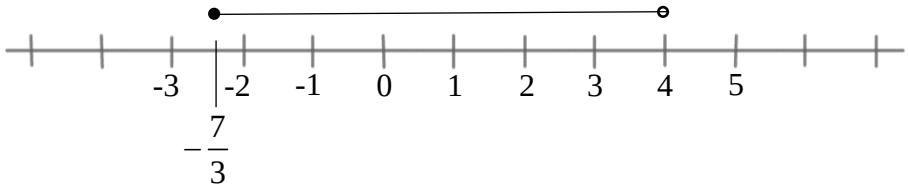
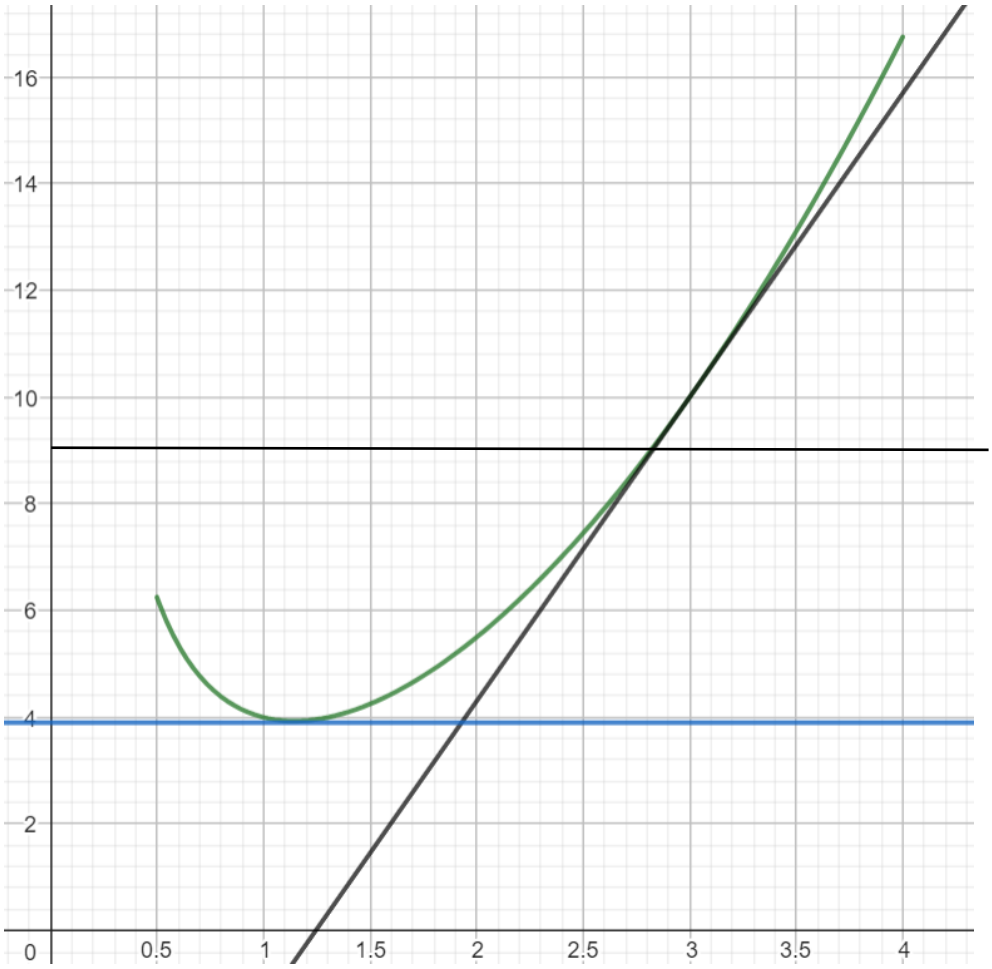
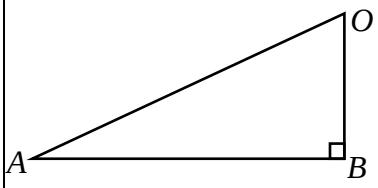
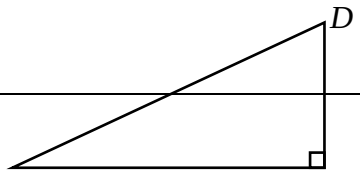
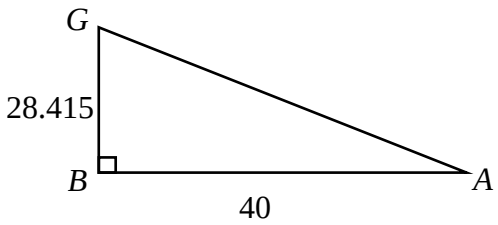
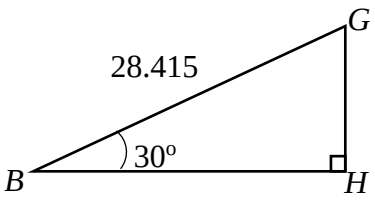
Marking Scheme 3Exp P2

1a	$\frac{\sqrt{50\times 8}}{4}$ $=5$	M1 A1	AO1
1b	$0.65\times 10^{3} = a\times 10^{-1}$ $a = \frac{0.65\times 10^{3}}{10^{-1}}$ $a = 6500$	 M1 A1	AO1
2a	$7^{-5}\times 7^{2k} = 1$ $7^{-5+2k} = 7^{0}$ $-5+2k = 0$ $k = \frac{5}{2}$	 M1 A1	AO2
2b	$3x-5<15-2x\le x+22$ $3x-5<15-2x$, $15-2x\le x+22$ $5x<20$, $-7\le 3x$ $x<4$, $x\ge -\frac{7}{3}$ $-\frac{7}{3}\le x<4$	 M1 M1 A1	AO2
2c		B1	
3a	Based on the perimeter, the various combination for Length and Breadth are: 1. 4+4+9+9 2. 5+5+8+8 3. 6+6+7+7 $320 = 2^{6}\times 5$ $320 = \underset{8}{\underline{2\times 2\times 2}}\times 2\times 2\times 2\times \underset{5}{\underline{5}}$ from the prime factorisation of 320, the perimeter combination should be 5+5+8+8. Thus the height of the cuboid will be 8 cm	 M1 M1 A1	AO3

3b	$n = 20$	B1	AO2
4a	16 °C	B1	AO1
4b	$16°C \rightarrow 8850$ m $1°C \rightarrow \frac{8850}{16}$ $1°C \rightarrow 553.125$ m $5 \times 553.125 = 2765.625$ m	 M1 A1	AO2
5a	Let x be the length and y be the breadth area $= xy$ new area $= (1.1x)(0.82y)$ new area $= 0.902xy$ % change $= \frac{0.902xy - xy}{xy} \times 100\%$ % change $= -9.8\%$	 M1 M1 A1	AO2
5b	amt in Yen $= 32400 + 6200$ amt in Yen $= 38600$ total amt in Yen $= 1.05 \times 38600$ total amt in Yen $= 40530$ total amt in SGD $= \frac{40530}{106.80}$ total amt in SGD $= \$379.49$	 M1 M1 A1	AO2
6a	$\frac{3000}{x}$	B1	AO1
6b	$\frac{3000}{x-6}$	B1	AO1
6c	$\frac{3000}{x-6} - \frac{3000}{x} = \frac{50}{9}$ $\frac{3000x - 3000(x-6)}{x(x-6)} = \frac{50}{9}$ $\frac{18000}{x(x-6)} = \frac{50}{9}$ $162000 = 50x^2 - 300x$ $x^2 - 6x - 3240 = 0$	M1 M1 A1	AO2

6d	$x^2 - 6x - 3240 = 0$ $x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(-3240)}}{2(1)}$ $x = 60$ or $x = -54(rej)$ no. of kg of vegetable $= \frac{3000}{60-6}$ no. of kg of vegetable $= 55.6$ kg	M1 M1 A1	AO2
7a	$y = x^2 + \frac{3}{x}$ $a = 1.5^2 + \frac{3}{1.5}$ $a = 4.25$	B1	AO1
7b	 Correct plotting of points – 2 mark [correct 6 out of 8 points – 1 mark] Smooth curve – 1 mark		AO2
7c	Drawing of line $y = 9$ $x = 2.8 \pm 0.05$	M1 A1	AO1

7d	Drawing of tangent Grad $= 5.67 \pm 0.1$	M1 A1	AO1
7e	Drawing of tangent $y = 3.9 \pm 0.1$	M1 A1	AO3
8a	 $OB = 17 - 12 = 5$ $\cos \angle AOB = \frac{5}{17}$ $\angle AOB = 72.895°$ $\angle AOB = 72.9°$	 M1 A1	AO1
8b	reflex $\angle AOC = 360° - 72.9° \times 2$ reflex $\angle AOC = 214.2°$ major arc length $= \frac{214.2°}{360°} \times 2\pi(17)$ major arc length $= 63.554$ major arc length $= 63.6$ cm	 M1 M1 A1	AO2
8c	area of sector $OAEC = \frac{145.8°}{360°} \times \pi(17)^2$ area of sector $OAEC = 367.71$ area of sector $OAEC = 368$ cm^2	M1 A1	AO1
8d	area of minor segment $ABEC = 367.71 - \frac{1}{2}(17)(17)\sin(72.9° \times 2)$ area of minor segment $ABEC = 286.49$ area of minor segment $ABEC = 286$ cm^2	M1 A1	AO2
9a	 		AO2

	A $\rangle 30^o$ F 35 cm $\cos 30° = \frac{35}{AD}$ $AD = 40.415$ $AD = 40.4$ cm	M1 A1	
9b	$BG = 40.415 - 12$ $BG = 28.415$ cm	M1 A1	AO1
9c	 $AG^2 = 40^2 + 28.415^2$ $AG = 49.065$ $AG = 49.1$ cm	M1 A1	AO2
9d	 $\sin 30° = \frac{HG}{28.415}$ $HG = 14.208$ $HG = 14.2$ cm	M1 A1	AO2
9e	area of triangle $GAD = \frac{1}{2} \times AD \times AB$ area of triangle $GAD = \frac{1}{2} \times 40.415 \times 40$ area of triangle $GAD = 808.3$ cm^2	M1 A1	AO1

10a	$\frac{x+y}{5}=\frac{z}{3}$ $3x+3y=5z$ $3x=5z-3y$ $x=\frac{5z-3y}{3}$	 M1 A1	AO2
10b	$x=\frac{5z-3y}{3}$ $x=\frac{5(-3)-3(2)}{3}$ $x=-7$	 B1	AO1
11a	1645 h	B1	AO1
11b	20 km	B1	AO1
11c	$\text{speed}=\frac{80}{1}$ $\text{speed}=80$ km/h	M1 A1	AO1
11d	$\text{avg speed}=\frac{160}{2.5}$ $\text{avg speed}=64$ km/h	M1 A1	AO1
12a	$\angle BDC=\angle EDF$ (vert. opp $\angle$) $\angle BCD=\angle EFD$ (alt $\angle$) triangle BDC is similar to triangle EDF (AA test)	 M1 A1	AO2
12b	$\frac{\text{Area of triangle } BDC}{\text{Area of triangle } EDF}=\left(\frac{BD}{ED}\right)^2$ $\frac{\text{Area of triangle } BDC}{\text{Area of triangle } EDF}=\frac{9}{4}$	M1 A1	AO1
12c	$\frac{\text{Area of triangle } BDC}{\text{Area of triangle } AFC}=\left(\frac{BD}{AF}\right)^2$ $\frac{\text{Area of triangle } BDC}{\text{Area of triangle } AFC}=\frac{9}{25}$ $\frac{54}{\text{Area of triangle } AFC}=\frac{9}{25}$ Area of triangle $AFC=150$ cm^2	M1 M1 A1	AO1
12d	$\frac{\text{Area of triangle } BDC}{\text{Area of trapezium } ABDF}=\frac{54}{150-54}$ $\frac{\text{Area of triangle } BDC}{\text{Area of trapezium } ABDF}=\frac{9}{16}$	M1 A1	AO2

13a	6 litres/min	B1	AO1
13b	6 full flushes, 6 half flushes + 4 full flushes $= 3 \times 15 + 18$ $= 63$ litres	 M1 A1	AO2
13c	$19\% \rightarrow 8208$ $100\% \rightarrow 43200$ litres	M1 A1	AO2
13d	$43200 \text{ litres} \rightarrow 0.001 \times 43200$ $43200 \text{ litres} \rightarrow 43.2 \text{ m}^3$ $\text{Tariff} = 1.52 \times 43.2$ $\text{Tariff} = \$65.66$ $\text{Water conservation tax} = 0.65 \times 65.66$ $\text{Water conservation tax} = \$42.68$ $\text{Water bill} = 65.66 + 42.68$ $\text{Water bill} = \$108.34$	 M1 M1 M1 A1	AO2
13e	First answer: $\text{highest usage} = 49.75 \text{ m}^3$ $\text{Tariff} = 1.52 \times 49.75$ $\text{Tariff} = \$75.62$ $\text{Water conservation tax} = 0.65 \times 75.62$ $\text{Water conservation tax} = \$49.15$ $\text{Water bill} = 75.62 + 49.15$ $\text{Water bill} = \$124.77$ Second answer: $\text{average usage} = \frac{49.75 + 49 + 48.75 + 49.25 + 48.25}{5} = 49 \text{ m}^3$ $\text{Tariff} = 1.52 \times 49$ $\text{Tariff} = \$74.48$ $\text{Water conservation tax} = 0.65 \times 74.48$ $\text{Water conservation tax} = \$48.41$ $\text{Water bill} = 74.48 + 48.41$ $\text{Water bill} = \$122.89$	 M1 M1 M1 A1 [M1] [M1] [M1] [A1]	AO3