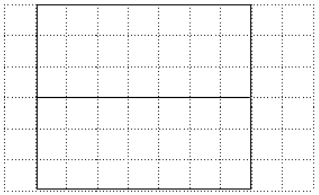
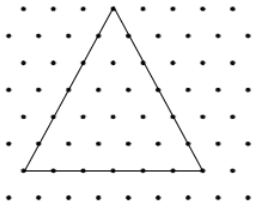
Question			Answer	Marks	Part marks and guidance	
1	(a)		$3x(2x + 3)$ final answer	2	**B1** for $x(6x + 9)$ or $3(2x^2 + 3x)$ or correct answer seen and spoilt.	Condone missing final bracket and e.g. $2\times x$
	(b)		$(x + 5)(x + 3)$ final answer	2	**B1** for $(x + a)$ and $(x + b)$ where $ab = 15$ or $a + b = 8$	Condone missing final bracket
2	(a)		$v = u + at$ written or better e.g. $21 = u + 2 \times 8$ $[u =] 21 – 2 \times 8 [= 5]$ or $21 – 16 [= 5]$	B1 B1	 If **0** scored **SC1** for $5 + 2 \times 8$ or $5 + 16 [= 21]$	written means selected and better includes $u = v – at$
	(b)		104	3	**M2** for $21^2 = 5^2 + 2 \times 2 \times s$ or better oe or **M1** for $v^2 = u^2 + 2as$ seen	Equivalents include e.g. 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20
3	(a)		435	3	**B2** for $[k =] 29$ or for an answer that satisfies both conditions e.g. $3 \times 5 \times 31 = 465$ or **M1** for $400 \div (3 \times 5)$ maybe implied by 26.66… or 26.7 or for $3 \times 5 \times$ (*their* prime number) correctly evaluated or for $3 \times 5 \times 27 = 405$	e.g. 29 used in final trial or even as *their* answer using any prime number that is greater than 29 e.g. **M1** for $3 \times 5 \times 23 = 345$ in working or $3 \times 5 \times 31 = 465$ with 31 as the answer treat factor trees or factor tables as multiplication
	(b)		any correct reason e.g. *a* and/or *b* are factors	1		see appendix

Question			Answer	Marks	Part marks and guidance	
4	**(a)**		(1.46, 715) accurately plotted	**1**		Tolerance : no daylight between *their* point and correct point
	(b)		Negative	**1**		Ignore embellishments
	(c)		(1.47, 620) ringed	**1**		allow any indication
	(d)	**(i)**	Accurate line of best fit	**1**		see overlay between (1.44, 720) and (1.44, 740) and between (1.60, 650) and (1.60, 670) and must reach vertical lines at each end, ignore beyond overlay
		(ii)	**FT** *their* line	**1FT**	**FT** *their* line with negative gradient only	tolerance : our reading ± 3
	(e)		Two different products correctly calculated, one product in the range 1.40 ≤ price ≤ 1.52 and one product in the range 1.52 < price ≤ 1.65	**3**	**B2** for one product correctly calculated or **B1** for one product calculated with the incorrect result	see appendix for the products, the points used must be either the given points or on *their* lobf not the outlier, if there are more than two products then select the best two
5			1261	**3**	**M2** for $8000(1 + \frac{5}{100})^3$ oe or **M1** for *their* 9261 – 8000 or $(1 + \frac{5}{100})^3$ oe implied by 1.157[625] or 1.158	**M2** implied by 9261 Note : 9200 and 1200 are the results by simple interest and score **0**

Question			Answer	Marks	Part marks and guidance	
6	(a)		7 by 6 rectangle (not dashed) with correct dividing line 	3	**B2** for a 7 by 6 rectangular outline or for any rectangular outline correctly splitting the shorter side in half by one line or **B1** for any rectangular outline	outline is not a square, accept horizontally or vertically accept freehand and for accuracy mark intention, condone dashed centre line If the diagram uses the grid edges and the line is not drawn **SC2** for an otherwise correct answer or **SC1** for a 7 by 6 rectangular outline
	(b)		Equilateral triangle with side 6 cm and no extra lines 	2	**B1** for equilateral triangle but the incorrect size or a correct equilateral triangle with one extra line	accept good freehand and for accuracy mark intention
7			2.6	2	**M1** for 36 920 ÷ 14 200	Allow clear correct conversions to other units so 0.0026, 2600 or 2 600 000 score **2** marks for **M1** condone figs 36 920 ÷ figs14 200
			g/cm^3 or $g\ cm^{-3}$	1		Units correct or consistent with *their* answer e.g. 0.0026 kg/cm^3, 2600 kg/m^3, 2 600 000 g/m^3 or 2.6 kg/dm^3 Accept units in words including use of "per".

Question			Answer	Marks	Part marks and guidance	
8			144	**4**	**M3** for $\frac{354}{15k+20k+24k} \times 24k$ oe or **M2** $\frac{354}{15k+20k+24k}$ or all three in a ratio e.g. 15*k* : 20*k* : 24*k* or **M1** for two ratios with a common number of red implied by 15*k* (white) and 24*k* (red seen, $k > 0$ or for 15*k* : 20*k* [:24*k*] or [15*k* :] 20*k* : 24*k*	**M3** implied by 90, 120, 144 with 144 not selected e.g. 3.75 : 5 : 6 and condone 15*k* : 20*k* with 20*k* : 24*k* also 3.75 : 5 [: 6]
9			4 655 to 4 655.7 or 4 656	**4**	**B2** for 21 or **M1** for $\frac{8.4}{2} \times 5$ oe and **M1** for π × 8.4^2 × *their* 21	Condone answer of 4652.7… or 4653 or 4656.9… or 4657
10	**(a)**		correct curve within tolerance	**3**	**B2** for 8 points accurately plotted or **B1** for 5 points accurately plotted	tolerance $\pm\frac{1}{2}$ small square radially for curve and points, some daylight between *y* = −8 and curve , condone a wobbly curve and slight feathering or tram lines in no more than 3 sections but no ruled lines and no dashed lines
	(b)		*x* = 0.5 oe	**1**		
	(c)		–2.3 or –2.4 3.3 or 3.4	**2**	**B1** for either answer **SC1** for an answer to more than 1 dp in each of −2.4 to −2.3 and 3.3 to 3.4 If **1** scored **FT** *their* curve for **2** marks or if **0** scored **FT** *their* curve for **1** or **2** marks or for **SC1**	tolerance $\pm\frac{1}{2}$ small square radially

Question			Answer	Marks	Part marks and guidance	
11			24	**4**	**M2** for $\frac{45}{12} \times 8$ or $\frac{8}{12} \times 45$ oe or 30 or **M1** for $\frac{45}{12}$ or $\frac{12}{45}$ or $\frac{12}{8}$ or $\frac{8}{12}$ oe and **M1** for 99 – 45 – *their* RQ or 24 correctly placed on diagram	Equivalent factors include 3.75, $3\frac{3}{4}$, $\frac{4}{15}$, 0.266… , 0.267, 1.5, $1\frac{1}{2}$, $\frac{2}{3}$, 0.666…, 0.667 Alt.: **M2** for $99 \div \frac{45}{12}$ (3.75) oe or 26.4 or **M1** for $\frac{45}{12}$ or $\frac{12}{45}$ oe and **M1** for $(26.4 - 8 - 12) \times \frac{45}{12}$ (3.75) oe
12			[y =] $56x^2$ with correct working	**6**	**B2** for $y = 3.5t^2$ or **M1** for $y = kt^2$ or better e.g.14 = $k2^2$ or k = 3.5 **B2** for $t = 4x$ or **M1** for $t = mx$ or better e.g. 12 = $m3$ or m = 4 **M1** for $y = 3.5(4x)^2$ If **0**, **1** or **2** scored, instead award **SC3** for $y = 56x^2$ with no working or insufficient working	"Correct working" requires evidence of at least **M1M1** or **B2** condone e.g. $y = kt^2$ and k = 3.5 for **B2** condone e.g. $t = mx$ and m = 4 for **B2** for **M1FT** allow combining *their* two expressions for y and t
13			17 with correct working	**4**	**B1** for 37.5 selected or 37.49[9…] **B1** for 2.25 selected **M1** for (36.5 to 37.5) ÷ (2.25 to 2.35) If **0** scored, instead award **SC1** for an answer of 17 with no working or insufficient working or **SC1** for either 36.5 and 37.49[9…]/37.5 or 2.25 and 2.349[9…]/2.35	"Correct working" requires evidence of at least **B1B1** alt. method **B1** for 2.25 selected **B1** for 37.5 selected **M1** for 2.25 × 16 = 36 **M1** for 2.25 × 17 = 38.25 Max. 3 marks unless the answer is 17 Note : 37 ÷ 2.3 = 16.08… with answer 17 scores **M1**

Question			Answer	Marks	Part marks and guidance	
14	**(a)**		0.8 × 100	**1**		accept $\frac{8}{10}$ oe fraction for 0.8
	(b)		1 654	**4**	**M3** for 80 × 2.5 + 95 × 3.4 + 75 × 5 + 120 × 6.3 or 200 + 323 + 375 + 756 or **M2** for the expression with two errors or **B1** for one of 95, 75 and 120 or **M1** for 80 × 2.5 + *their*95 × 3.4 + *their*75 × 5 + *their*120 × 6.3	for **M3** condone one error allow **M2** for 200 + 646 + 750 + 756 allow **M1** for e.g. 200 + 646 + 750 + 1575
15	**(a)**		24	**3**	**M1** for 16 = $\frac{1}{4}$ or 4 × 16 oe or 64 **M1** for *their* 64 – 16 – 15 – 9 oe	Alt.: **M1** for 16 × 3 and **M1** for 48 – 15 – 9
	(b)		$\frac{16}{40}$ oe or $\frac{16}{16+their\ 24}$ oe	**2FT**	**B1FT** for $\frac{16}{k}$ or $\frac{k}{16+their\ 24}$ (both proper fractions)	**FT** *their* 24
16			1763 or 1763.4 to 1763.5 with correct working	**6**	**M2** for $\frac{1}{2}$ × 72 × *their* 65.25… × sin 25 or **M1** for [AC=] 72cos 25 or 72sin 65 oe **M3** for $\frac{1}{2}$ × *their* 65.254 × *their* 42.24…× sin34 oe or **M2** for [AB=] $\frac{their65.25...\times sin38}{sin108}$ oe or **M1** for $\frac{AB}{\sin 38} = \frac{their65.25...}{\sin 108}$ oe If **0, 1** or **2** scored award **SC3** for answer 1763 or 1763.4 to 1763.5 with no or insufficient working If **0** or **1** scored award **SC2** for 992.79… or 992.8 or 770.69… or 770.7 with no or insufficient working	"Correct working" requires evidence of at least **M2** or **M1 M1** condone answers in range 1750 – 1780 with full correct working **M2** implied by 992.79… or 992.8 or maybe by 985 – 999[…] nfww or **M1** implied by [AC=] 65.2[5…] or 65.3 **M3** implied by 770.69… or 770.7 or maybe by 760 – 783 nfww **M2** implied by [AB=] 42.2[4…] accept any correct method e.g. **M2** for area of triangle ACD = ½ × 72sin25 × 72cos25 oe or **M1** for [CD=]72sin25 implied by 30.4…

Question			Answer	Marks	Part marks and guidance	
17			$\frac{271}{1000}$ or 0.271	**4**	**B3** for 271 OR **B2** for 1000 or 729 OR **M1** for 10 × 10 × 10 or 9 × 9 × 9	Accept any correct method e.g. **M3** for 1 × 10 × 10 + 9 × 1 × 10 + 9 × 9 × 1 or 271 or **M2** for two of these three terms correct or **M1** for one of these three terms correct
18	**(a)**		5 × 22 – 8 or $\frac{102+8}{5}$ = 22 oe	**M1**		Condone 110 – 8 or $5u_3 – 8 = 102$ then $5u_3 = 110$ then $u_3 = 22$
	(b)		6	**3**	**M2** for $\frac{22+8}{5}$ or better or **M1** for $u_3 = 5u_2 – 8$ or better	e.g. **M2** for $\frac{30}{5}$ e.g. **M1** for $22 = 5u_2 – 8$
	(c)		2 $u_2 = u_1$, so all terms will be equal	**B1** **B1**	 If **0** scored **SC1** for next term = 2 or 5 × 2 – 8 seen	

Question			Answer	Marks	Part marks and guidance	
19			[*h* =] 4.8 [*A* =] 1350 with correct working	**6**	**M2** for $\sqrt[3]{\frac{3750}{240}}$ or 2.5 oe or $\sqrt[3]{\frac{240}{3750}}$ or 0.4 oe or **M1** for $\frac{3750}{240}$ or 15.625 oe or $\frac{240}{3750}$ or 0.064 oe **B2** for [*h* =] 4.8 or **M1** for $\frac{12}{2.5}$ oe **B2** for [*A* =] 1350 or **M1** for 216 × (*their* 2.5)^2 oe	"Correct working" requires evidence of at least **M2** e.g. 12 × 0.4 e.g. 216 ÷ (*their* 0.4)^2 Note : Use of scale factor = $\frac{\sqrt[3]{3750}}{\sqrt[3]{240}}$ often leads to accuracy errors so award **M2** for $\frac{\sqrt[3]{3750}}{\sqrt[3]{240}}$ **M1** for $\frac{12}{their 2.5}$ oe (penalise accuracy once here at first occurrence) **M1 A1** for 216 × (*their* 2.5) = answer to A involving a rounding error

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Marks</th><th colspan="2">Part marks and guidance</th></tr>
<tr><td>20</td><td>(a)</td><td></td><td>[$2^3 - 3 \times 2 - 4 =$] -2
[$3^3 - 3 \times 3 - 4 =$] 14

and any indication of a sign change [so solution lies between 2 and 3]</td><td>M1
M1

A1</td><td>Must indicate their input and output

Dep. on at least M1 and different signs</td><td>Accept other values of x used between 2 and 3, correct to 2 figs rot, (see table in part (c)). For full marks, the two values need to produce a sign change.

<u>Alternative method</u>
SC3 for using an iterative equation that converges and concluding statement that first two values lie between 2 and 3 oe</td></tr>
<tr><td></td><td>(b)</td><td></td><td>[x = 2.5] 4.125

$2 < x < 2.5$</td><td>B1

B1</td><td></td><td>Condone equals signs and condone in words, allow a smaller correct interval</td></tr>
<tr><td></td><td>(c)</td><td></td><td>Two correct evaluations in the range $2 < x < 2.5$, one which gives a positive value and the other giving a negative value

[x =] 2.2</td><td>M2

A1</td><td>M1 for one correct evaluation in the range $2 < x < 2.5$

Dependent on achieving at least M1

<u>Alternative method</u>
M1 rearranges to a correct iterative formula (converging or diverging)
and
M1 <u>attempts</u> first two iterations (either substitution seen or found to at least 2dp rot)
and
A1 for 2.2

OR
If 0 scored SC1 for 2.2 with no worthwhile working</td><td>Working for (c) may be seen in (b)

Examples
<table><tr><td>2.05</td><td>-1.53488</td></tr><tr><td>2.1</td><td>-1.039</td></tr><tr><td>2.15</td><td>-0.51163</td></tr><tr><td>2.2</td><td>0.048</td></tr><tr><td>2.25</td><td>0.640625</td></tr><tr><td>2.3</td><td>1.267</td></tr><tr><td>2.35</td><td>1.927875</td></tr><tr><td>2.4</td><td>2.624</td></tr><tr><td>2.45</td><td>3.356125</td></tr></table>condone missing suffixes here
e.g.
$x_{n+1} = \sqrt[3]{3x_n + 4}$ with $x_0 = 2$, $x_1 = 2.1544\ldots$, $x_2 = 2.1872\ldots$</td></tr>
</table>