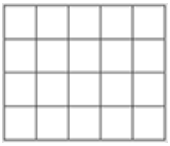
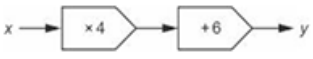
Mark scheme

Question			Answer/Indicative content	Marks	Guidance	
1	a		$x^2 + 5x – 7x – 35$ [= $x^2 – 2x – 35$]	1		All four terms must be seen Could be seen in a grid
	b		–35 [y-intercept] –5 and 7 [roots]	1 1	Must be in correct place	Allow (0, –35) Allow (–5, 0) and (7, 0)
	c		(1, –36)	2	**B1FT** for 1 **B1FT** for –36	**B1FT** is mid-point of their two roots from **21(b)** provided one is positive and one negative *Their* 1 must be > 0 **B1FT** for their value of x *Their* –36 must be < 0
			Total	**5**		
2			61[cm] with correct working	6	**M1** for $8x + 3 = 6x + 8$ **M1** for $8x – 6x = 8 – 3$ **oe**	Correct working requires evidence of at least **M1M1A1M1** or **M1M1A1M2** **FT** *their* equation if wrong sides equated Accept only: $8x + 3 = 4x + 5$

						or $6x + 8 = 4x + 5$
						After **M1**, $x = 2.5$ implies **M1M1A1**
					A1 for $x = 2.5$ **oe**	Do not penalise if their value of x is not subsequently used in their work leading to an **algebraic** final answer e.g. $18x + 16$
					M1 for $8x + 3 + 6x + 8 + 4x + 5$ **soi**	Implied by $18x + 16$
					M1 for substitution of *their x* into $8x + 3$ or $6x + 8$ or $4x + 5$ or *their* $18x + 16$	*Their x* must be > 0 and clearly stated as $x = \ldots$. Substitution of their x into $8x + 3$, $6x + 8$ and $4x + 5$ and then adding implies **M1 M1**.
					If **0** or **1** scored, instead award **SC2** for answer 61	<u>Alternative method using trials:</u>
					If **0** scored, instead award **SC1** for $x = 2.5$	In all trials x must be > 0 **M1M1A1** for both $8x + 3$ and $6x + 8$ correctly evaluated with $x = 2.5$ or **M1M1** for three correctly evaluated trials of both $8x + 3$ and $6x + 8$ with consistent value of x or

						M1 for two correctly evaluated trials of both $8x + 3$ and $6x + 8$ with consistent value of x AND **M2** dep on at least **M1** for *their x* substituted into their $18x + 16$ oe or **M1** dep on at least **M1** for their x substituted into $4x + 5$ **M1** dep on previous **M1** adding their three lengths
			Total	**6**		
3			y^{16}	1		
			Total	**1**		
4	a	i	77	1		Condone extra correct terms e.g. 230, ...
		ii	9	2	**M1** for add 1 then divide by 3 **soi**	Allow embedded answer for **M1** e.g. $9 \times 3 - 1 = 26$
	b		$4n$ oe	1		Condone poor notation e.g. $4 \times n$, $n = 4n$, $4n + 0$, $4n - 0$ **oe** e.g. $n + n + n + n$
			Total	**4**		

<table>
<tr><td>5</td><td>a</td><td></td><td>Rectangle 4 by 6 correctly orientated
  </td><td>1</td><td></td><td>Does not need shading nor internal lines</td></tr>
<tr><td></td><td>b</td><td></td><td><table><tr><th>Pattern</th><th>Calculation</th><th>Number of tiles</th></tr><tr><td>1</td><td>1 × 3</td><td>3</td></tr><tr><td>2</td><td>2 × 4</td><td>8</td></tr><tr><td>3</td><td>3 × 5</td><td>15</td></tr><tr><td>4</td><td>4 × 6</td><td>24</td></tr><tr><td>5</td><td>5 × 7</td><td>35</td></tr><tr><td></td><td></td><td></td></tr><tr><td>10</td><td>10 × 12</td><td>120</td></tr><tr><td></td><td></td><td></td></tr><tr><td>n</td><td>n × (n + 2)</td><td>$n^2 + 2n$</td></tr></table></td><td>4</td><td>B2 for first four cells correct
or
B1 for two of the first four cells correct
B1 for 10 × 12 and 120
B1 for n × (n + 2)</td><td>Allow 6 × 4
Allow 7 × 5
Condone n × n + 2 × n</td></tr>
<tr><td></td><td>c</td><td></td><td>4355</td><td>3</td><td>M2 for $4225 + 2\sqrt{4225}$ oe or $\sqrt{4225} \times (\sqrt{4225} + 2)$
or
M1 for $\sqrt{4225}$</td><td>Accept 65 ± 130
May be $\sqrt{4225} = y$ then $y \times (y + 2)$
Accept 65 × 65 for 4225 and 65 for $\sqrt{4225}$ in M2 and M1</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>8</td><td></td><td></td></tr>
<tr><td>6</td><td></td><td></td><td>  </td><td>2</td><td>B1 for two of x × 4 + 6 y correctly placed</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>2</td><td></td><td></td></tr>
<tr><td>7</td><td></td><td></td><td>$w = \frac{p}{5}$ or w = p ÷ 5 final answer</td><td>1</td><td></td><td>Accept $\frac{p}{5} = w$ or p ÷ 5 = w</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>1</td><td></td><td></td></tr>
<tr><td>8</td><td></td><td>i</td><td>6</td><td>1</td><td></td><td></td></tr>
</table>

		ii	19	2	**M1** for 36 ÷ 3 **soi** 12 or ÷ 3 and +7 written under appropriate parts of machine	May draw their own machine
			Total	**3**		
9			$x = y + 4$ final answer	1		Accept $y + 4 = x$
			Total	**1**		
10			12 000 with correct working	6	**M3** for $\frac{x \times 1.5 \times 6}{100} = \frac{x \times 1.1 \times 7}{100} + 156$ better or **M1** for $\frac{x \times 1.5 \times 6}{100}$ oe **M1** for $\frac{x \times 1.1 \times 7}{100}$ oe AND **M1FT** for correctly removing fractions	Correct working requires evidence of at least **3 M** marks Accept any letter for x e.g. **M3** for $x \times [0].015 \times 6 = x \times [0].011 \times 7 + 156$ or $[0].09x = [0].077x + 156$ e.g. $[0].015x \times 6$ or $\frac{0.9x}{100}$ or $0.09x$ e.g. $[0].011x \times 7$ or $\frac{7.7x}{100}$ or $0.077x$ <u>If both equations seen but only one used allow **M1**, **M1** to stand **FT** *their*</u>

					M1FT for correct single *x* term **isw** If **0**, **1** or **2** scored, instead award **SC3** for answer 12 000 with no or insufficient working	equation in one variable e.g. [0].013*x* [= 156] Note: [0].09*x* – [0].077*x* = 156 scores **M4** Any calculation of 1.5% or 1.1% of 156 scores **0** For additional information refer to '2024 November, J560/03, Alternative, Mark Scheme Appendix' within downloadable extra resource materials.
			Total	**6**		
11			<table><tr><th>Statement</th><th>Value of *x*</th><th>True</th><th>False</th></tr><tr><td>$x > -1$</td><td>3</td><td>✓</td><td></td></tr><tr><td>$x < -2$</td><td>-2</td><td>✓</td><td></td></tr><tr><td>$\frac{x}{10} = 0.5$</td><td>50</td><td></td><td>×</td></tr><tr><td>$x - 2 \neq 1$</td><td>3</td><td></td><td>×</td></tr><tr><td>$-2 < x < -0.7$</td><td>0</td><td></td><td>×</td></tr></table>	3	**B2** for three correct or **B1** for two correct	
			Total	**3**		
12			6.7	3	**B2** for 6.68… or **M1** for 21 ÷ *Π*	

			Total	**3**		
13			$-4j + 9k$ final answer	2	**B1** for $-4j$ or $9k$ in final answer or correct answer seen and spoilt	$9k + -4j$ scores **B1**
			Total	**2**		
14			18 with **correct working**	5	Finding adult cost *(a)* directly: **M3** for $6a + 2a - 26 = 118$ or **M2** for $6a + 2(a - 13)$ or **M1** for $a - 13$ **M1** for $8a = 144$ OR **M2** for $118 + 26$ or **M1** for 13×2 used, may be implied by use of 26 **M1** for *their*$(118 + 26) \div 8$ Simultaneous Equations	Correct answer from trials scores **5** "Correct working" requires evidence of at least **3** method marks Finding child cost *(c)* first: **M3** for $6c + 2c + 78 = 118$ or **M2** for $6(c + 13) + 2c$ or **M1** for $c + 13$ **M1** for $8c = 40$ or $c = 5$ OR **M2** for $118 - 78$ or M1 for 6×13 used, may be implied by use of 78 **M1** for *their*$(118 - 78) \div 8$ M1 for *their*$(118 - 78) \div 8 + 13$ Trials

					M1 for $6a + 2c = 118$ **M1** for $a - c = 13$ **M1** for correct method to equate coefficients of one variable, allow one arithmetic error **M1** for correct method to eliminate one variable, allow one arithmetic error If **0** or **1** scored, instead award **SC2** for 18 with no working or insufficient working If **0** scored instead award **SC1** for 5 with no working or insufficient working	**M3** for correctly evaluated trial using [a =] 18 and [c =] 5 or **M2** for two correctly evaluated trials where $c = a - 13$ or **M1** for one correctly evaluated trial where $c = a - 13$
			Total	**5**		
15			2160 with correct working	5	**Method 1** **M3** for $\frac{360}{4 \times 0.05}$ **oe may** be implied by 1800 or **M2** for $\frac{360}{0.05}$ **oe or** $\frac{360}{4} \div 5$ or $\frac{360}{5} \div 4$	Correct working for **5** marks requires evidence of at least **M2** N/C methods need labels or operators **oe 360** = 1800 × 4 × (0.05 or 5 / 100)

					or **M1** for $\frac{360}{4}$ or $\frac{360}{5}$ or $\frac{P\times5\times4}{100} = 360$ **oe** AND **M1dep** for *their* 1800 + 360	or $\frac{360}{20} \times 100$ or N/C e.g. 5% = 90, 1% = 18, 100% = 1800 or 20% = 360, 10% = 180, 100% = 1800 or 20% = 360, 360 × 5 = 1800 or or 1 year = 90, 1% = 18, 100% = 1800 NB 360 × 5 = 1800 **alone** scores **M0** May be implied by 9000 or 18 or N/C e.g. 5% = 90, 1% = 18 or 20% = 360, 10% = 180 May be implied by 90 or 72 or N/C e.g. 5% = 90 or 20% = 360 "May be implied" tells you to look for the correct working associated with these values *Their* 1800 dependent on **M3** and not spoiled
					OR **<u>Method 2</u>** **<u>Trials</u>** **M2** for two complete trials bracketing 360 and resulting in 360 ±10 or **M1** for one	Trials must show substitution and evaluation e.g. 1850 × 0.05 × 4 **oe** = 370 1750 × 0.05

					complete trial ≠ 360 If **0** or **1** scored, instead award **SC2** for 2160	× 4 **oe** = 350 e.g. 500 × 0.05 × 4 **oe** = 100 with no working or insufficient working
			Total	**5**		
16	a		h^5 final answer	1		Not *h5* unless 5 **clearly** raised
	b		$4f(g + 3)$ final answer	2	**B1** for $4(fg + 3f)$ or $f(4g + 12)$	Allow e.g. *1g* and inclusion of × Condone missing final bracket Correct answer seen and then spoilt **B1**
			Total	**3**		
17	a		Equation	1		Allow any clear intention e.g. arrow to equation
	b		Inequality	1		Allow any clear intention e.g. arrow to inequality
			Total	**2**		
18	a		The length is three times the width **oe** **or** The width is a third of the length	1		"Three times" or "a third" is not enough unless it is clear that length = 3 ×

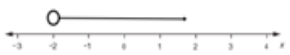
						width Accept 3*k* is three times *k* **oe or** L = 3W **oe** **Do** not accept values or length = 3 × *k* Mark the best response as long as it is not contradictory or has an incorrect statement
	b		$3k^2 - g^2$ final answer	2	**M1** for $3k \times k - g \times g$ **oe**	**Ignore** units if included **oe for** M1 may be e.g. $3k \times k - g^2$
	c	i	$8k$ final answer	3	**B2** for correct answer unsimplified or **B2** for $8k - 2g$ [+ g + g] or **M2** for $3k + k + 3k - g + k - g$ [+ g + g] **oe** **or** **M1** for [height =] $k - g$ or [length =] $3k - g$	Condone $8k + 0[g]$ for **3** marks Accept in any order Accept e.g. $2g$ for $g + g$ Identified or seen on diagram in correct position
		ii	10.2 **nfww**	2	**M1** for *their* **part (i)** = 81.6 or $\frac{81.6}{8}$	*Their* part (i) must be algebraic in terms of *k* or *k* and *g* *Their* (a) can be rearranged

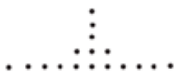
						Note : $8k - 2g = 81.6$ scores M1 but does not score the second mark as from wrong working
			Total	**8**		
19	a		Correct curve through given points	3	**B2** for 6 points correctly plotted or **B1** for 4 points correctly plotted	Half square accuracy. For curve: No line segments used Condone **minor** feathering or doubling Max half square vertically or horizontally from any point
	b		*their* –0.7 and *their* 2.7	2	Strict **FT** from *their* graph. **B1** for each or ruled $y = 4$ cutting *their* curve twice or points indicated on *their* curve where $y = 4$	Must have graph to score Do not accept coordinates Half square accuracy or better For thick lines mark centre of line Ruled line within half square of $y = 4$ throughout *Their* curve may be a polygon or straight line If intersection at mid-point of small square e.g. –0.75 accept –0.8 or –0.7
			Total	**5**		

20			113 or 113.1 or 113.09 to 113.11	2	**M1** for $\pi \times 6^2$ **oe**	Allow 36π for **2** marks π gives 113.0973... 3.142 gives 113.112 For **M1** π may be evaluated allowing $\frac{22}{7}$ or 3.14 or 3.142
			Total	**2**		
21	a		$(x – 3)(x + 10)$ $x^2 – 3x + 10x – 30$ or better $x^2 + 7x – 30 = 90$ or $x^2 – 3x + 10x – 30 = 90$	B1 M2 A1	**M1** for 3 out of 4 terms correct **A1 dep** on **B1M2** With no errors leading to the answer	**B1** implied by $(x − 3)$ and $(x + 10)$ in a multiplication grid Condone missing final bracket e.g. $(x − 3)(x + 10)$ $+7x$ is two terms <u>A1 alternatives:</u> $x^2 + 7x – 30 – 90 = 0$ or $x^2 – 3x + 10x – 30 – 90 = 0$
	b	i	$(x + 15)(x – 8)$ [= 0] -15 and 8	M2 B1FT	**M1** for $(x + a)(x + b)$ where $ab = −120$ or $a+b = 7$ or $x(x + 15) – 8(x + 15)$ or $x(x – 8) + 15(x – 8)$	Condone $(x + 15)(x − 8) = y$ for 2 marks For **M2** and **M1** condone the omission of the final bracket.

					correct or **FT** *their* linear factors	$(x - 15)(x + 8)$ then −15 and 8 scores **M1B0** If both correct after $x(x + 15) – 8(x + 15)$ or $x(x – 8) + 15(x – 8)$ allow **M2B1 BOD**
		ii	5	1	**FT dep** on 2 integer answers given in part (b)(i) *their* positive answer – 3 that results in a positive value	
			Total	**8**		
22			3 30	2	**B1** for each in correct place	
			Total	**2**		
23			7 **nfww**	3	**M2** for $5^2 + 2 \times 3 \times 4$ **oe** or **M1** for $[u^2 =] 5^2$ or $[2as =] 2 \times 3 \times 4$	Accept answer −7 or ± 7 **M2** implied by $[v^2 =] 49$ or $\sqrt{49}$ **M1** implied by $[u^2 =] 25$ or $[2as =] 24$
			Total	**3**		
24	a		$7a + 4b$	2	**B1** for $7a$ or $4b$ in final answer	Accept $4b + 7a$ for **2** marks Do not accept $-7a$ or $-4b$
	b		$24wy$ or $24yw$	1		

						Not e.g. 24×*wy*, *w*24*y*, *y*24*w*, *wy*24
			Total	**3**		
25			20	1		
			Total	**1**		
26			167 with correct working	5	**M2** for 5*x* + 25 = 180 **oe** or **M1** for (*x* – 18) + (4*x* + 43) = 180 **oe** AND **A1** for [*x* =] 31 **M1** for 4 × *their x* + 43 If **0** or **1** scored, instead award **SC2** for 167 with no or insufficient working If **0** scored, instead award **SC1** for [*x* =] 31 or *y* = 4*x* + 43	"Correct working" requires evidence of at least **M2** or **M1M1** <u>Trials</u>: Correct answer from trials scores 5 Allow correct substitution into (*x* – 18) + (4*x* + 43) to imply **M1** if 180 also stated **Dep** on at least **M1** *their x* ≤ 34 **SC** marks may be seen on diagram
			Total	**5**		
27			[*x* =] 4 [*y*=] 1 final answer	3	**M1** for correct method to eliminate one variable **A1** for *x* = 4 **A1** for *y* = 1 If 0 scored **SC1** for a pair of values that satisfies one of the original equations	Allow one error Or correct substitution of one equation into the other and getting to *kx* = *n* Correct

						answer from trials scores **3**
			Total	**3**		
28	a		8	1		
	b		9.5	3	**M1** for 26 = 4(c − 3) **M1FT** for 6.5 = c − 3 or for 26 = 4c − 12 OR Without formal algebra: **M1** for 26 ÷ 4 implied by 6.5 **M1** for (*their* 6.5) + 3	First correct step only apply **FT** to an equivalent **M1** expression Accept any letter for c c must not be blank
			Total	**4**		
29			x > -2 AND 	4	**B2** for x > -2 or **M1** for 8x > 1 − 17 or better AND **B2FT** for *their* inequality correctly shown or **B1FT** for correctly placed circle for *their* x > -2 but with hollow circle and incorrect arrow or for filled circle with correct arrow	<u>Solution to inequality</u> Allow **M1** for this expression with other inequality symbols or equals sign or [x =] -2 as solution (can be implied by mark/circle on the diagram) or trials leading to selection of -2 or final correct trial using -2 <u>Displaying the solution:</u> Display must show an inequality that fits on the number line

						for **FT** Mark to candidate's advantage either $x > -2$ or *their* inequality Accept an arrow of any length or a line reaching 4 <u>If no solution to inequality seen:</u> Hollow circle at -2 arrow to right **M1B2** Hollow circle at -2 arrow to left **M1B1** Solid circle at -2 arrow to left **M1B1** Solid circle at -2 arrow to right **M1B0** Mark at -2 no line or arrow **M1B0** Circle and/or arrow at other than -2 **M0B0**
			Total	**4**		
30	a			1		May be drawn at the end of the sequence Ignore extras
	b		35 Add 3 to each pattern $3n + 5$ or $3 \times 10 + 5$ or $14 + 21$	1 1		Answer must not come from a drawing. For additional information refer to 'Qn 4b, 2024

					June, Alternative J560/01, Mark Scheme Appendix' within downloadable resource materials.
			Total	**3**	
31	a		$x^2 + 3x – 5x – 15$ [= $x^2 – 2x – 15$]	1	All four terms must be seen Could be seen in a grid **Examiner's Comments** Most candidates were not able to clearly show this expansion. The mark scheme expects candidates to show the correct 4 term expansion of the two brackets. Candidates often made errors by having incorrect signs for the coefficients. This question was also omitted by a significant proportion of candidates.
	b		–15 [y-intercept] –3 and 5 [roots]	1	Allow (0, –15) Must be in correct place. Allow (–3, 0) and (5, 0) **Examiner's Comments** A very small proportion of candidates gained marks in this question. Most candidates did not link this part to Question 21 (a) and so did not use the information there to help them here. Most candidates who did score gave the correct *y*-intercept of –15. Those who gave answers for the *x*-intercepts tended to give –5 and 3.

					This question was omitted by a significant proportion of candidates.
	c		(1, ⁻16)	2	**B1FT** for 1 **B1FT** is mid-point of their two roots from 12(b) provided one is positive and one negative. *Their* 1 must be > 0 **B1FT** for –16 **B1FT** for their value of *x* *their* - 16 must be < 0 **Examiner's Comments** A very small proportion of candidates gained marks in this question. Where candidates scored one mark, it was for having the correct *x*-coordinate of 1. A small number of candidates did gain the follow through (FT) mark for their *x*-coordinate, however this was rare due to the large number of candidates who did not answer Question 21 (b). It was very rare to award a mark for the *y*-coordinate (either as –16 or from the FT). A very small number of high attaining candidates achieved the correct answer from using completing the square.
			Total	**5**	
32			28[cm] with correct working	6	Correct working requires evidence of at least **M1M1A1M1**

						or **M1M1A1M2**
					M1 for $5x + 4 = 3\times + 7$	FT *their* equation if wrong sides equated
					M1 for $5x – 3x = 7 – 4$ oe	Accept only: $4x – 1 = 5x + 4$ or $4x – 1 = 3x + 7$
					A1 for $x = 1.5$ oe	After **M1**, $x = 1.5$ implies **M1M1A1**
						Do not penalise if their value of x is not subsequently used in their work leading to an **algebraic** final answer e.g. $12x + 10$.
					M1 for $5x + 4 + 3x + 7 + 4x - 1$ soi	implied by $12x + 10$
					M1 for substitution of *their* x into $5x + 4$ or $3x + 7$ or $4x – 1$ or their $12x + 10$	*their* x must be > 0 and clearly stated as $x =$.... Substitution of their x into $5x + 4$, $3x + 7$ and $4x – 1$ and then adding implies **M1 M1**.
						<u>Alternative method using trials:</u>
					If **0** or **1** scored, instead award **SC2** for answer 28 If **0** scored, instead award **SC1** for $x = 1.5$	In all trials x must be > 0 **M1M1A1** for both $5x + 4$ and $3x + 7$ correctly

						evaluated with $x = 1.5$ or **M1M1** for three correctly evaluated trials of both $5x + 4$ and $3x + 7$ with consistent value of x or **M1** for two correctly evaluated trials of both $5x + 4$ and $3x + 7$ with consistent value of x AND **M2** dep on at least **M1** for their x substituted into their $12x + 10$ oe or **M1** dep on at least **M1** for their x substituted into $4x - 1$ **M1** dep on previous **M1** adding their three lengths
					Examiner's Comments Candidates who attempted this question generally achieved at least one mark. This question was challenging for	

					most candidates, but those who scored did so in one of two ways. The most common was to find the sum of the three sides as an expression (this was given 1 mark). Some candidates however incorrectly equated this to 180. The other way was to equate the two correct sides ($5x + 4 = 3x + 7$), which a small number of candidates did and this was also given M1. Some were then not able to solve this equation correctly, while those that did correctly find $x = 1.5$ often did not continue the question any further. Of those candidates who did find a value for x, some summed the sides algebraically and then substituted their value for x, while others substituted it into all three sides and then added (some of these evaluated one or more of the expressions incorrectly and therefore lost marks). A very small proportion of candidates attempted trials, but when they did so they often were unsure how to interpret their values and therefore subsequent trails appeared random. It was very rare for candidates to be given the Special Case (SC) marks, which shows that generally candidates were showing sufficient workings.
			Total	**6**	
33	a	i	59	1	Condone extra correct terms e.g. 176, ... **Examiner's Comments** Most candidates gave the correct answer of 59. Those who did not score had generally either made arithmetic errors or omitted the question entirely.

		ii	7	2	**M1** for add 1 then divide by 3 soi Allow embedded answer for M1: e.g.: 7 × 3 – 1 = 20 **Examiner's Comments** Most candidates gave the correct answer of 7 and scored 2 marks. A small number of candidates scored 1 mark for a correct method with arithmetic errors, or for giving an embedded answer of 7 × 3 – 1 = 20. The most common misconception was to find $\frac{20-1}{3}$, usually leading to 6.(666...).
	b		5*n* oe	1	Condone poor notation e.g.5 × *n* , *n* = 5*n*, 5*n* + 0, 5n – 0. oe e.g. n + n + n + n + n **Examiner's Comments** Even though the mark scheme condoned poor notation and equivalent answers here, quite a few candidates were unsuccessful. The most common errors were *n* + 5, 5*n* + 5, × 5 or calculating the next number in the sequence (usually giving 25).
			Total	**4**	
34			y^8	1	**Examiner's Comments** Responses to this question were mixed. Higher performing candidates understood the relationship between

					the powers and successfully answered y^8. Those who were less successful divided 12 by 4 to get y^3.
			Total	**1**	
35	a	i	6	1	**Examiner's Comments** This was answered well. Common errors were $9 - 6 \times 2 = {}^{-}3$ or ${}^{-}6$.
		ii	24	2	**M1** for $36 \div 2$ soi 18 or $\div 2$ and +6 written under appropriate parts of machine | May draw their own machine **Examiner's Comments** This part was also generally answered well. A few candidates gained a method mark for showing 18 or $36 \div 2$, however the working seen often suggested that less successful candidates did not understand the inverse process. A common error was 12.
	b		$x \quad \times 3 \quad + 8 \quad y$	2	**B1** for two of x $\times 3$ $+ 8$ y correctly placed **Examiner's Comments** Many candidates were unsuccessful here. Most just wrote the terms and operations in the boxes in the order given, so y was the input, 8 or +8 was in the first box and so on. A few candidates gained B1 for placing x and y in the correct places.

			Total	**5**	
36	a		<table><tr><th>Pattern</th><th>Calculation</th><th>Number of tiles</th></tr><tr><td>1</td><td>1 × 2</td><td>2</td></tr><tr><td>2</td><td>2 × 3</td><td>6</td></tr><tr><td>3</td><td>3 × 4</td><td>12</td></tr><tr><td>4</td><td>4 × 5</td><td>20</td></tr><tr><td>5</td><td>5 × 6</td><td>30</td></tr><tr><td></td><td></td><td></td></tr><tr><td>10</td><td>10 × 11</td><td>110</td></tr><tr><td></td><td></td><td></td></tr><tr><td>n</td><td>$n \times (n + 1)$</td><td>$n^2 + n$</td></tr></table>	4	**B2** for first four cells correct or **B1** for two of the first four cells correct **B1** for 10 × 11 and 110 **B1** for $n \times (n + 1)$ Allow 5 × 4 Allow 6 × 5 Condone $n \times n + n$ **Examiner's Comments** Almost all candidates attempted this question and many scored at least a mark. The row for Pattern 4 was usually correct and the row for Pattern 5 was also often correct, with only a few numerical errors. The common error with the row for Pattern 10 was to write 6 × 7 and 42, not realising that it didn't follow directly on from the rows above. Candidates were less successful in the final row, which was intended to lead them into the final part of the question. Expressions such as $n + n + n$ or $n \times n$ (× n) were common.
	b		4160	3	**M2** for $4096 + \sqrt{4096}$ oe or $\sqrt{4096} \times (\sqrt{4096} + 1)$ or **M1** for $\sqrt{4096}$ Accept 64 × 65 May be $\sqrt{4096} = y$ then $y \times (y + 1)$ Accept 64 × 64 for 4096 and 64 for $\sqrt{4096}$ in M2 and M1 **Examiner's Comments** With many errors in the final row of the table in part (b), this part was only

					attempted by just over half ofthe candidates and only a very small proportion of the attempts were correct. Common errors were to answer 4096 or work out 4096^2 or 4096 ÷ 4. Very few attempted $\sqrt{4096}$. Several less successful responses answered 9 + 3 = 12.	
			Total	**7**		
37			12 000 with correct working	6	**M3** for $\frac{x \times 1.5 \times 5}{100} - \frac{x \times 1.1 \times 6}{100} = 108$ oe or better or **M1** for $\frac{x \times 1.5 \times 5}{100}$ oe **M1** for $\frac{x \times 1.1 \times 6}{100}$ oe AND **M1FT** for correctly removing fractions **M1FT** for correct single *x* term *isw* If **0, 1** or **2** scored, instead award **SC3** for answer 12 000 with no or insufficient working	Correct working requires evidence of at least 3 M marks Accept any letter for *x* e.g. M3 for *x* × [0].015 × 5 = *x* × [0].011 × 6 + 108 or [0].075*x* = [0].066*x* + 108 e.g. [0].015*x* × 5 or $\frac{7.5x}{100}$ or 0.075*x* e.g. [0].011*x* × 6 or $\frac{6.6x}{100}$ or 0.066*x* If both equations seen but only one used allow M1, M1 to stand FT *their* equation in one variable e.g. [0].009*x* [= 108] Note: [0].075*x*– [0].066*x*=108 scores M4

						Any calculation of 1.5% or 1.1% of 108 scores 0 For additional information refer to '2024 November, J560/03, Mark Scheme Appendix: item 3' within downloadable extra resource materials.

Examiner's Comments

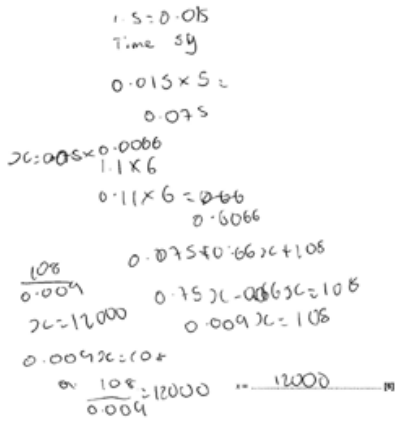
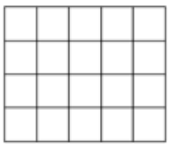
This question was attempted by many candidates, but fewer than hoped as there was a question in a similar context in summer 2024.

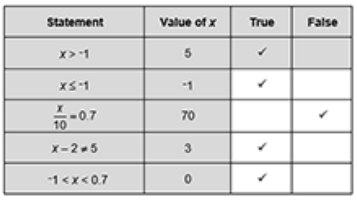
Of those who did attempt the question, few scored above 2 marks.

A very small number of candidates attempted the main method of creating expressions and then an equation using x and 108.

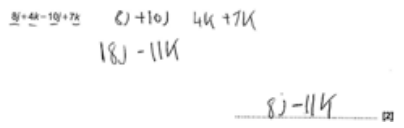
A common start (which probably led into the candidates attempting the question numerically rather than algebraically) was to recognise that Darcie received 7.5% over the time of the investment and Ivan 6.6%; each of these earned M1. After that, methods often became poorly organised calculations, possibly involving 108, or attempting trials of 7.5% of an amount and, sometimes, 6.6% of the same amount. Too often the calculations were incorrect percentage calculations, e.g. 7.5% of £200 = 200 × 7.5.

The trial and improvement scheme did not provide additional credit for multiple attempts at different amounts.

					Exemplar 3  This candidate represents one of the few to construct a complete solution. After a faltering start with several errors, they finally achieve a correct statement midway down the response. Initial statements have varying numbers of zeros after the decimal point; after seeing the correct 0.075 (of x) it becomes the incorrect 0.75 and there is similar uncertainty for 0.066, but this is condoned as transcription errors as the difference is then given correctly as 0.009 x. The rest of the method is correct, even though the order is uncertain, as presumably $0.009x = 108$ comes before $\frac{108}{0.009}$, which is then repeated at bottom left.
			Total	**6**	
38			Rectangle 4 by 5 correctly orientated 	1	Does not need shading nor internal lines **Examiner's Comments** This was usually correct. The occasional errors were to rotate the shape or to draw a square (generally 5 × 5, but occasionally 4 × 4).

			Total	**1**	
39	a		$x = y - 3$ final answer	1	Accept $y - 3 = x$ **Examiner's Comments** This was reasonably answered by more successful candidates. Less successful candidates were unsure of algebraic processes. Common errors were $y + 3$, $3y$, $3 - y$ and $y \div 3$.
	b		$w = \frac{p}{3}$ or $w = p \div 3$ final answer	1	Accept $\frac{p}{3} = w$ or $p \div 3 = w$ **Examiner's Comments** Responses here were slightly less successful than part (a) and similar errors in algebraic processes were made. Common errors were $w = \frac{3}{p}$, $w = 3p$ and $w = 3 + p$.
			Total	**2**	
40			 	3	**B2** for three correct or **B1** for two correct **Examiner's Comments** Many candidates gained at least one mark on this question. There was no obvious pattern to where incorrect responses occurred, but it was unusual to find all the statements answered incorrectly.

			Total	**3**	
41			5.4	3	B2 for 5.41... or M1 for 17 ÷ π **Examiner's Comments** Many candidates did not know how to answer this question. A common incorrect method was to multiply 17 by π, while others divided 17 by 2. **Assessment for learning** Candidates should consider the reasonableness of their answer. This may have helped some realise the diameter of a circle cannot be larger than its circumference.
			Total	**3**	
42			-2*j* + 11*k* final answer	2	**B1** for –2*j* or 11*k* in final answer or correct answer seen and spoilt 11*k* + − 2*j* scores **B1** **Examiner's Comments** Although many managed to score 2 marks here, there was also a lot of confusion over which terms to add and which to subtract (as shown in the exemplar below) with 18*j* and 3*k* seen often. Many candidates struggled to deal with −2*j*, with the most common response being 2*j* + 11*k* (which scored 1 mark for 11*k*). Exemplar 2

					 This response has both coefficients incorrect and did not gain any marks.
			Total	**2**	
43			22 with correct working	5	Correct answer from trials scores **5** "Correct working" requires evidence of at least **3** method marks <u>Finding adult cost (*a*) directly:</u> **M3** for 5a + 2a − 12 = 142 or **M2** for 5*a* + 2(*a* − 6) or **M1** for *a* − 6 **M1** for 7*a* = 154 OR **M2** for 142 + 12 **M1** for *their*(142 + 12) ÷ 7 <u>Finding child cost (*c*) first:</u> **M3** for 5c + 2c + 30 = 142 or **M2** for 5(*c* + 6) + 2*c* or **M1** for *c* + 6 **M1** for 7*c* = 112 or *c* = 16 OR **M2** for 142 − 30 or **M1** for 6 × 5 used, may be implied by use 30 **M1** for *their* (142 – 30) ÷ 7

					M1 for *their*(142 –30) ÷ 7 + 6	
					<u>Simultaneous Equations</u> **M1** for 5a + 2c = 142 **M1** for a − c = 6 **M1** for correct method to equate coefficients of one variable, allow one arithmetic error **M1** for correct method to eliminate one variable, allow one arithmetic error If **0** or **1** scored, instead award **SC2** for 22 with no working or insufficient working If **0** scored instead award **SC1** for 16 with no working or insufficient working	<u>Trials:</u> **M3** for correctly evaluated trial using [*a* =] 22 and [*c* =] 16 or **M2** for two correctly evaluated trials where *c* = *a* − 6 or **M1** for one correctly evaluated trial where *c* = *a* − 6
					<u>Examiner's Comments</u> Only the more able candidates started with algebra and followed it through to a correct conclusion. Many used trials	

					instead. If candidates use trials, they should be encouraged to set them out in an ordered manner; many responded to this question with a page filled with assorted calculations and it was not always possible to link the input with the output.	
			Total	**5**		
44	a	i	9*a* final answer	1		Accept 9 × *a* and *a*9 and *a* × 9
		ii	$^{-}x + 6 - 4y$ final answer	2	**B1** for ^{-}x seen or [+]6 – 4*y* seen in final answer	Accept answer in any order
	b		3	1		
			Total	**4**		
45	a		$7(x - 3)$	1		Condone missing final bracket
	b		$5x\,(3 + x)$	2	**B1** for $5(3x + x^2)$ or $x(15 + 5x)$	Condone missing final bracket
			Total	**3**		
46	a		*at* = *v* – *u* seen as single statement	1		Accept e.g. $^{-}at = {}^{-}v + u$
	b		15	2	**M1** for correct substitution 3 + 2 × 6 **oe**	For **M1** accept a two-step evaluation with an arithmetic slip e.g. 2 × 6 = 10 followed by 10 + 3
			Total	**3**		

47			200 with correct working	6	**M1** for $2(x + 1) = 3x – 7$ **oe** **M1** for reaching $ax = b$ **FT** *their* equation **A1** for $x = 9$ OR <u>Trials</u> **M1** for one trial into $2(x + 1)$ and $3x – 7$ evaluated correctly **M1** for two trials of $2(x + 1)$ and $3x – 7$ evaluated correctly **A1** for [w =] 10 and [l =] 20 AND **M2** for (*their x* + 1) × (3 × *their x* – 7) or **M1** for (*their x* + 1) or (3 × *their x* – 7) If **0** or **M1** scored, instead allow **SC2** for answer 200 with no or insufficient working If **0** scored, instead allow **SC1** for $x = 9$ with no or insufficient working	"Correct working" requires evidence of at least **M1M1A1** or alternate convincing approach **FT** from an equation with x on both sides only *Their x* must be a positive integer and stated *Their x* or *their* length/width may be on the diagram
			Total	**6**		
48	a		Equation	1		
	b		Expression	1		
			Total	**2**		

49	a		$8x^2$ final answer	1		Do not accept $\frac{8x^2}{1}$
	b		$x = 3y - 15$ or $x = 3(y - 5)$ final answer	2	**B1** for answer $3y - 15$ or $3(y - 5)$ or **M1** for a correct first step $3y = x + 15$ or $y - 5 = \frac{x}{3}$ If **0** scored, instead award **SC1** for correct step to final answer **FT** incorrect first step	**SC** only awarded for 2 step attempts
			Total	**3**		
50	a	i	36	1		
		ii	No [because] 604 is not a multiple of 6 **oe**	1	**Response Mark** No, it goes up in 6s and the closest number to that is 606 **1** No, if we kept adding 6, it would go 600 then 606 **1** No, 100 × 6 = 600 so 101 × 6 = 606 **1** 6 does not divide into 604 and 6 is the commonality of the sequence **1** The numbers are multiples of 6 **1** No, not all even numbers will be in the sequence (not incorrect but not describing why 604 isn't in the sequence) **0** No, it goes up in 6s not 2s **0** No, the sequence is going up in 6s **0**	
	b	i	1	1		
		ii	Divide by 2 **oe**	1	**Response Mark** Each number is halved **1**	

					÷ 2 every time you go down **1** I divided the next term by 2 **1** You halve 2 **1** You subtract half the number to give the next number **1** The number that is subtracted is halved for the next number **1** Double each number **0**	
			Total	**4**		
51			9 **nfww**	4	**M3** for $5t - 2$ and *their* $(5 \times 8 + 3)$ correctly used together or $43 + 2 = 5t$ or $(43 + 2) \div 5$ or $5 \times 9 - 2 = 43$ OR **M1** for $5 \times 8 + 3$ may be implied by 43 **M1** for $5t - 2$ or $43 + 2$ or for one correctly evaluated trial	e.g. an equation with a first step to solve
			Total	**4**		
52	a		$12a - 3a^2$ final answer	2	**B1** for $12a$ or $^{-}3a^2$ in final answer	
	b		$x > 0.75$ or $x > \frac{3}{4}$ final answer	2	**M1** for $4x > 11 - 8$ **oe** or for $x + 2 > 2.75$ **oe** or for answer 0.75 **oe** with or without equality or wrong inequality symbol	
	c		$(x + 5)(x + 4)$	M2 B1FT		Condone final bracket missing Accept $(x + 5) = 0$, $(x + 4) = 0$ for **M2**

			$^-5$ and $^-4$		**M1** for $(x + a)$ and $(x + b)$ where $ab = 20$ or $a + b = 9$ For correct solutions from *their* quadratic factors If 0 scored, **SC1** for answers ± 5 and ± 4	Allow correctly completed grid with + 5 and + 4 as headers for **M1**
			Total	**7**		
53	a		The length is twice the width oe or The width is half the length	1		"Twice" or "double" or "half" is not enough unless it is clear that length = 2 × width Accept 2*k* is double *k* oe or L = 2W oe Do not accept values or length = 2 × *k* Mark the best response as long as it is not contradictory or has an incorrect statement **Examiner's Comments** A reasonable number of candidates gave the correct answer in some form. Uncredited responses included 'They both have k', 'The width is double', 'It is double', 'It is half', '2 × *k*' and 'They are the same'. Many seemed unsure about what the question was requesting.
	b		$2k^2 - g^2$ final answer	2		

					M1 for $2k \times k - g \times g$ oe	Ignore units if included oe for **M1** may be e.g. $2k \times k - g^2$
					Examiner's Comments Candidates found writing an expression extremely challenging and few logical attempts were seen (successful attempts approached the area as a rectangle minus a square). A significant number did not attempt this question. Some candidates appeared to not recognise that a rectangle's opposite sides must have equal length, although $2k \times k$ was sometimes seen as the answer. Often expressions contained powers greater than 2 (such as $2k^2 - g^4$), or numerical values, or were solely numeric. Products of k and g (such as $2k^2g$) or sums of k and g (such as $2k + k + g$, or $2k^2 + g$) were frequently seen.	
	c	i	$6k$ final answer	3	**B2** for correct answer unsimplified or **B2** for $6k - 2g$ [+ g + g] or **M2** for $2k + k + 2k - g + k - g$ [+ g + g] oe or **M1** for [height =] $k - g$ or [length =] $2k - g$	Condone 6k + 0[g] for 3 marks Accept in any order Accept e.g. $2g$ for $g + g$ Identified or seen on diagram in correct position
					Examiner's Comments Responses here were similar to those	

					of the previous part and candidates demonstrated the same lack of security with algebraic representation. Very few candidates realised by inspection that the perimeter must be 6*k* and was independent of the value of *g*. A significant number did not attempt this question.
		ii	10.4 nfww	2	**M1** for *their* **part (i)** = 62.4 or $\frac{62.4}{6}$ *Their* part (i) must be algebraic in terms of *k* or *k* and *g* *Their* (a) can be rearranged Note : 6*k* – 2*g* = 62.4 scores M1 but does not score the second mark as from wrong working **Examiner's Comments** Many candidates showed no clear strategy to solve the problem. A few gained M1 for writing their answer to (c) (i) = 62.4, but if that contained *g* they found themselves unable to make further progress. 62.4 ÷ 2 or 62.4 ÷ 4 were popular incorrect methods. A very few candidates took 62.4 to be the value of *k* and tried to work out the perimeter. **Assessment for learning** Candidates need to be confident with generalising common situations.
			Total	**8**	

54	a		Correct curve through given points	3	**B2** for 6 points correctly plotted or **B1** for 4 points correctly plotted Half square accuracy. Use overlay as guide For curve: No line segments used Condone **minor** feathering or doubling Max half square vertically or horizontally from any point **Examiner's Comments** Many candidates plotted the points yet did not join them with a curve. A few tried to use straight lines. Many did not correctly plot the points within a half-square accuracy (particularly the point at (1, ⁻1), possibly because of the proximity of the '1' label on the *x*-axis). Some points were plotted using very blunt pencils. The few curves that were seen were often not accurate and missed the plotted points by more than a half square vertically or horizontally. A surprising number of candidates made no attempt to plot the points and did not respond at all. **Assessment for learning** Candidates need to practise accurately plotting points and how to then draw a curve through them.
	b		*their* –1.1 and *their* 2.6	2	

					Strict **FT** from *their* graph. **B1** for each or ruled $y = 6$ cutting *their* curve twice or points indicated on *their* curve where $y = 6$	Must have graph to score Do not accept coordinates Half square accuracy or better For thick lines mark centre of line Ruled line within half square of $y = 6$ throughout *Their* curve may be a polygon or straight line If intersection at mid-point of small square e.g. –1.15 accept –1.2 or –1.1
					<u>Examiner's Comments</u> Many candidates could not score marks here as they had not drawn a graph in part (a). A few did draw the horizontal line $y = 6$ to earn B1, but a very few candidates drew $x = 2$ instead. Where lines did exist, reading was often inaccurate; readings were often taken to be at the nearest integer point (for example, if their graph crossed the line where the x-coordinate was $^{-}1.2$, it would be given as $^{-}1$). Some responses seemed to be the intercepts of their curve with the x-axis, while others gave responses that seemed unrelated to the graph they had drawn.	
			Total	**5**		
55			2160 with correct working	5	**<u>Method 1</u>** **M3** for $\frac{360}{5 \times 0.04}$ oe	Correct working for 5 marks requires

					may be implied by 1800 or **M2** for $\frac{360}{0.04}$oe or $\frac{360}{5}$ ÷ 4 or $\frac{360}{4}$ ÷ 5 or **M1** for $\frac{360}{5}$ or $\frac{360}{4}$ or $\frac{P \times 4 \times 5}{100}$ = 360 oe AND **M1dep** for *their* 1800 + 360 OR **<u>Method 2 Trials</u>** **M2** for two complete trials bracketing 360 and resulting in 360 ±10 or **M1** for one complete trial ≠ 360 If **0** or **1** scored, instead award **SC2** for 2160 If **0** scored, **SC1** for £1661[.64]	evidence of at least **M2** N/C methods need labels or operators oe 360 = 1800 × 5 × (0.04 or 4 / 100) or $\frac{360}{20}$ × 100 or N/C e.g. 4% = 72, 1% = 18, 100% = 1800 or 20% = 360, 10% = 180, 100% = 1800 or 20% = 360, 360 × 5 = 1800 or or 1 year = 90, 1% = 18, 100% = 1800 NB 360 × 5 = 1800 **alone** scores **M0** May be implied by 9000 or 18 or N/C e.g. 4% = 72, 1% = 18 or 20% = 360, 10% = 180 May be implied by 72 or 90 or N/C e.g. 4% = 72 or 20% = 360 "May be implied" tells you to look for the correct working associated with these values *Their* 1800 dependent on **M3** and not spoiled Trials must

					show substitution and evaluation e.g. 1850 × 0.04 × 5 oe = 370 1750 × 0.04 × 5 oe = 350 e.g. 500 × 0.04 × 5 oe =100 with no working or insufficient working When candidates say "4% =" they should mean "4% of the amount invested =" and not "4% of 360 =" Make a professional judgement if this is correct. 360 × 1.04 or 360 × 0.04 are good indicators of error. 4% of 360 = 14.40 and then 14.40 × 5 = 72 is **wrong method** because they are finding 4% of the interest and not 4% of the original amount. In the examples below, the M marks are earned by the statement **with those** preceding it. Not just for the statement. In some methods, **M2** evidence can never seen 360 ÷ 5 (= 72) **M1** or 20% = 360 4% = 72 **M1** (72) × 25 = (1800) **M3** or 100% = 1800 **M3**

					360 ÷ 5 (= 72) **M1** or 20% = 360 4% = 72 **M1** (72) ÷ 4 (= 18) **M2** or 1% = 18 **M2** (18) × 100 = (1800) **M3** or 100% = 1800 **M3**
					360 ÷ 4 (= 90) **M1** or 20% = 360 1 year = 72 **M1** (90) ÷ 5 (= 18) **M2** or 1% = 18 **M2** (18) × 100 = (1800) **M3** or 100% = 1800 **M3**
					360 ÷ 20 (= 18) **M2** or 20% = 360 1% = 18 **M2** (18) × 100 = (1800) **M3** or 100% = 1800 **M3**

					360 ÷ 4 (= 90) **M1** or 20% = 360 5% = 90 **M1** (90) ÷ 5 (= 18) **M2** (18) × 100 = (1800) **M3** or 100% = 1800 **M3** 360 × 100 = (36000) or 20% = 360 (36 000) ÷ 5 = 7200 **M1** 5% = 90 **M1** 500% = 9000 (7200) ÷ 4 = 1800 **M3** 100% = 1800 **M3** Note: the scheme say “May be implied by 72” but, as shown in the example above, 72 can come

					from wrong method. 72 is a good guide to look for supporting evidence to judge if the figure comes from correct method. **Examiner's Comments** In this 'You must show your working' question, more successful candidates organised and/or annotated their work so that it was clear that they were using a correct method to answer the question. Misreads and misinterpretations were common. Many candidates attempted compound interest, which received zero marks. Others misinterpreted the information and began by finding 4% **of** 360, which is an incorrect method. This however did lead to 14.40 and then 72, which is also a value that appeared in correct methods and so examiners were looking to the method used to award marks. Similarly, some candidates just wrote 5 × 360 = 1800 with no supporting evidence. As this can come from the incorrect assumption '£360 per year for 5 years', again examiners needed to look to supporting evidence to know that a correct chain of reasoning had been used. Some candidates mixed incorrect attempts with correct ones without distinguishing which they favoured, or which had been used to reach the final answer. Candidates are advised to cross out rejected working and to practise setting out answers logically.
			Total	**5**	

56			201 or 201.1 or 201.06 to 201.09	2	**M1** for $\pi \times 8^2$ oe π gives 201.0619... 3.142 gives 201.088 For **M1** π may be evaluated allowing $\frac{22}{7}$ or 3.14 or 3.142 **Examiner's Comments** Many candidates gained at least the method mark here for $8^2\pi$ or 64π and many gained the second mark for correctly evaluating their formula. Common incorrect methods included $8\pi^2$, $4^2\pi$ and $16^2\pi$, as well as calculations of the circumference.
			Total	**2**	
57	a		h^4 final answer	1	Not $h4$ unless 4 **clearly** raised **Examiner's Comments** Many correct answers were seen. Common errors were $4h$ (or $h4$), h^3 and 4^h. Sometimes H was used, but condoned.
	b		$3g(f + 4)$ final answer	2	**B1** for $3(fg + 4g)$ or $g(3f + 12)$ Allow e.g. 1f and inclusion of × Condone missing final bracket Correct answer seen and then spoilt **B1** **Examiner's Comments**

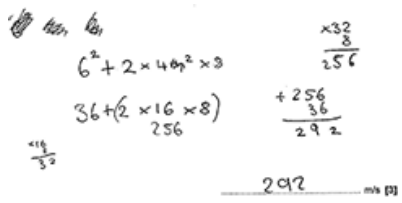
					Correct solutions were in the minority here. Partial factorisations were seen, almost always 3(*fg* + 4*g*) and very rarely *g*(3*f* + 12). A number of candidates extracted 3*g* as a common factor but gave the answer 3*g*(*f* + 12). Most candidates did not demonstrate knowledge of factorisation and showed misunderstanding of algebraic rules. Answers such as 36*fg* or 15fg^2 were common. **Assessment for learning** Candidates need to be familiar with standard algebraic processes.
			Total	**3**	
58	a		Expression	1	Allow any clear intention e.g. arrow to expression **Examiner's Comments** Fewer than half the candidates correctly identified this as an 'Expression'. A large number chose 'Equation', even despite the lack of an equals sign.
	b		Identity	1	Allow any clear intention e.g. arrow to identity **Examiner's Comments** Few recognised this as an 'Identity'.

					'Equation' and 'Formula' were popular incorrect answers. **Assessment for learning** Candidates need to know and be familiar with algebraic words.
			Total	**2**	
59	a		$(x – 2)(x + 7)$ $x^2 – 2x + 7x – 14$ or better $x^2 + 5x – 14 = 70$ or $x^2 – 2x + 7x – 14 = 70$	B1 M2 A1	**M1** for 3 out of 4 terms correct **A1** dep on **B1M2** With no errors leading to the answer **B1** implied by $(x - 2)$ and $(x + 7)$ in a multiplication grid Condone missing final bracket e.g. $(x - 2)(x + 7$ $+5x$ is two terms A1 alternatives: $x^2 + 5x – 14 – 70 = 0$ or $x^2 – 2x + 7x – 14 – 70 = 0$ **Examiner's Comments** This question was a challenge for almost all candidates. There was a high proportion who did not attempt it and marks were not given regularly. The majority of attempts worked with the given equation rather than using the information provided to arrive at that equation. Some candidates attempted to find the perimeter of the shape (in contrast with Question 23 earlier).
	b	i	$(x + 12)(x – 7)$ [= 0]	M2 B1FT	

			⁻12 and 7		**M1** for $(x + a)(x + b)$ where $ab = -84$ or $a+b = 5$ or $x(x + 12) – 7(x + 12)$ or $x(x – 7) + 12(x – 7)$ correct or **FT** *their* linear factors	Condone $(x + 12)(x - 7) = y$ for 2 marks For **M2** and **M1** condone the omission of the final bracket. (x - 12)(x + 7) then -12 and 7 scores **M1B0** If both correct after $x(x + 12) – 7(x + 12)$ or $x(x – 7) + 12(x – 7)$ allow **M2B1 BOD**
					Examiner's Comments Responses to this question were much less successful than similar questions in previous series, notably with the otherwise high performing candidates. This may be due to the negative integer in the quadratic. Some candidates attempted to make use of factor pairs of ⁻84, but often struggled to make progress. Factorisations such as $(x - 84)(x + 1)$ and $(x - 12)(x + 7)$ were seen and given M1, with some candidates then correctly solving them to receive the B1 also for Follow Through. Often 'factorisations' just used the numbers 5 and 84 within the backets, without attempts to identify numbers with the relevant sum and/or product. Some candidates wrote correct solutions without any factorising, which could be given B1 only. Poorer attempts often attempted to rearrange the equation rather than trying to factorise it.	
		ii	14	1		

					FT dep on 2 integer answers given in part (b)(i) *their* largest positive answer + 7 **Examiner's Comments** Those with a correct answer for part (b)(i) generally scored the mark here, along with some 'Follow Through' marks being given to candidates with incorrect (b)(i) responses. A common response was 'x + 7', the expression given on the rectangle in the question.
			Total	**8**	
60	a		$2y + 11x$	2	**B1** for $2y$ or $11x$ in final answer Accept $11x + 2y$ for 2 marks Do not accept $^{-}2y$ or $^{-}11x$ **Examiner's Comments** Many candidates were successful in this question. Those that did not score 2 marks often scored B1 for $11x$, or less frequently for $2y$, in responses such as $11x - 2y$. A number of candidates attempted to combine the x and y terms, for example $13xy$.
	b		$30ab$ or $30ba$	1	Not e.g. $30 \times ab$, $a30b$, $b30a$, $ab30$ **Examiner's Comments** Candidates were even more

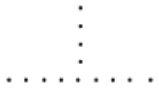
					successful here than part (a). Correct responses generally gave 30*ab*; very few gave 30*ba*. Common errors seen in this question were omitting either the *a* or *b*, or adding the numerical components to give 11*ab*.
			Total	**3**	
61	a		15	1	**Examiner's Comments** The vast majority gave a correct answer here. Incorrect responses often came from finding the increase between just one pair of adjacent terms (either + 2, + 3 or + 4) and then applying that to the 10, resulting in responses of 12, 13 or 14.
	b		3 27	2	**B1** for each in correct place **Examiner's Comments** This was another highly successful question for candidates. Those that hadn't correctly answered part (a) often struggled here too, again using the + 3 or + 7 increase between the given numbers and so 4 and 0 were common incorrect responses for the first term and then 20 and 24 for the fifth term. A few made arithmetic slips and gave 26 or 28 for the fifth term.
			Total	**3**	
62			10 **nfww**	3	**M2** for $6^2 + 2 \times 4 \times 8$ **oe** or **M1** for $[u^2 =] 6^2$ or $[2as =] 2 \times 4 \times 8$ Accept answer $^-10$ or ± 10 **M2** implied by $[v^2 =] 100$ or $\sqrt{100}$ **M1** implied by $[u^2 =] 36$ or $[2as =] 64$

					Examiner's Comments Candidates often struggled here and knowledge of kinematics formulae appeared to be very weak. Almost all candidates were aware they needed to substitute the values into the formula, but the majority did so incorrectly. Another common error was candidates believing that the acceleration needed to be squared because of its unit (hence using 16 for the acceleration). Of those that did substitute correctly, some didn't apply BIDMAS rules and added before multiplying. A number of candidates didn't square root to then get their final answer (this was given 2 marks if their calculation was otherwise correct). Some candidates calculated 2 + *a* + *s* rather than 2 × *a* × *s*. Exemplar 1  This exemplar demonstrates some of the common errors. The candidate substitutes correctly into the formula, however they misinterpret the units for acceleration and use 4^2. They carry out their calculation correctly, but then do not square root their answer (writing 'v^2 =' in their working could have avoided this). The response was given M1 for 6^2.
			Total	**3**	
63			$x < 2$	4	

			AND 		**B2** for $x < 2$ or **M1** for $7x < 11 + 3$ or better AND **B2FT** for *their* inequality correctly shown or **B1FT** for correctly placed circle for *their* $x < 2$ but with hollow circle and incorrect arrow or for filled circle with correct arrow	<u>Solution to inequality</u> Allow **M1** for this expression with other inequality symbols or equals sign or [$x =$] 2 as solution (can be implied by mark/circle on the diagram) or trials leading to selection of 2 or final correct trial using 2 <u>Displaying the solution:</u> Display must show an inequality that fits on the number line for **FT** Mark to candidate's advantage either $x < 2$ or *their* inequality Accept an arrow of any length or a line reaching –3 <u>If no solution to inequality seen:</u> Hollow circle at 2 arrow to left **M1B2** Hollow circle at 2 arrow to right **M1B1** Solid circle at 2 arrow to left **M1B1** Solid circle at 2 arrow to right **M1B0** Mark at 2 no line or arrow **M1B0**

					Circle and/or arrow at other than 2 **M0B0** **Examiner's Comments** Many of those that attempted the inequality algebraically were successful in finding the critical value of 2, either with an equals sign or the correct inequality. Most candidates correctly used a hollow circle on their representation, although some lost a mark for drawing their arrow or line to the right rather than the left.
			Total	**4**	
64			146 with correct working	5	**M2** for $3x + 36 = 180$ oe or **M1** for $(x – 14) + (2x + 50) = 180$ oe AND **A1** for $[x =] 48$ **M1** for $2 \times$ *their* $x + 50$ If **0 or 1** scored, instead award **SC2** for 146 with no or insufficient working If **0** scored, instead award **SC1** for $[x =] 48$ or $y = 2x + 50$ "Correct working" requires evidence of at least **M2 or M1M1** Trials: Correct answer from trials scores 5 Allow correct substitution into $(x – 14) + (2x + 50)$ to imply **M1** if 180 also stated Dep on at least **M1** *their* $x < 65$ **SC** marks may be seen on diagram **Examiner's Comments**

					Although there were a few fully correct solutions, many candidates did not see the link between $2x + 50$, $x - 14$ and 180 and so struggled to form the initial equation. Those who managed to set up the equation often went on to solve it correctly and find x as 48°, but then frequently did not know how to proceed. Some candidates were given SC1 for $y = 2x + 50$.
			Total	**5**	
65			[x =] 7 [y=] 4 final answer	3	**M1** for correct method to eliminate one variable Allow one error Or correct substitution of one equation into the other and getting to $kx = n$ **A1** for $x = 7$ **A1** for $y = 4$ If 0 scored **SC1** for a pair of values that satisfies one of the original equations Correct answer from trials scores **3** **Examiner's Comments** This question was a more accessible question than others on this topic have been, since the two solutions were low integer values rather than decimals. Several candidates were given all 3 marks. Fully correct formal algebraic methods were rare, but many candidates demonstrated they understood what is meant by simultaneous equations and were able to find the solutions by inspection. Others were able to find a pair of values that satisfied one equation and were given SC1.
			Total	**3**	

66	a			1	May be drawn at the end of the sequence Ignore extras **Examiner's Comments** Many candidates were able to draw pattern 4 correctly.
	b		31 Add 3 to each pattern $3n + 1$ or $3 \times 10 + 1$ or $10 + 21$	1 1	Answer must not come from a drawing **Response Mark** P[attern] 4 = 13, p 5 = 16, p 6 = 19, p7 = 22, p8 = 25, p9 = 28, p10 = 31 1 1 Goes up by 3 each time so 7 x 3 = 21 = 31 (10 was amount of dots on last diagram) 1 1 31. Horizontal dots increase by 2 each time and vertical dots increase by 1 each time 1 1 31 Its 10 up, 10 to the left, 10 to the right and 1 in the middle 1 1 31 patterns go up 3 1 1 31. I added 3 six times. 1 0 31 It doesn't give any numbers 1 0 31 by using the calculator 1 0 31. I added 3 1 0 28 dots in pattern 10. I counted the dots in pattern 4 and added 3 six times. 0 1 30. All patterns gain 3 as they get bigger. 0 1 **Examiner's Comments** Many recognised that the patterns increased by 3 dots and worked out the number of dots as 31. Some did not give a complete explanation, for example just stating 'add 3' rather than 'add 3 each time' or similar.
			Total	**3**	

67	a		36	1	**Examiner's Comments** Many correct responses were seen. A common error was to substitute the values into the equation, but not to calculate the value.
	b		1.5	3	**M1** for $30 = 4(c + 6)$ **M1FT** for $7.5 = c + 6$ or for $30 = 4c + 24$ OR Without formal algebra: **M1** for $30 \div 4$ implied by 7.5 **M1** for (*their* 7.5) – 6 First correct step only apply **FT** to an equivalent **M1** expression Accept any letter for c c must not be blank **Examiner's Comments** Some candidates were able to give the correct response. Others gained 1 mark, usually for $30 = 4(c + 6)$ and then making errors multiplying out the bracket.
			Total	**4**	
68			12 cao with correct working	4	**M1** for πr^2 [=] $6\pi r$ or πr^2 [=] $3\pi d$ **M1** for cancellation by π implied or factorising e.g. $\pi r(r - 6) = 0$ or $r(r - 6) = 0$ "Correct working" requires evidence of at least M1M1 FT *their* initial statement if possible Accept $\pi r^2 = 6\pi r$ followed by $r^2 = 6r$ as showing

					A1 for [radius =] 6 [and 0] Trials using πr^2 and $6\pi r$ or πr^2 and $3\pi d$ or πr^2 and $2\pi r$ *or* πr^2 and πd **M2** for two correct trials with $r \neq 6$ or two correct trials with first r ≠ 6 and then r = 6 or one correct trial with $r = 6$ or **M1** for one correct trial with $r \neq 6$ **A1** for [radius =] 6 If **0** or **M1** scored, instead award **SC2** for answer 12 cao If **0** scored, instead award **SC1** for answer 6 [and 0]	cancelling Dependent on M1M1 Must use same value substituted for *r* in both formulas Answers required Dependent on M2 or M1 with no working or insufficient working with no working or insufficient working
			Total	**4**		
69			[*x*=] 4 and [*y* =] 3 or (4, 3) seen [1 ×] *their x* + 3 × *their y* 13	B1 M1 B1	FT *their* (*x*, *y*)	Must be clearly identified/linked to *x* and to *y* May be on graph *Their x* and *their y* can be any values linked to *x* and *y* Clear substitution

						required in $x + 3y$ Must see working for FT
			Total	**3**		
70			9 –15 with correct working	3	**M2** for $(x – 9)(x + 15)$ or **M1** for $(x + a)(x + b)$ where either $ab = –135$ or $a + b = 6$ OR **M2** for 2 correct trials with any number or **M1** for 1 correct trial with any number If **0** scored, **SC1** for 9 and –15 with no working or insufficient working	"correct working" requires **M2** **M2** and **M1** may be implied by grids and other forms such as $x(x + 15) – 9(x + 15)$ Must see substitutions e.g. $5^2 + 6\times5 – 135$ <u>Use of formula</u> **M2** for $\frac{-6 \pm \sqrt{(6)^2 - 4\times[1]\times-135}}{2\,[\times1]}$ or better e.g. $\frac{-6 \pm \sqrt{576}}{2}$ **M1** for formula with at most two errors Do not award if wrong working
			Total	**3**		
71	a	i	46	1		
		ii	5 cao	2	**M1** for either step reversed soi	May be seen on diagram eg + 4, ÷ 5, 25 implies 21 + 4 or 21 + 4 ÷ 5 or answer 21.8
	b		$y = 5x – 4$ final answer	2		

					M1 for final answer $5x - 4$ or $y = 5x + 4$ or $y = kx - 4$ ($k \neq 0$) or $y = 5x - c$ where c > 0 If 0 scored **SC1** for final answer $x = \frac{y+4}{5}$	Accept throughout *y* on right e.g. $5x - 4 = y$ Accept throughout $x \times 5$ or $x5$ or $x \times k$ etc but not x^5 $y = 5(x - c)$ $5x - 4y$ scores **0** Do not accept arrows e.g. $5 \rightarrow \times x \rightarrow 4 \rightarrow y$
			Total	**5**		
72	a		18	1		
	b		12	1		
			Total	**2**		
73	a		$5x + 10$	1		
	b		$4b^2 - 4b$	2	**B1** for $4b^2$ or $-4b$	
			Total	**3**		
74			2.6 **oe**	3	**M2** for $4x + 6x = 19 + 7$ **oe** OR **M1** for $10x - 7 = 19$ or $10x = k$ or $4x = 26 - 6x$ or $kx = 26$ AND **M1** for $x = \frac{b}{a}$FT *their* $ax = b$ seen	e.g. $x = \frac{26}{10}$oe

			Total	**3**		
75			3, 4, 5	3	**B2** for 2 correct and no extras or all 3 correct and one extra OR **M2** for $2 < x \leq 5$ or **M1** for $2 < x$ or $x \leq 5$	
			Total	**3**		
76			$^{-}2$	2	**M1** for 10 or $^{-}12$ or $5 \times 2 + 4 \times {}^{-}3$ **oe**	Not $10x$ or $^{-}12y$
			Total	**2**		
77			[a =] 17 [c =] 13 with correct working	5	**B4** for one correct answer with correct working OR **M1** for $5a + 4c = 137$ oe **M1** for $2a + 3c = 73$ oe **M1** for method to find a common coefficient, allow one arithmetic error **M1** for correct method to eliminate 1 variable, allow one arithmetic error OR If **0** or **M1** scored, instead award **SC2** for both	"Correct working" requires evidence of at least **M1M1M1** Correct answer from trial and improvement scores **5** Accept other variables for a and c <u>If substitution method used</u> **M1** for correct rearrangement of equation **M1** for correctly substituting into other equation A sign error is not an arithmetic error

					correct answers with no or insufficient working Or **SC1** for two answers which satisfy one of the original conditions	Do not allow 14.6[0] 14.6[0] for **SC1**
			Total	**5**		
78	a	i	$2r - 5t$ final answer	2	**B1** for $2r$ or $-5t$ in final answer or correct answer seen and spoilt	$2r + - 5t$ scores **B1**
		ii	a^4	1		
		iii	$8b^3$	1		
	b		$3(a - 5b)$	1		Allow $3(1a - 5b)$
			Total	**5**		
79	a		33	1		Ignore extras after 33
	b		Add 6	1		Need direction and quantity
	c		The sequence is all odd numbers oe	1	**Response Mark** $6n + 3 = 80$; $n = 12.8(3\ldots)$ it's not an integer **1** The last digits of the number always end with 1, 3, 5, 7, 9 never 0 **1** After 75 it goes to 81 **1** After 69 it goes to 75 so 80 can't be **1 bod** If you add on in 6's you get to 75 not 80 **1 bod** Nearest term would be 81 which is 1 off **1 bod** 33, 39, 45, 51, 57, 63, 69, 75, 81 **1 bod** $80 \div 6 = 13\frac{1}{3}$**0** There is 75 in the sequence, followed	

					by the sequence to 75 **0** Because the sequence didn't start at 0 it started at 3 means that the sequence isn't the 6 times table **0** Because the next two terms only take you to 75 **0** Because each term is prime **0** None of the terms end in 0/are a multiple of 10 **0** Because 80 is an even number – *not enough* **0** Because it's not possible to add 6 from the terms to get to 80 **0**	
			Total	**3**		
80	a		$d=\frac{f-5}{4}$ or $d=\frac{f}{4}-\frac{5}{4}$	2	**M1** for $f-5=4d$ or $\frac{f}{4}=d+\frac{5}{4}$ or $\frac{f-5}{4}$ or $\frac{f}{4}-\frac{5}{4}$ as answer	Allow 1.25 for $\frac{5}{4}$
	b		48	2	**M1** for $4+5.5\times 8$	
			Total	**4**		
81			$k=\frac{t-h}{3}$ **oe** final answer	2	**B1** for answer $k=\frac{t-h}{3}$ **oe** or **M1** for $t-h=3k$ or $\frac{t}{3}=k+\frac{h}{3}$	For 2 **oe** allow $k=\frac{t}{3}-\frac{h}{3}$ For **B1 oe** allow $\frac{t}{3}-\frac{h}{3}$ $t-3k-h=0$ does not count as the first correct step
			Total	**2**		
82			33 with correct working	5	**M1** for $2x+5+4x-3+x=100$ may be implied by a subsequent correct equation	"Correct working" requires evidence of first method and at least **M1** and $x=14$ or **M3** if using trials or **M2M1** for non-

					M1 for simplifying *their* equation to $ax + b = c$ or $7x + 2 = 100$ **M1** for the first correct step in solving *their* $ax + b = c$ and **M1** for substituting *their* 14 into $2x + 5$ OR **M3** for one complete correct evaluation of $2x + 5 + 4x - 3 + x = 100$ or **M2** for one complete correct evaluation of $2x + 5 + 4x - 3 + x =$ a total or **M1** for one correct evaluation of each expression $2x + 5$ [+] $4x - 3$ [+] x If **0, 1** or **2** scored, instead award **SC3** for answer 33 with no or insufficient working If **0** or **1** scored, instead award **SC2** for $x = 14$ with no or insufficient working	algebraic method Three separate expressions are not enough Ignore inclusion of % in working $7x + 2 = 100$ scores **M1M1** e.g. $7x = 100 - 2$ $7x = 98$ scores **M1M1M1** For **M** marks with trials: allow each term or each expression from the question evaluated separately e.g. (Use 10) 20 + 5 + 40 – 3 + 10 = 72 or 25 (+) 37 (+) 10 = 72 <u>Alternative method (Non algebraic)</u> **M2** for 100 – 5 + 3 **oe** or **M1** for – 5 + 3 or – 2 AND **M1** for *their* (100 – 5 + 3) ÷ 7 AND **M1** for substituting *their* 14 into $2x + 5$

			Total	**5**		
83	a	i	$20a$ final answer	1		Accept $20 \times a$ or $a20$ or $a \times 20$
		ii	b^5 final answer	1		Do not accept $b5$ but **BOD** if 5 appears raised above the base of b
		iii	c^8 final answer	1		Do not accept $c8$ but **BOD** if 8 appears raised above the base of c
	b		$2(5 – 4y)$ final answer	1		May be $2\times(5 – 4y)$ or $^-2(^-5 + 4y)$
			Total	**4**		
84	a		$(x + 8)(x + 3)$ final answer	2	**M1** for $(x + a)(x + b)$ where $a + b = 11$ *or* $ab = 24$ or for $x(x + 3) + 8(x + 3)$ or $x(x + 8) + 3(x + 8)$	Condone $(x + 8)(x + 3) = 0$ and $(x + 8)(x + 3) = y$ for 2 marks
	b		$^-8$ and $^-3$	1	**FT** *their* (a) **dep** on two brackets	Allow correct solutions if part (a) incorrect
			Total	**3**		
85	a		15	1		
	b		$^-5$	1		
			Total	**2**		

86	a		No and 56 **oe** or No and 36 and 40 or No and 25 and 21	4	**M3** for 1 + 3 + 6 +10 + *their* 15 + *their* 21 or for *their* 15 + *their* 21 and 60 – *their* 20 or for 60 – (*their* 15+10+6+3+1) and *their* 21 or **B2** for 15 and 21 or **B1** for 15 or 21 **OR** **M2** for 60 – (*their* 15 + 10 + 6 + 3 + 1) or 60 – *their* 20 or **M1** for [60 –] 1 + 3 + 6 +10	implied by 56 implied by 36 and 40 implied by 15 and 21 *their* 15 > 10 and *their* 21 > *their* 15 **B2** implied by 36 **M2** implied by 25 or 40 **M1** implied by 20
	b	i	6 + 10 and 16	1		
		ii	9	2	**M1** for recognition of square number pattern	e.g. $\sqrt{100}$, 9 × 9, 25, 36, [49, ….]
			Total	**7**		
87			2 8	2	**B1** for each	
			Total	**2**		
88	a		They have subtracted 6	1		Do not allow contradictions **Response Mark** Subtracted 7 **1** The error Darcie has made is they have subtracted 7 whereas they needed to do the opposite **1** They moved the equation to the other

					side $4x = 17 – 6$ they should have added 6 onto 17 **1** $4x = 17 – 6$ **1** They have subtracted 17 – 6 instead of adding 6 to 17 **1** $4x$ isn't equal to 17 – 6, $4x – 6$ is equal to 17 *first part is correct, second part is irrelevant not a contradiction* **1** Darcie hasn't worked out the right way as they have subtracted 6 from 17 **1** It should be $4x = 17 + 6$ **1** On the 2nd part where it says $4x = 17 – 6$ wrong they shouldn't have subtracted 6 from 17 **1** They should have added 6 to 17 **1** **bod** Darcie did not add 6 **0** $4x = 17 + 6$ $4x = 23$ $x = 5.75$ with no further explanation **0** They should have added 6 **0** You need to do the same to both sides **0** Darcie got the answer wrong because it is $x = 5.75$ *need to see a reason* **0** They subtracted 6 from 17 when it's supposed to equal 17 **0** They weren't supposed to subtracted them *do they mean* $4x – 6$ *or* $17 – 6$ **0**
	b		They have used 27 as the initial velocity and 6 as the final velocity	1	Accept u and v if clear $u = 6$ and $v = 27$ **Response Mark** $v = 27$ not u (or $u = 6$ not v) **1** They put 27 in the place of the u and not the v (or 6 in the place of the v and not the u). It's meant to be $27 = 6 + (a \times 5)$ not $6 = 27 + (a \times 5)$ **1** Initial velocity not 27 **1** v not initial velocity **1** They didn't substitute properly they put 27 m/s for initial velocity (or 6 m/s for final velocity) **1** They have written the final velocity (or initial velocity) down in the equation in the wrong place which therefore makes their calculation wrong **1 bod** They have used the 27 m/s (or 6 m/s) when that is the velocity, they were using the wrong numbers **0** They substituted the formula wrong

					not enough **0** It should equal 27 not *v* (or 6 not *u*) *'it' isn't enough* **0**	
			Total	**2**		
89			Open circle above 0 Arrow pointing left	1 1		For 2 marks, arrow may be of any length but must start at 0, mark intent For the arrow accept a line starting at 0 and reaching $^{-}4$
			Total	**2**		
90			$6x + 2$ final answer	4	**M2** for $24x + 8$ **isw** or **M1** for $8x - 1 + 9x + 3 + 7x + 6$ **M1** for *their* '$(24x + 8)$' $\div 4$	Must be an algebraic expression in the form $ax + b$ $b \neq 0$
			Total	**4**		
91			$5x^2 + 16xy + 3y^2$ final answer	3	**M2** for three correct terms from $5x^2 + 15xy + [1]xy + 3y^2$ or **M1** for two correct terms in the expansion above	More than 4 terms mark the worst 4 Accept values in a grid $16xy$ is 2 terms Do not accept for M2 or M1 $5x3y$, $5xx$, $3yy$, $1x1y$ unless processed further
			Total	**3**		
92	a		35	1		Ignore extras 35, 43, 51 even if incorrect

	b		Add 8	1	May be seen on diagram with no contradiction on answer line **Response Mark** +8 *in the answer space* **1** Add 8 **1** Up 8 **1** +8 on diagram, answer space blank **1** 8 × 5 – 5 *refers to the 5th term* **1** 8*n* – 5 alone *not an explanation* **0** Gap of 8 *quantity but no direction* **0** Took 11 from 3 to work out the difference and then added it onto 27 **0** +8 on diagram, answer in answer space mark answer line **See answer line**	Needs quantity and direction
			Total	**2**		
93	a		30 final answer	2	**M1** for 81 + 9 implied by 90 or *their* (81 + 9) ÷ 3 or 30 × 3 = 90 – 9 = 81 **oe**	
	b		$y = 3x - 9$ final answer	2	**M1** for final answer $3x - 9$ or $y = 3x + 9$ or $y = kx - 9$ ($k \neq 0$) or $y = 3x - c$ where $c > 0$ final answer or $x = 3y - 9$ If **0** scored **SC1** for $x = \frac{y+9}{3}$ **oe** final answer	Accept throughout *y* on right e.g. $3x - 9 = y$ Accept throughout $x \times 3$ or $x\ 3$ or $x \times k$ but not x^3 Accept $y = 3(x - c)$ where $c > 0$ $3x - 9y$ scores 0 $x = 3x - 9$ scores 0 Do not accept arrows e.g. 3 → × *x* → − 9 → *y*

			Total	**4**		
94			20	3	**B1** for [median =] 2.5 **M1** for *their* median × 10 – 5	Accept only 20 for 3 marks If 3 (mode) or 2.25 (mean) or other wrong value from 1 to 3 used **M1** still available.
			Total	**3**		
95			5 nfww	4	**B2** for [*a* =] 8 or **M1** for 9*a* = 72 or better and **M1** for showing substitution/use of their *a* e.g. 4 × *their* 8 + 8*b* = 72 oe or better or [*b* =] (18 – *their* 8)/2	If another value for *a* is used to find *b* do not award B2 T&I only scores if ending at 8 or better may be e.g. *a* + 2*b* = 18 or $\frac{72-4\times \textit{their } 8}{8}$
			Total	**4**		
96			[*x* =] −2 [*y* =] 3	3	**M1** for correct method to eliminate one variable **B1** for *y* = 3 **B1** for *x* = –2 If 0 scored **SC1** for a pair of values that satisfy one of the original equations	Allow one arithmetic error in subtraction of terms or in rearrangement If previously rearranged must be correct rearrangement
			Total	**3**		
97	a			1		

						May be at the end of the sequence
	b		22 Add 3 [each time] or goes up in 3s oe or $3n - 2$ oe or correct calculation leading to 22 using 8, 7, 7 or values from given terms e.g. 8 + 7 + 7 or 3 × 7 + 1 or 13 [dots] and 9 [dots] or [1, 4, 7, 10, 13] 16, 19, 22	1 1		Ignore a drawing Mark the best part if no contradiction 8 + 7 + 7 may be 7 on right two columns and one more on left oe 3 times previous pattern number + 1 oe
			Total	**3**		
98	a		$12a$ final answer	1		Condone poor algebra e.g. 12 × a and a × 12 but not a^{12}
	b		$\frac{1}{3}x^3$ or $\frac{x^3}{3}$ final answer	2	**B1** for $\frac{1}{3}x^k$ $k \neq 0$ or gx^3 $g \neq 0$ as answer	Condone 1 before term in x Allow $\frac{x^4}{3x}$ and $\frac{2x^3}{6}$ for B1
			Total	**3**		
99	a		13 $^-3$	2	**B1** for each	
	b		Correct curve	3	**B2FT** for 7 or 8 points accurately plotted	Tolerance ± $\frac{1}{2}$ small square radially

					or **B1FT** for 5 or 6 points accurately plotted	
	c		⁻1.7 or ⁻1.8 1.7 or 1.8	2 FT	Strict **FT** **B1** for either **FT** *their* graph	If curve is between 2 grid lines accept either value as correct answer Do not accept answers to morethan 1d.p. Do not allow ±√3 or answers with no graph
			Total	**7**		
100			[137] 91 93 279 in any order With correct working	5	**M3** for 5*x* and 465 or for (150 × 4 – 137 + 2) ÷ 5 **A1** for 93 or **M2** for a correct algebraic expression and correct constant or for 150 × 4 – 137 [+ 2] or for 137 + 91 + 93 + 279 = 150 × 4 oe or for trials leading to the correct answer	"correct working" requires at least **M2** 150 × 4 can be implied by 600 throughout e.g. 137 + *x* – 2 + *x* + 3*x* and 600; 5*x* – 2 and 463 Do not accept *x*, 3*x* or *x* – 2 as correct algebraic expressions for **M2** Condone e.g. 137 + *x* – 2 +

					or **M1** for 137 + x – 2 + x + 3x nfww or 150 × 4 or 600 If **0** or **1** scored, instead award **SC2** for 91, 93, 279 in any order with no or insufficient working If **0** scored, **SC1** for [x =] 93	x + 3x ÷ 5 for **M1** Mark to candidate's advantage
			Total	**5**		
101	a		2t final answer	1		Accept 2 × t Condone t2
	b		$y(y - 5)$ final answer	1		Accept e.g. 1y(y – 5), (y – 0)(y – 5) Condone final bracket missing
			Total	**2**		
102	a		3	2	**M1** for (160 – 85) ÷ 25	Condone 160 – 85 ÷ 25 for **M1**
	b		10:35 [am] with correct working	5	**M1** for 5 × 25 + 85 oe **A1** for 210	"correct working" requires evidence of at least **M1 M1**

					M1 for *their* 210 correctly converted into hrs and mins or decimal hours soi by 3 h 30 m or 3.5 [h] **M1** for 2:10 – *their* time If **0**, **1** or **2** scored, instead award **SC3** for answer 10:35 [am] with no working or insufficient working If **0** or **1** scored, instead award **SC2** for 3 h 30 m or 3.5 [h] with no working or insufficient working If **0** scored, **SC1** for 210 with no working or insufficient working	Provided *their* 210 is not a multiple of 60 Do not accept 3.3 hours as a correct conversion from 3 h 30 m, but condone 3.3 used in the next step *Their* time may be in whole hours, minutes, hrs and mins or decimal hours
			Total	**7**		
103			$x \leq 5$ AND	4	**B2** for $x \leq 5$ or **M1** for $3x \leq 11 + 4$ or better or $x - \frac{4}{3} \leq \frac{11}{3}$ or better	<u>Solution to inequality</u> Allow **M1** for this expression with other inequality symbols or equals sign or [$x =$] 5 as solution (can be implied by

						mark/circle on the diagram) or trials leading to selection of 5 or final correct trial using 5
					AND	<u>Displaying the solution:</u>
					B2FT for *their* inequality correctly shown or **B1FT** for correctly placed circle for *their* $x \leq 5$, but with hollow circle and correct arrow or for filled circle with incorrect arrow	Display must show an inequality that fits on the number line for FT Mark to candidate's advantage either $x \leq 5$ or *their* inequality Accept an arrow of any length or a line reaching 1 <u>If no solution to inequality seen:</u> Filled circle at 5 arrow to left **M1B2** Filled circle at 5 arrow to right **M1B1** Hollow circle at 5 arrow to left **M1B1** Hollow circle at 5 arrow to right **M1B0** Mark at 5 no line or arrow **M1B0** Circle and/or arrow at other than 5 **M0B0**
			Total	**4**		
104	a		$x + 160$	1		

	b		200 nfww	4	**B1** for $5x$ **M1** for $5x$ = *their* (x + 160) **A1FT** for x = 40	*their* (x + 160) cannot be numeric and must lead to an equation that can be solved when equated to $5x$ e.g. if *their* (x + 160) is $5x$ then M0 FT correctly solving *their* linear equation in x
			Total	**5**		
105	a		$x^2 + 3x + 5x + 15$ [= $x^2 + 8x + 15$] Taylor with a correct statement about definition of an identity or of an equation or Taylor with correct supporting work and statement	M1 B1	<u>Alternative Method</u>	May be seen in the work space or within their statement and it might be seen in e.g. a table where the addition can be implied e.g. an identity is true for all values of x or e.g. this cannot be solved to get a value of x or e.g. left-hand side is the same as the right-hand side Accept "neither, because if it was an identity then it would have ≡"

					M1 for shows LHS = RHS for at least three values of *x* **B1 dep** for Taylor with *their* correct statement e.g. a quadratic equation does not have three solutions [so by elimination it is an identity] **Response for the B marks Mark** 1 Taylor – the expression before and after the equal sign are the same (*'same' implies identical in form*) **1 'same' implies identical in form** 2 Taylor – $(x + 3)(x + 5)$ is the same as $x^2 + 8x + 15$ **1** 3 Taylor – the statement in the box doesn't gives a value, an equation would be to find a specific number **1** 4 Identity – $(x + 3)(x + 5)$ has the same answer expanded as $x^2 + 8x + 15$ (*condone identity instead of Taylor*) **1** 5 Taylor – they are written differently but are equal to the same (*this is ok to score as they have clarified that the 2 sides are the same but in different forms*) **1 BOD** 6 Taylor – $(x + 3)(x + 5)$ is equal $x^2 + 8x + 15$ when expanded **0** 7 Taylor there is nothing to work out (*not enough*) **0** 8 Taylor – it is identifying how each formula is equal to each other (*equal to each other is not enough*) **0** 9 Taylor – you're not asked to work anything out, it gives you the answer (*they say you're not say you're not asked to work it out rather than saying it cannot be solved*) **0**
	b		$(x + 9)(x – 2)$	M2 B1FT	For M2 or M1 condone omission of final bracket

			$^-9$ and 2 final answer		**M1** for $(x + a)(x + b)$ where $a + b = 7$ or $ab = {}^-18$ or for $x + 9$ [= 0] and $x - 2$ [= 0] **strict FT** for correct solutions from *their* quadratic factors If 0 scored **SC1** for answer ±2 and ±9	e.g. $(x + 5)(x + 2)$ as $a + b = 7$ or e.g. $(x - 9)(x + 2)$ as $ab = {}^-18$ e.g. FT $x = {}^-5$ and $x = {}^-2$ from $(x + 5)(x + 2)$
			Total	**5**		
106	a		$3x + 15$ final answer	1		
	b		$t = \frac{r+3}{5}$ or $t = \frac{r}{5}+\frac{3}{5}$	2	**M1** for $r + 3 = 5t$ or for $\frac{r}{5} = t - \frac{3}{5}$ or for answer $\frac{r+3}{5}$ or $\frac{r}{5}+\frac{3}{5}$ or for correct step to answer after incorrect first step shown	
			Total	**3**		
107	a		11 and 2	2	**B1** for each	
	b		Correct curve	3	**B2FT** for 6 or 7 correct plots **B1FT** for 4 or 5 correct plots	Tolerance ±1 small square for plotting and curve through correct points Condone slight feathering – must not be ruled If large blob for plot, check centre of blob
	c		$^-2.5$ to $^-2.4$ and 2.4 to 2.5	2FT		

					Strict FT **B1** for either FT *their* graph	Tolerance ±½ a small square Do not allow exact answers or answers with no graph Do not FT from a straight line graph If more than 2 intersections, **B1** for each correct intersection on the answer line. If more than 2 answers, mark the worst
			Total	**7**		
108			55 with correct working	6	**M1** for $3x - 10 = 2x + 35$ **M1dep** for $\pm x = k$ or $kx = \pm 45$ ($k \neq 0$) **A1** for $x = 45$ OR **M1** for at least two trials of $3x - 10$ or evaluated for $x = 45$ **M1** for at least two trials of $2x + 35$ or evaluated for $x = 45$ **A1** for both expressions evaluated as 125 when $x = 45$ AND **M1** for 3 × *their* $x - 10$ or 2 × *their* $x + 35$ **M1** for $y = 180 - (2 \times$ *their* $x + 35)$ **oe** If 0 scored **SC2** for answer	'Correct working' requires evidence of at least **M1** AND **M1** i.e. we expect to see a minimum of an equation or trials leading to $x = 45$ and the substitution

					55 with no working or insufficient working Or **SC1** for x = 45 with no or insufficient working	
			Total	**6**		
109			$x > 9$	3	**M1** for $3x - 12 > 15$ or $x - 4 > 5$ **M1** for next correct productive step FT *their* first step	For method marks condone incorrect inequality sign or 'equals'
			Total	**3**		
110	a		15	1		
	b		14	2	**M1** for ÷ 5 and + 2 **soi** or for 60 ÷ 5 = 12 **soi**	
			Total	**3**		
111			[d =] 1.9[0] [c =] 2.15 with correct working	5	**B4** for 1 correct answer with correct working OR **M1** for $4d + 3c$ = 14.05 **oe** **M1** for $2d + 5c$ = 14.55 **oe** **M1** for method to find a common coefficient, allow 1 arithmetic error	Accept other variables for d and c 'Correct working' requires evidence of at least **M1M1M1** Correct answers from trial and improvement score **5** If substitution method used: **M1** for correct rearrangement of equation

					M1 for correct method to eliminate 1 variable, allow one arithmetic error OR If **0** or **M1** scored instead award **SC2** for both answers correct with no or insufficient working Or **SC1** for two answers which satisfy one of the original equations	**M1** for correctly substituting into other equation A sign error is not an arithmetic error
			Total	**5**		
112			38	1		
			Total	**1**		
113	a		$8ad^3$ cao, final answer	2	**B1** for $8a$ or d^3 in final answer or correct answer seen and spoilt	**B1** for e.g. $8a \times d^3$
	b		$5x\ (9 - x)$ final answer	2	**B1** for $5(9x – x^2)$ or $x(45 – 5x)$ as final answer or correct answer seen and spoilt	Accept $5x(9 – 1x)$ Condone final bracket missing
			Total	**4**		
114		i	39	1		Condone further terms if correct
		ii	Added 8	1		Needs quantity and direction e.g. add 8,

						plus 8, + 8Not *n*[th] + 8
			Total	**2**		
115			4.5 final answer	2	**M1** for $8x = 41 - 5$ or better	Accept $4\frac{1}{2}, \frac{9}{2}$ or $\frac{36}{8}$ for **2** marks
			Total	**2**		
116			$\frac{32-1}{3}$ is not an integer	2	**M1** for $\frac{32-1}{3}$ or 31 and 34 **Response Mark** 32 is a multiple of 4 but 1 added on would make it 33 which isn't a multiple of 4 **2** Shows 10th term as 31 and 11th term as 34. 32 lies between 10th and 11th term **2** $3n + 1 = 32$ and so $3n = 31$ and so $n = 10.33\ldots$ which is not a whole number/integer **2** Shows 10th term as 31 and 11th term as 34 **1** Sequence starts at 1 and adds on 3 each time meaning it would be 34 not 32 **0** + 1 in $3n + 1$ **0**	Accept any full alternative methods or arguments
			Total	**2**		
117	a		$x \times x$ or $4(x + 3)$ seen $x^2 = 4x + 12$ or $x^2 = 4(x + 3)$ Correctly rearranging to $x^2 - 4x - 12 = 0$ without error	M1 M1dep A1	Dependent on first **M1** and not from rearrangement of original equation	Allow [area of] square = x^2 or [area of] rectangle = $4x + 12$ x^2 and/or $4x + 12$ may be written with correct shape(s)
	b		$^{-}2$ 6 **nfww**	3		

<table>
<tr>
<td></td><td></td><td></td><td></td><td></td>
<td>B2 for one correct solution nfww

OR

M2 for $(x + 2)(x – 6) = 0$
Or M1 for $(x + a)(x + b)$ where $ab = -12$ or $a + b = ^-4$

OR

M2 for two correct trials using $^-4 \le x \le 0$ and two correct trials using $4 \le x \le 8$
Or M1 for two correct trials using $^-4 \le x \le 0$ or two correct trials using $4 \le x \le 8$

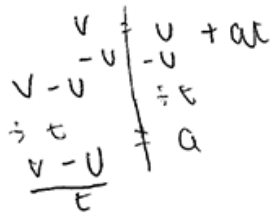
If 0 scored SC1 for answers 2 and $^-6$</td>
<td>e.g. one trial is when $x = 2$, $2^2 – 4 \times 2 – 12 = ^-16$
Accept as trial $x = 2$ and $^-16$
x
<table><tr><td>$^-4$</td><td>16</td><td>16</td><td>$^-12$</td><td>20</td></tr><tr><td>$^-3$</td><td>9</td><td>12</td><td>$^-12$</td><td>9</td></tr><tr><td>$^-2$</td><td>4</td><td>8</td><td>$^-12$</td><td>0</td></tr><tr><td>$^-1$</td><td>1</td><td>4</td><td>$^-12$</td><td>$^-7$</td></tr><tr><td>0</td><td>0</td><td>0</td><td>$^-12$</td><td>$^-12$</td></tr></table>
<table><tr><td>4</td><td>16</td><td>$^-16$</td><td>$^-12$</td><td>$^-12$</td></tr><tr><td>5</td><td>25</td><td>$^-20$</td><td>$^-12$</td><td>$^-7$</td></tr><tr><td>6</td><td>36</td><td>$^-24$</td><td>$^-12$</td><td>0</td></tr><tr><td>7</td><td>49</td><td>$^-28$</td><td>$^-12$</td><td>9</td></tr><tr><td>8</td><td>64</td><td>$^-32$</td><td>$^-12$</td><td>20</td></tr></table></td>
</tr>
<tr>
<td></td><td>c</td><td></td><td>Length [of square] cannot be negative</td><td>1</td>
<td>Dependent on negative answer in (b)</td>
<td>Do not accept x cannot be negative</td>
</tr>
<tr>
<td></td><td>d</td><td>i</td><td>36</td><td>1</td>
<td>FT (their positive root from (b))^2</td>
<td>If two positive roots seen in (b) accept either or both used in (d)(i) and in (ii)
BUT, if one answer right and one wrong in any part, 0 marks</td>
</tr>
<tr>
<td></td><td></td><td>ii</td><td>9</td><td>1</td><td></td><td></td>
</tr>
</table>

					FT (*their* positive root from **(b)**) + 3	
			Total	**9**		
118			$3p + 5h$ final answer	2	**B1** for $3p$ or $5h$ seen	
			Total	**2**		
119	a		$y \geq 3x$ cao	1		Do not accept extras
	b		$3x = 9$ cao	1		Do not accept extras
	c		$2x + y$ cao	1		Do not accept extras
			Total	**3**		
120			$b = \frac{A+3c}{2}$ **oe**	2	**M1** for $\frac{A+3c}{2}$ **oe** or correct first step e.g. $A + 3c = 2b$ or $\frac{A}{2} = \frac{2b}{2} - \frac{3c}{2}$ or for next correct step towards isolating b following first error	Note $b = \frac{-3c-A}{-2}$ **oe** is correct e.g. Following $2b = A - 3c$ $b = \frac{A-3c}{2}$
			Total	**2**		
121	a		$5(x - 4)$	1		Condone missing final bracket

Examiner's Comments

This question was not understood by

					the majority of candidates. More confident candidates went straight to the correct answer. Others tried to collect terms and $^{-}15x$ was sometimes seen, or they didn't deal with the constant term and just gave $5(x - 20)$.
	b		$7x\,(2 + x)$	2	**B1** for $7(2x + x^2)$ or $x(14 + 7x)$ | Condone missing final bracket **Examiner's Comments** As with part (a), this was not understood by the majority and a small minority did not attempt it. Where candidates seemed confident with algebra, partial factorisation was the usual error. Less confident candidates had more trouble. Some responded with $21x^3$ or $21x^2$ (some reached this and then squared the coefficient, giving $441x$), while others squared the 7 and wrote $14x + 49x = 63x$. Some candidates extracted a factor containing x, but then left x in both terms inside the bracket, e.g.$7x(2x + x)$.
			Total	**3**	
122	a		$v - u = at$ seen as single statement	1	Accept e.g. $-v + u = -at$ but not e.g. $\frac{v-u}{t} = at \div t$ **Examiner's Comments** Very few candidates were able to show that the rearrangement was correct. More than a third of candidates did not attempt the question.

					Algebraic errors were common. There were a number of misunderstandings, but in particular: • subtracting *t* from one or more terms • using arrows to indicate movement, with no processes being shown • writing added or subtracted terms under the formula with no clear steps seen. Exemplar 2  This type of layout is not often successful for this type of 'Show…' question. No clear step is seen in the rearrangement, e.g. $v - u = at$, which would have scored the mark.
	b		1.5 oe	2	**M1** for correct substitution $\frac{9-3}{4}$ oe e.g. $1\frac{1}{2}$ or $\frac{6}{4}$ or $\frac{3}{2}$ For **M1** accept a two-step evaluation with an arithmetic slip eg 9 – 3 = 5 followed by 5 ÷ 4 Do not accept $\frac{3-9}{4}$ for M1 **Examiner's Comments** More candidates were successful with using the given formula here in (b) than in (a). Around threequarters

					attempted the question. For those who did not score marks, the common error was substituting the values for v, u and t incorrectly. Many of these gave $\frac{3-9}{4}$, but the 4 was also sometimes misplaced.
			Total	**3**	
123	a	i	$7a$ final answer	1	Accept $7 \times a$ and $a7$ and $a \times 7$ **Examiner's Comments** Most candidates gave the correct response. However, misunderstandings with algebra were revealed by answers such as $6a^3$, $7a^3$, or $6a + a$.
		ii	$-x + 4 - 3y$ final answer	2	**B1** for $-x$ seen or $[+]4 - 3y$ seen in final answer Accept answer in any order **Examiner's Comments** This question saw many candidates score at least one mark, often for either $-x$ or $-3y + 4$ in their answer. Again, some poor algebra was seen in working, such as $^-x - 3y + 4 = {}^-4xy + 4 = 0xy$, or $^-3y + 4 = 1$, or $2x - 3x = 5x$.
	b		1	1	**Examiner's Comments** This was well done and was often accompanied by working. The common errors were $^-9$ and 9, although other numbers did occur.
			Total	**4**	
124	a		Expression	1	

					Examiner's Comments Candidates showed a lack of algebraic understanding here. The most common response was 'equation'.
	b		Equation	1	**Examiner's Comments** Candidates seemed to consider π as an algebraic term here rather than an irrational number. The most common response was 'Formula'. When 'Equation' was used in part (a), candidates appeared reluctant to repeat it in this part, rendering the mark inaccessible; these candidates generally responded with 'Expression' instead.
			Total	**2**	
125	a		$5x$ final answer	1	Do not accept $\frac{5x}{1}$ but condone $5x^1$ **Examiner's Comments** Candidates struggled to access this question and often gave a numerical response (e.g. '25'), or just rewrote the question in the form '$5x^2 \div x$'. There was little evidence that candidates understood that they should cancel common factors, using the same method as for numerical fractions.
	b		$x = 5y - 10$ or $x = 5(y - 2)$ final answer	2	**B1** for answer $5y - 10$ or $5(y - 2)$ or

					M1 for a correct first step $5y = x + 10$ or $y - 2 = \frac{x}{5}$ If 0 scored **SC1** for correct step to final answer FT incorrect first step SC only awarded for 2 step attempts **Examiner's Comments** Candidates showed a lack of knowledge or clear processes here. Most attempted multiple steps at once and when an error was made this often resulted in zero marks, since there was no correct first step seen, or no option to award 'correct' follow through from an incorrect first step to a second step if the first step isn't shown. Often, candidates just switched the *y* and the *x*.
			Total	**3**	
126	a	i	24	1	**Examiner's Comments** Almost all candidates responded to this correctly. A few wrote the nth term formula as the answer. Some gave more than just the next term.
		ii	No [because] 402 is not a multiple of 4 oe	1	1 No, it goes up in 4's the closest number to that is 400 [or 404] 1 2 No, if we kept adding 4 it would go 400 then 404. 1 3 No, 100 x 4 = 400 so 101 x 4 = 404 1 4 4 does not divide into 402 and 4 is the commonality of the sequence 1 5 the numbers are multiples of 4 1 6 No, not all even numbers will be in the sequence (not incorrect but not describing why 402 isn't in the sequence) 0 7 No, there will be no 02 in the

					number (not incorrect but not enough without saying why) 0 8 No, it goes up in 4s not 2s. 0 9 No, the sequence is going up in 4's. 0 **Examiner's Comments** The most successful candidates referred to 402 not being in the 4 times table. There were also many responses that stated '100 × 4 = 400 so the next would be 404'. Of the responses that could not be given, statements that it 'goes up in fours' without referencing 402 were common.
	b	i	8	1	**Examiner's Comments** Many candidates were able to identify the term-to-term rule to reach a correct answer. However, common errors were 7 and 6.
		ii	Multiply by 2 oe	1	1 each number is doubled. 1 2 X2 every time you go up. 1 3 I multiplied the next term x 2. 1 4 You double 4. 1 5 The terms keep adding itself to get the next number. 1 6 You add the number by itself to give the next number. 1 7 the number that is added on is doubled for the next number 1 8 +4 (accompanied with the correct patterns on the sequence oe is acceptable) 1 9 +4 (alone does not score) 0 10 Half each number. 0 **Examiner's Comments** Candidates with a correct response in (b) (i) almost always achieved the mark in this part. Those with an incorrect response in (b) (i) of 7 usually followed it with an explanation here suggesting they had only considered the later three terms shown and not the two decimal terms.

					Those with an incorrect response in (b)(i) of 6 usually here stated the term-to-term rule 'add 2', as if they were only considering the final two terms shown.	
			Total	**4**		
127			200 with correct working	6	**M1** for 2 (x + 2) = 3x – 4 oe **M1** for reaching $ax = b$ FT *their* equation **A1** for x = 8 OR <u>Trials</u> **M1** for one trial into 2(x + 2) and 3x - 4 evaluated correctly **M1** for two trials of 2(x + 2) and 3x - 4 evaluated correctly **A1** for [w =] 10 and [l =] 20 AND **M2** for (*their* x + 2) × (3 × *their* x – 4) or **M1** for (*their* x + 2) or (3 × *their* x – 4)	"Correct working" requires evidence of at least **M1M1A1** or alternate convincing approach FT from an equation with x on both sides only. *their x* must be a positive integer and stated *their x* or *their* length/width

					may be on the diagram If **0** or **M1** scored, instead allow **SC2** for answer 200 with no or insufficient working If **0** scored, instead allow **SC1** for $x = 8$ with no or insufficient working **Examiner's Comments** There were very few candidates that recognised the need to set-up and solve an equation here and very few marks were given. There was frequent evidence of very poor algebraic skills. Often a candidate would 'simplify' the expressions given in the question and state '$x + 2 = 2x$' and '$3x - 4 = -2x$'. Most candidates achieving marks did so for trial and improvement methods. Rarely was evidence seen to give marks for finding the value of x, but marks were given for substituting their value of x into the expressions for the width and length and subsequently multiplying these together. A few did reach 10 and 20, but not algebraically and so were given a maximum of 2 marks for multiplying their length of 20 by their width of 10. The most common misconception was to work with the area $(x + 2)(3x - 4)$ immediately.
			Total	**6**	
128	a		$x > 0.6$ or $x > \frac{3}{5}$ final answer	2	

					M1 for $5x > 12 - 9$ oe or for $x + 1.8 > 2.4$ oe or for answer 0.6 oe with or without equality or wrong inequality symbol	
					Examiner's Comments Fewer candidates were given 2 marks on this part compared to part (a). There was some confusion combining terms, for example reaching 14x > 12, as well as muddled inequalities containing an equals sign.	
	b		$(x + 4)(x + 3)$ - 4 and - 3	M2 B1FT	**M1** for $(x + a)$ and $(x + b)$ where $ab = 12$ or $a + b = 7$ for correct solutions from *their* quadratic factors If 0 scored **SC1** for answers ±4 and ±3	Condone final bracket missing Accept $(x + 4) = 0$ $(x + 3) = 0$ for M2 Allow correctly completed grid with +4 and +3 as headers for M1
					Examiner's Comments Few candidates were able to correctly factorise the quadratic, but those who did often gave the correct response. A common error following a correct factorisation was to give 3 and 4 rather than $^{-}3$ and $^{-}4$.	

			Total	**5**	
129			7 nfww	4	**M3** for $6p - 8$ and *their* $(6 \times 5 + 4)$ correctly used together or $34 + 8 = 6p$ or $(34 + 8) \div 6$ or $6 \times 7 - 8 = 34$ OR **M1** for $6 \times 5 + 4$ may be implied by 34 **M1** for $6p - 8$ or $34 + 8$ or for one correctly evaluated trial eg an equation with a first step to solve **Examiner's Comments** Many candidates reached the correct answer. Of those who did not, almost all were able to complete the first step of finding the output for function A of 34. Few candidates made errors when working back from this value with function B, although a common error was to subtract 8 from 34 rather than adding it. Few candidates resorted to using trials to find the value of p that gave the output 34; for those that did, it proved to be an inefficient method, although often successful.
			Total	**4**	
130			$10a - 5a^2$ final answer	2	**B1** for $10a$ or $-5a^2$ in final answer

					Examiner's Comments Many candidates were given both marks here. Those that received 1 mark usually received it for having 10*a* in their final response.
			Total	**2**	
131			$k = \frac{t+h}{2}$ oe final answer	2	**B1** for answer $\frac{t+h}{2}$ oe or **M1** for $t + h = 2k$ or $\frac{t}{2} = k - \frac{h}{2}$ For **2** oe allow $k = \frac{t}{2} + \frac{h}{2}$ or $k = 0.5t + 0.5h$ For **B1** oe allow $\frac{t}{2} + \frac{h}{2}$ or $0.5t + 0.5h$ $t - 2k + h = 0$ does not count as the first correct step **Examiner's Comments** Around a fifth of candidates scored 2 marks in this question and used standard techniques correctly to rearrange the formula. Most candidates did use k as the subject of their rearranged formula. Many attempted to rearrange the equation in one step, often producing the wrong answer. Where a first step was seen, $2k = t - h$ was a common error. Candidates were frequently unsure about how to deal with the constant 2. Answers of $k = 2th$ and $k = \frac{th}{2}$ were sometimes seen, as were $k = \frac{1}{2}t + h$ or $k = \frac{1}{2}t - h$.

					Roughly a fifth of candidates did not attempt this question.	
			Total	**2**		
132			37 with correct working	5	**M1** for $2x + 5 + 3x - 1 + x = 100$ may be implied by a subsequent correct equation **M1** for simplifying *their* equation to $ax + b = c$ or $6x + 4 = 100$ **M1** for the first correct step in solving *their* $ax + b = c$ and **M1** for substituting *their* 16 into $2x + 5$ OR	"Correct working" requires evidence of first method and at least **M1** and $x = 16$ or **M3** if using trials or **M2M1** for non-algebraic method Three separate expressions are not enough Ignore inclusion of % in working $6x + 4 = 100$ scores **M1M1** e.g. $6x = 100 - 4$ $6x = 96$ scores M1M1M1 For **M** marks with trials: allow each term or each expression from the question evaluated separately

						e.g. (Use 10) 20 + 5 + 30 – 1 + 10 = 64
					M3 for one complete correct evaluation of $2x + 5 + 3x - 1 + x = 100$	or 25 (+) 29 (+) 10 = 64
					or	<u>Alternative method (Non algebraic)</u>
					M2 for one complete correct evaluation of $2x + 5 + 3x - 1 + x =$ a total	**M2** for 100 – 5 + 1 oe
					or	or
					M1 for one correct evaluation of each expression $2x + 5$ [+] $3x - 1$ [+] x	**M1** for – 5 + 1 or – 4
						AND
					If **0**, **1** or **2** scored, instead award	
					SC3 for answer 37 with no or insufficient working	**M1** for *their* (100 – 5 + 1) ÷ 6
						AND
					If **0** or **1** scored, instead award	
					SC2 for $x = 16$ with no or insufficient working	**M1** for substituting *their* 16 into $2x + 5$
					<u>Examiner's Comments</u>	

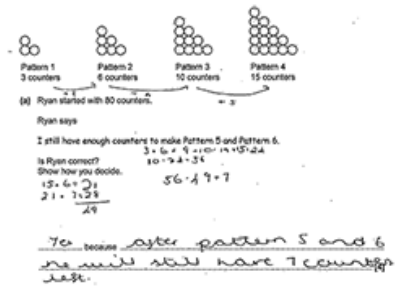
					Just less than half of candidates responded to this question. Very few gained part marks. Some candidates formed a correct expression by adding the given expressions but didn't use this to form an appropriate equation and so didn't proceed constructively with this question. Those candidates who did form an appropriate equation often achieved at least 3 marks by solving this equation accurately, but a small number didn't complete a correct first step when solving their equation. Some candidates reached $x = 16$ as their solution but didn't substitute this value back into the expression for short words. Some candidates tried trial and improvement and substituted a value for x in one or all the expressions, but often did not give a total for the three expressions. Many could not make the link between the whole book and 100%. Much poor algebra was seen, such as $2x + 5 = 7x$ and $2x + 5 = 3x - 1$.
			Total	**5**	
133	a	i	12a final answer	1	Accept $12 \times a$ or $a12$ or $a \times 12$ **Examiner's Comments** Most candidates gained the mark here. The common error was $7a$, but $3 \times 4 \times a$ was also seen.
		ii	b^4 final answer	1	Do not accept b4 but BOD if 4 appears raised above the base of b

					Examiner's Comments This was reasonably well answered, but weaker responses often gave 4*b* as the answer.
		iii	c^6 final answer	1	Do not accept c6 but BOD if 6 appears raised above the base of c **Examiner's Comments** This part showed a similar pattern of response to part (a)(ii). c^8 was the common error.
	b		3(3 − 2*y*) final answer	1	May be 3 × (3 – 2*y*) or –3(–3 + 2*y*) **Examiner's Comments** Less able candidates did not do well on this question. The common wrong answer was 3*y*, which indicated poor understanding of the topic.
			Total	**4**	
134	a		(*x* + 6)(*x* + 4) final answer	2	**M1** for (*x* + *a*)(*x* + *b*) where *a* + *b* = 10 *or ab* = 24 or for *x*(*x* + 4) + 6(*x* + 4) or *x*(*x* + 6) + 4(*x* + 6) Condone (*x* + 6)(*x* + 4) = 0 and (*x* + 6)(*x* + 4) = y for 2 marks **Examiner's Comments** Many candidates attempted this

					question, but often attempted to factorise into a single bracket and gave responses such as $x(x + 10) + 24$. Some candidates had knowledge of the requirement of factor pairs of +24, but often did not know how to use these correctly. Responses commonly awarded the M1 were $(x + 12)(x – 2)$ and $(x + 8)(x + 3)$.
	b		–6 and –4	1	**FT** *their* (a) dep on two brackets | Allow correct solutions if part (a) incorrect **Examiner's Comments** Those candidates who scored full marks in part (a) were rarely able to give a correct answer here in part (b); +4 and +6 were often given as *their* roots. Very few follow-through marks could be given, as most responses in part (a) were single bracket responses.
			Total	**3**	
135	a		18	1	| **Examiner's Comments** A high proportion of candidates understood the requirement of inverse operations. The most common error was to give "$x = \frac{6}{3} = 2$".
	b		−7	1	| **Examiner's Comments** The majority of candidates identified

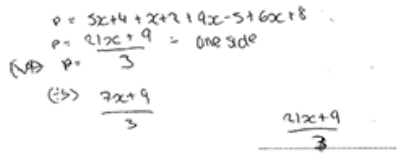
					division as the inverse operation needed here. The common error was to ignore the negative and give $x = 7$. Candidates who didn't identify division as the inverse operation generally responded with '$x = ^{-}14 + 2 = ^{-}12$' or '$x = ^{-}14 - 2 = ^{-}16$'.
			Total	**2**	
136	a		No and 83 **oe** or No and 49 and 46 or No and 25 and 28	4	**M3** for 3 + 6 +10 + 15 + *their* 21 + *their* 28 — implied by 83 or for *their* 21 + *their* 28 and 80 – *their* 34 — implied by 49 and 46 or for 80 – (*their* 21+15+10+6+3) and *their* 28 — implied by 25 and 28 or — *their* 21 > 15 and *their* 28 > their 21 **B2** for 21 and 28 — B2 implied by 49 or **B1** for 21 or 28 **OR** **M2** for 80–(*their* 21+15+10+6+3) or 80–*their* 34 — M2 implied by 25 or 46 or **M1** for [80−] 3 + 6 +10 + 15 — M1 implied by 34 **Examiner's Comments** Candidates accessed this question in numerous ways.

					Almost all candidates attempted to find the number of counters needed for patterns 5 and 6. The most common methods to then reach the answer were to find the total counters needed (i.e. 83), or to find the number of counters remaining after pattern 4 and the total counters needed for patterns 5 and 6, then compare them. Many candidates made basic arithmetic errors in both addition and/or subtraction, but many showed their method and in most cases were able to score M2 or M3. The subtraction 80 – 34 was often seen as 56. Some candidates chose to draw the patterns out, but then often miscounted their counters. Some candidates added the pattern numbers (i.e. 5 and 6) instead of the counters needed for those patterns.  **Assessment for learning** This question is a ‘Show how you decide’ question. If calculations aren’t shown, then only correct numbers can imply method, as stated in the mark scheme. Candidates must show the comparison figures, not just make a statement. They do not need to write an extensive justification; the expected justification will be in their figures. Exemplar 2

					 This candidate adds the given numbers 3, 6, 10 and 15 in stages, but with a numerical error (they reach 24). They then subtract this from 80 to get 56. The candidate correctly identifies 21 and 28 as the number of counters in patterns 5 and 6 counters, then adds them (to get 49). The candidate is given M3 for '*their* 21 + *their* 28 and 80 – *their* 34'.
	b	i	10 + 15 and 25	1	**Examiner's Comments** This question was answered well by candidates, with only basic arithmetic errors being made.
		ii	10	2	**M1** for recognition of square number pattern If 0 scored **SC1** for answer 11 | e.g. $\sqrt{144}$, 11×11, 36, 49, [64, …] **Examiner's Comments** Very few candidates were able to access this question. Many candidates did not provide a response. It was very rare to see a candidate identify the square number pattern in the final column of the table and not many candidates were able to write the continuing pattern from the table.

					Candidates often formed the equation $2k + 1 = 144$ and attempted to solve it, reaching 71.5 as an answer.
			Total	**7**	
137			2 8	2	**B1** for each **Examiner's Comments** Candidates found this question particularly difficult. Working seen was often in trials. Candidates that attempted the question often entered numbers without working. The most common mark given was B1 for the 2 on the left side of the identity. The 8 was more challenging to reach, due to the 'double negative' from expanding the bracket on the right of the identity. There was a high number of candidates who did not attempt this question.
			Total	**2**	
138	a		He has added 4	1	Do not allow contradictions **Response** For additional information refer to **2023 June (J56001) Mark scheme Appendix** within downloadable additional mark guidance. **Examiner's Comments** Many candidates realised the error, however some just showed how to solve the equation without pointing out the error as required.

	b		He has used 29 as the initial velocity	1	Accept *u* and *v* if clear *v* = 29 not *u* =29 | See appendices **Response** For additional information refer to **2023 June (J56001) Mark scheme Appendix** within downloadable additional mark guidance. **Examiner's Comments** Not many candidates were able to give the correct reason. Many referred to the acceleration and stated that it needed to be squared (almost certainly due to confusion with the units for acceleration). Other candidates referred to the use of brackets.
			Total	**2**	
139			Open circle above –2 Arrow pointing right	1 1	For 2 marks, arrow may be of any length but must start at –2, mark intent For the arrow accept a line starting at –2 and reaching 3 **Examiner's Comments** There seemed to be an understanding that ⁻2 was a key value, but many were unaware of how to record this on the diagram. When an open circle was placed correctly at ⁻2, the majority went on to score the full 2 marks. A variety of alternative annotations were seen, including an arrowhead above ⁻2, a closed circle, an additional circle at the right-hand end of a line, a mark/arrow above the correct point

					with no line, as well as arrows pointing in the wrong direction.
			Total	**2**	
140			$7x + 3$ final answer	4	**M2** for $21x + 9$ isw or **M1** for $5x + 4 + x + 2 + 9x - 5 + 6x + 8$ **M1** for *their* $(21x + 9) \div 3$ Must be an algebraic expression in the form $ax + b$ $b \neq 0$ **Examiner's Comments** There were few fully correct answers for this question and a significant number of candidates did not attempt it. Candidates should be encouraged to attempt all questions. Some candidates listed all the expressions but didn't attempt to add them together. Several did this correctly and scored 2 marks for $21x + 9$. Some knew they had to divide by 3 and scored the third mark for writing this. **Misconception** A common misconception is that $5x + 4$ can be simplified to $9x$, etc. Exemplar 1  This response has shown correct

					working for 3 marks. Had they correctly divided by 3, they would have scored all 4 marks.
			Total	**4**	
141			$3x^2 + 7xy + 2y^2$ final answer	3	**M2** for three correct terms from $3x^2 + 6xy + [1]xy + 2y^2$ or **M1** for two correct terms in the expansion above More than 4 terms mark the worst 4 Accept values in a grid $7xy$ is 2 terms Do not accept for M2 or M1 $3x2y$, $3xx$, $2yy$, $1x1y$ unless processed further **Examiner's Comments** Many candidates gave four terms in their expansion, with the $3x^2$ and $2y^2$ expressions often correct. A common error was to simplify $3x \times 2y$ to $5xy$. Even with the four correct terms, candidates frequently were unable to collect like terms together correctly, with various products of the four terms being attempted. **Misconception** A common misconception was simply to add the terms in the brackets, giving so $4x + 3y$.
			Total	**3**	
142	a		33	1	

					Ignore extras 33, 40, 47 even if incorrect **Examiner's Comments** The majority of candidates were successful at answering this part of the question.
	b		Add 7	1	May be seen on diagram with no contradiction on answer line | Needs quantity and direction For additional information refer to **2023 June (J56001) Mark scheme Appendix** within downloadable additional mark guidance. **Examiner's Comments** Many candidates gave the correct answer to this question. Common errors were to give the *n*th term rule. This alone is not an 'explanation' of how they got their answer, but if they went on to show the *n*th term being used for the 5th term then they were given the mark for an explanation. Another mistake was just to explain the method for any sequence and not explain what they had actually done; they referred to finding the difference, but not what the difference was.
			Total	**2**	
143	a		20 final answer	2	**M1** for 87 – 7 implied by 80 or *their* (87 – 7) ÷ 4 or 20 x 4 = 80 + 7 = 87 oe

					Examiner's Comments The majority of candidates gave the correct answer to this question.
	b		$y = 4x + 7$ final answer	2	**M1** for final answer $4x + 7$ or $y = 4x - 7$ or $y = kx + 7$ ($k \neq 0$) or $y = 4x + c$ where $c > 0$ final answer or $x = 4y + 7$ If **0** scored **SC1** for $x = \frac{y-7}{4}$ final answer Accept throughout y on right e.g. $4x + 7 = y$ Accept throughout x x 4 or x 4 or x x k but not x^4 Accept $y = 4(x + c)$ where $c > 0$ 4x + 7y scores 0 $x = 4x + 7$ scores 0 Do not accept arrows e.g. 4 → xx → 7 →y **Examiner's Comments** Many candidates scored 2 marks. The common error was to confuse x and y.
			Total	**4**	
144			$y = 4x - 3$ final answer	2	Accept throughout y on right

					M1 for final answer $4x - 3$ or $y = 4x + 3$ or $y = kx - 3$ ($k \neq 0$) or $y = 4x - c$ where c > 0 If 0 scored **SC1** for final answer $x = \frac{y+3}{4}$	e.g. $4x - 3 = y$ Accept throughout $x \times 4$ or $x4$ or $x \times k$ etc but not x^4 $y = 4(x - c)$ $4x - 3y$ scores **0** Do not accept arrows e.g. $4 \rightarrow \times x \rightarrow 3 \rightarrow y$
					Examiner's Comments A good number of correct responses were seen. The inclusion of the multiplication symbol was condoned but some candidates included arrows and these were not. $4x - 3y$ was a common wrong answer and a minority answered $x = y$.	
			Total	**2**		
145			8 cao with correct working	4	**M1** for πr^2 [=] $4\pi r$ or πr^2 [=] $2\pi d$ **M1** for cancellation by π implied or factorising e.g. $\pi r(r - 4) = 0$ or $r(r - 4) = 0$	"Correct working" requires evidence of at least M1M1 FT *their* initial statement if possible Accept $\pi r^2 = 4\pi r$ followed by $r^2 = 4r$

						as showing cancelling
					A1 for [radius =] 4 [and 0]	Dependent on M1M1
					Trials using πr^2 and $4\pi r$ or πr^2 and $2\pi d$ or πr^2 and $2\pi r$ *or* πr^2 and πd	Must use same value substituted for *r* in both formulas Answers required
					M2 for two correct trials with $r \neq 4$	
					or two correct trials with first r ≠ 4 and then r = 4	
					or one correct trial with *r* = 4	
					or	
					M1 for one correct trial with $r \neq 4$	Dependent on M2 or M1
					A1 for [radius =] 4	
					If **0** or **M1** scored, instead award	with no working or insufficient working
					SC2 for answer 8 cao	
					If **0** scored, instead award	with no working or insufficient working

					SC1 for answer 4 [and 0] **Examiner's Comments** The modal response was no response. Some candidates did show the correct formulae but did not know what to do with them. Some attempted trial and improvement but did not always show clear substitution or consistent substitution of the same values in the area and circumference formulae. For some candidates, an attempted substitution of 360 was seen, suggesting a misunderstanding of the topic. Only the most able candidates tried to construct an equation between the two formulae.
			Total	**4**	
146			[*x*=] 5 and [*y* =] 4 or (5, 4) seen 3 × *their x* + [1 ×] *their y* 19	B1 M1 B1	Must be clearly identified/linked to *x* and to *y* May be on graph *Their x* and *their y* can be any values linked to *x* and *y* Clear substitution required in 3*x* + *y* **FT** their (*x*, *y*) Must see working for FT **Examiner's Comments** Very few candidates made a sensible attempt at this question. Some attempts indicated a lack of

					understanding of the solution of two equations being the point of intersection. Some solved the equations using algebraic methods. Some drew a line that they labelled '$3x + 2y$' but offered no solutions. Some put a mark at the point of intersection but did no more. Some candidates found $x = 5$ and $y = 4$ and gave the answer 19 but did not show a clear substitution of these values into $3x + y$ and so gained only 2 marks. Some stated a value for x and y that was not (5, 4). If they then showed a clear substitution into $3x + y$ and their answer was correct, they also gained 2 marks. In 'Show ...' questions candidates must show clearly all the steps of working required to get to the answer.
			Total	**3**	
147			−11 15 With correct working	3	**M2** for $(x + 11)(x – 15)$ or **M1** for $(x + a)(x + b)$ where either $ab = –165$ or $a + b = −4$ OR **M2** for 2 correct trials with any number or **M1** for 1 correct trial with any number "correct working" requires **M2** **M2** and **M1** may be implied by grids and other forms such as $x(x – 15) + 11(x – 15)$ Must see substitutions e.g. $5^2 – 4×5 – 165$ <u>Use of formula</u>

					M2 for $\frac{[-\,-]4 \pm \sqrt{([-]4)^2 - 4\times[1]\times-165}}{2\,[\times 1]}$ or better e.g. $\frac{4 \pm \sqrt{676}}{2}$ **M1** for formula with at most two errors If **0** scored, **SC1** for –11 and 15 with no working or insufficient working Do not award if wrong working **Examiner's Comments** A very small minority correctly factorised and found correct values for x. Trial and improvement was the favoured technique and a few scored a mark when clear substitution, and a result, was seen. Stating one of the solutions but showing no working scored 0 marks. Some, wrongly, tried to treat this as linear equation and no marks were scored for this. This topic was not well understood by most candidates.
			Total	**3**	
148	a		32	1	**Examiner's Comments** Many correct results were seen and 32 was a common answer. The incorrect answer of 2 was also frequently seen.
	b		10	1	**Examiner's Comments**

					Many gave the correct answer of 10 but 6 appeared frequently too.
			Total	**2**	
149		i	37	1	**Examiner's Comments** Many correct answers were seen but an incorrect answer of 2 was sometimes given. Candidates wrote down very little working.
		ii	5 cao	2	**M1** for either step reversed soi May be seen on diagram eg + 3, ÷ 4, 20 implies 17 + 3 or 17 + 3 ÷ 4 or answer 17.75 **Examiner's Comments** A good number of correct answers were seen, though fewer than in the first part. The common errors were 65, from taking 17 as the input, or 7.75 from ignoring the correct order of operations. Again, not much working was seen and quite a lot of candidates could not reverse the function machine.
			Total	**3**	
150			$3x + 3$	1	
			Total	**1**	