Triangle BCD is an equilateral triangle.
		(ii) Angle BOC = 120°, angle at centre = 2x angle at circumference Angle BAC = 360 – 90 – 90 – 120 = 60°
	b)	(i) $T_7 = 36$
		(ii) $T_n = \frac{1}{2}(n+1)(n+2)$

		(iii) $(n+1)(n+2)=351$ $n^2+3n+2=702$ $n^2+3n-700=0$ $n=-28$(reject) or 25 $n=25$




120
100
80
60
(10.17291, 72.38714)
(5.57114, 53.21307)
20
40
60

6	a)	(i) $\overrightarrow{PQ} = \overrightarrow{OQ} - \overrightarrow{OP}$ $= \begin{pmatrix} 2 \\ m \end{pmatrix} - \begin{pmatrix} -3 \\ 4 \end{pmatrix}$ $= \begin{pmatrix} 5 \\ m-4 \end{pmatrix}$ $\left\lvert \overrightarrow{PQ} \right\rvert = \sqrt{5^2 + (m-4)^2} = 13\text{units}$ $25 + m^2 - 8m + 16 = 169$ $m^2 - 8m - 128 = 0$ $m = -8 \text{ or } 16 \text{ (rejected)}$ $m = -8$
		(ii) $\overrightarrow{QP} = 2\overrightarrow{PR}$ $\overrightarrow{QP} = \begin{pmatrix} -5 \\ 12 \end{pmatrix}$ $\overrightarrow{QP} = 2\overrightarrow{PR}$ $\frac{1}{2}\begin{pmatrix} -5 \\ 12 \end{pmatrix} = \overrightarrow{OR} - \overrightarrow{OP}$ $\begin{pmatrix} -2.5 \\ 6 \end{pmatrix} + \begin{pmatrix} -3 \\ 4 \end{pmatrix} = \overrightarrow{OR}$ $\overrightarrow{OR} = \begin{pmatrix} -5.5 \\ 10 \end{pmatrix}$ $R(-5.5, 10)$
	b)	(i) $y = \frac{2}{3}x + C$ When x = 5, y = 7, $C = \frac{11}{3}$ $y = \frac{2}{3}x + \frac{11}{3}$ (ii) Let y = 1, x = – 4 $\text{area} = \frac{1}{2} \times 9 \times 9 = 40.5\text{units}^2$
		(iii) *PQ* and *BC* are parallel Angle PAQ = Angle BAQ (common) Angle APQ = Angle ABC (corresponding angle) Triangle APQ and ABC are similar
7	a)	(i)

		 (ii) 260 (iii) Students in class A has a higher score for the science test than class B. The median marks for class A is higher than B. Students in class A has a less consistent score than class B. The interquartile range for class A is higher than class B.
	b)	(i) mean = 51 Standard deviation = 9.165≈9.17
		(ii) a) $\frac{18}{80}\times\frac{17}{79}=\frac{153}{3160}$ or 0.0484 b) $\frac{6}{80}\times\frac{32}{79}+\frac{32}{80}\times\frac{6}{79}=\frac{24}{395}$
8	a)	Vol of pyramid = $\frac{1}{3}\left(\frac{1}{2}\times 8\times 8\times\sin 60\right)\times 20$ $=184.75\text{cm}^3$
	b)	$\frac{V_1}{V_2}=\frac{39.96}{185}=\frac{27}{125}$ $\frac{l_1}{l_2}=\sqrt[3]{\left(\frac{27}{125}\right)}=\frac{3}{5}$ $\frac{A_1}{A_2}=\left(\frac{3}{5}\right)^2=\frac{9}{25}$
	c)	Method 1 $HF=\frac{3}{5}\times 8=4.8$ area of triangle FGH $=\frac{1}{2}\times 4.8\times 4.8\sin(60)$ $=9.98\text{cm}^2$ Method 2 area of triangle FGH $=\frac{9}{25}\times\frac{1}{2}\times 6\times 6\sin(60)$ $=9.98\text{cm}^2$

9 a)

Compare unit cost

1 Egg

Type	Cost	Sets
Pasar 10	0.27	60 trays
Pasar 30	0.23	20 trays
Dasun 15	0.3033	40 trays

1 Bread

Garden14	0.1928	22 loaves
Sunny12	0.2083	25 loaves

1 Sausages

Chicken F 10	0.525	30 packs
Chef S 6	0.504	50 packs

1 Ham

FP 10	0.435	30 packs
SC 10	0.33	30 packs

1 coffee

Nes35	6.15	9 packs
Ind 25	3.95	12 packs

Compare cost for 300 sets

600 eggs

Type	Cost	Sets
Pasar 10	162	60 trays
Pasar 30	<u>138</u>	20 trays
Dasun 15	182	40 trays

600 Breads

Garden14	<u>116.10</u>	43loaves
Sunny12	125	50loaves

300 Sausages

Chicken F 10	157.50	30 packs
Chef S 6	160 <u>151.25</u> (0.35disc)	50 packs

300 Ham

FP 10	130.50 104.40 (20%disc)	30 packs
SC 10	<u>99</u>	30 packs

300 coffee

Nes35	55.35 49.20 (disc1)	9 packs
Ind 25	<u>47.40</u>	12 packs

Lowest possible cost

138 + 116.10 + 151.25 + 99 + 47.40 = $551.75

	b)	Possible solution 1 Let the selling price be $\$x$. Total sales = $\$300x$ To meet cover expenses criteria 40% of sales = 551.75 100% of sales = 551.75 ÷ 40% = 1379.375 60% of sales = 1379.375 × 60% = 827.625 Meets the donation criteria T3 Selling price of each set = 1379.375 ÷ 300 = \$2.75875 ≈ \$4.60 Alternative solution 1379.375 – 200 = 1179.375 1179.375 ÷ 300 = 3.93 ~ \$4 Possible assumption: 1) All 300 breakfast sets can be made without any loss of ingredient. 2) All 300 breakfast sets are sold at the minimum selling price during the carnival. 3) Did not include funding, as it is uncertain if it can be achieved.