Mark scheme

Question			Answer/Indicative content	Marks	Guidance	
1			$3d^2 - 6d$	2	**B1** for $3d^2$ or $-6d$ **Examiner's Comments** Candidates were able to access both parts of this question. In part (b) partial marks were often credited for one correct term, $3d^2$ or $-6d$. In both parts many candidates gave an expression with only one term, having added or subtracted unlike terms. In part (a) 6x was commonly seen and in part (b) $-3d^2$. Exemplar 2  In this exemplar the candidate has correctly expanded the second part of the bracket as $-6d$, which scored B1. As seen in many responses, incorrect subtracting of the algebraic expression resulted in an incorrect answer of one term.	
			Total	**2**		
2			3.6 **oe**	3	**M2** for $6x + 4x = 27 + 9$ oe OR	e.g. $x = \frac{36}{10}$ oe

					M1 for $10x - 9 = 27$ or $10x = k$ or $6x = 36 - 4x$ or $kx = 36$ AND **M1** for $x = \frac{b}{a}$ FT *their* $ax = b$ seen **<u>Examiner's Comments</u>** Very few candidates gained full marks on this question. Most candidates struggled to use inverse operations and very few showed any kind of method to solve. The most common error made by candidates was attempting to remove the $-4x$ on the right-hand side of the equation by subtracting $4x$, rather than adding $4x$ to both sides. Very few candidates managed to progress the equation successfully beyond this first step. Marks were most often gained for either reaching 'a multiple of $x = 36$', or for reaching $ax = b$ followed by $x = \frac{b}{a}$. Occasionally both were seen together with $2x = 36$ and then $x = \frac{36}{2} = 18$.
			Total	**3**	
3			2, 3, 4	3	**B2** for 2 correct and no extras or all 3 correct and one extra OR **M2** for $2 \le x < 5$ or **M1** for $2 \le x$ or $x < 5$

					Examiner's Comments Few candidates showed a method to solve this double inequality. Very few candidates managed to write the inequality in terms of x. The most common attempt was to use substitution to find values that worked. These candidates often gave 3 and 4 but misread the inequality sign and missed 2, so scored B2.
			Total	**3**	
4			2	2	**M1** for 12 or $^-10$ or $4 \times 3 + 5 \times {^-2}$ **oe** — Not $12x$ or ^-10y **Examiner's Comments** Most candidates attempted this question and managed to score at least M1 for either calculating $4x = 12$ or $5y = -10$. Many candidates gave an incorrect answer of either 22 or −22, often from correct working. A small number of candidates reached the values of 12 and −10 but included the x and y in their answer as an expression, $12x - 10y$. Marks were not credited in this instance.
			Total	**2**	
5	a		$d = \frac{f-4}{5}$ or $d = \frac{f}{5} - \frac{4}{5}$	2	**M1** for $f - 4 = 5d$ or $\frac{f}{5} = d + \frac{4}{5}$ or $\frac{f-4}{5}$ or $\frac{f}{5} - \frac{4}{5}$ as answer **Examiner's Comments** Few correct answers were seen, the majority were unable to complete the first step correctly, with many shuffling the values and variables around to

					make a new formula without showing any understanding of algebraic rearrangement. Some showed a correct first step, for example writing '− 4' next to the formula but were unable to execute this correctly. The 4 was rarely subtracted from both sides, division by 4 was frequently seen.
	b		50	2	**M1** for 5 + 7.5 × 6 **<u>Examiner's Comments</u>** Although some candidates were able to give the correct answer, many were unable to answer this question. Most realised that a represents acceleration and *t* is time, but many did not know what *u* and *v* stand for. Confused by the units of acceleration, some squared 7.5 when substituting. Very few candidates gained just a method mark here as those who used the correct method almost invariably went on to arrive at the correct answer to score both marks.
			Total	**4**	
6			[a =] 19 [c =] 12 with correct working	5	**B4** for one correct answer with correct working OR **M1** for 4a + 5c = 136 oe **M1** for 3a + 2c = 81 oe **M1** for method to find a common | "Correct working" requires evidence of at least **M1M1M1** Correct answer from trial and improvement scores **5** Accept other variables for *a* and *c*

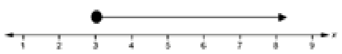
					coefficient, allow one arithmetic error **M1** for correct method to eliminate 1 variable, allow one arithmetic error OR If **0** or **M1** scored instead award **SC2** for both correct answers with no or insufficient working or **SC1** for two answers which satisfy one of the original conditions	If substitution method used **M1** for correct rearrangement of equation **M1** for correctly substituting into other equation A sign error is not an arithmetic error Do not allow 16.2[0] 16.2[0] for SC1
					Examiner's Comments Very few candidates attempted the algebraic route, preferring some incomplete trial and improvement. There was often no logical starting values and very few candidates substituted values into both conditions. A large number tried to make some progress by dividing the amounts (136 and 81) by various combinations of adults and children, e.g., 136 ÷ 9 or 81 ÷ 5. The most common mark was SC1 from two values in the answer that satisfied one of the conditions.	

			Total	**5**	
7	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 **Examiner's Comments** Several candidates were able to give the correct response for 2 marks. For others, the negatives proved a problem. Common responses such as $2r +- 5t$, $2r - 9t$ and $2r + 9t$ scored 1 mark.
		ii	a^5	1	**Examiner's Comments** There were many correct answers with $5a$ being a frequent wrong answer. $5a^5$ was also seen.
		iii	$7b^4$	1	**Examiner's Comments** This part was not as well answered as the first two parts, common incorrect answers were $7b$, and 7^5.
	b		$4(a - 3b)$	1	Allow 4(1a – 3b) and 2(2a – 6b) **Examiner's Comments** Many correct answers were seen. Candidates who did not know how to factorise often combined the terms in several ways with $-8ab$ being the most common, others included $48ab$.

			Total	**5**	
8	a		39	1	Ignore extras after 39 **Examiner's Comments** Generally, answers were correct.
	b		Add 8	1	Need direction and quantity **Examiner's Comments** Mainly correct responses were seen. A small number just stated they had found the difference but did not say that it was 8. Others mentioned 8 but did not say that they had added this to the previous term.
	c		The sequence is all odd numbers oe	1	For additional information refer to **2022 November (J56001) Mark scheme Appendix** within downloadable additional mark guidance. **Examiner's Comments** A wide variety of responses were seen here. Candidates who stated that all the terms in the sequence were odd, but 80 is even, almost always gave a clear enough explanation to score the mark. Many opted to take a more complex approach by looking at the difference and using it to find further terms in the sequence. These were sometimes successful, but many gave only partial explanations that did not fully explain why 80 does not appear.
			Total	**3**	
9	a		11 $^{-}$5	2	**B1** for each

					Examiner's Comments Several fully correct answers were seen. Many candidates scored 1 mark, usually for $^-5$. The first value was often $^-11$ or 21 from incorrectly dealing with the negative sign.
	b		Correct curve	3	**B2ft** for 7 or 8 points accurately plotted or **B1ft** for 5 or 6 points accurately plotted Tolerance ± $\frac{1}{2}$ small square radially 2 1 **Examiner's Comments** Many fully correct answers were seen. Those who attempted this question usually scored at least 1 mark for plotting the given points, with many plotting all the points and gaining 2 marks. Several did not join the points or did so with straight lines. Curves at times were feathered or missed the plotted points and for those who had errors they were not aware of the shape or symmetry of the quadratic curve they were aiming for.
	c		−2.3 or −2.2 2.2 or 2.3	2FT	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 more than 1d.p. Do not allow ± √5 or answers with no graph **Examiner's Comments** Candidates who realised the need to use the graph often gave the correct answer(s). With curves not drawn, candidates could not use their graph to solve the equation. Some did attempt

					to use algebra to work out values despite the question stating "use your graph".
			Total	**7**	
10	a		3	2	**M1** for (150 − 90) ÷ 20 — Condone 150 − 90 ÷ 20 for **M1** **<u>Examiner's Comments</u>** Many candidates gave the correct answer. A small number did not use the function machine in reverse.
	b		[0]9:45 [am] with correct working	5	**M1** for 6 × 20 + 90 oe **A1** for 210 **M1** for *their* 210 correctly converted into hrs and mins or decimal hours soi by 3 h 30 m or 3.5 [h] — "correct working" requires evidence of at least **M1 M1** **M1** for 1:15 – *their* time — 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 If **0**, **1** or **2** scored, instead award **SC3** for answer 9:45[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

					Examiner's Comments Many candidates were able to do the time conversion and the subtraction to score full marks. Many were able to correctly convert 210 minutes to 3.5 hours. A small number made errors and common conversions were 2 hours 10 minutes or 3.3 hours. Candidates need to check their answers are reasonable in the context of the question.
			Total	**7**	
11			$x \geq 3$ **AND** 	4	**B2** for x ≥ 3 or **M1** for $2x \geq 11 - 5$ or better or $x + 2.5 \geq 5.5$ or better AND **B2FT** for *their* inequality correctly shown or B1FT for correctly placed circle for *their* $x \geq 3$ but with hollow circle and correct arrow or for filled circle with incorrect arrow Solution to inequality Allow **M1** for this expression with other inequality symbols or equals sign or [x =] 3 as solution (can be implied by mark/circle on the diagram) or trials leading to selection of 3 or final correct trial using 3 Displaying the solution: Display must show an inequality that fits on the number line for FT Mark to candidate's advantage either $x \geq$ **3** or *their* inequality Accept an arrow of any length or a line reaching 9 If no solution to

					inequality seen: Filled circle at 3 arrow to right **M1B2** Filled circle at 3 arrow to left **M1B1** Hollow circle at 3 arrow to right **M1B1** Hollow circle at 3 arrow to left **M1B0** Mark at 3 no line or arrow **M1B0** Circle and/or arrow at other than 3 **M0B0** **Examiner's Comments** Some candidates gained full marks on this question. The hardest part for most candidates was displaying a solution. Some candidates were able to find the critical value of 3 but did not write it as an inequality.
			Total	**4**	
12			[127] 148 149 296 in any order With correct working	5	**M3** for 4*x* and 592 or for (180 × 4 − 127 − 1) ÷ 4 **A1** for 148 or **M2** for a correct algebraic expression and correct constant or for 180 × 4 − 127 [− 1] or for 127+148+149+296=180 ×4 oe or for trials leading to the correct answer or **M1** for 127 + *x* + *x* + 1 + 2*x* nfww or 180 × 4 or 720 If **0** or **1** scored, instead "correct working" requires at least **M2** 180 × 4 can be implied by 720 throughout eg 127 + *x* + *x* + 1 + 2*x* and 720; 4*x* + 1 and 593 Do not accept *x*, 2*x* or *x* + 1 as correct algebraic expressions for **M2**

					award **SC2** for 148 149 296 in any order with no or insufficient working If **0** scored, **SC1** for [x=]148 Condone e.g. 127 + x + x + 1 + 2x ÷ 4 for **M1** Mark to candidates advantage **Examiner's Comments** A variety of approaches were seen leading to the answer. A successful approach by some candidates was to form and solve an equation, others gained success using different approaches including trial and improvement. Many candidates were able to calculate the total as 720 to gain 1 mark. Several candidates did not attempt this question. Some wrote 127, x, x + 1 and 2x straight onto the answer line with no attempt to show any working.
			Total	**5**	
13	a		$2t$ final answer	1	Accept 2 × t Condone $t2$ **Examiner's Comments** This was generally answered well. Many candidates identified like terms correctly and followed addition and subtraction rules for combining these. The most common error was to only collect the positive terms resulting in an answer of $6t - 4t$.
	b		$x(x + 2)$ final answer	1	Accept e.g. $1x(x + 2)$, $(x + 0)(x + 2)$ Condone final bracket missing **Examiner's Comments**

					Many correct answers were seen. Some candidates did not identify the common factor. For those who did attempt factorisation, the most common error was trying to factorise into two brackets.
			Total	**2**	
14			30	3	**B1** for [median =] 3.5 **M1** for *their* median × 10 – 5 Accept only 30 for 3 marks If 4 (mode) or 3 (mean) or other wrong value from 1 to 4 used **M1** still available. **<u>Examiner's Comments</u>** Most candidates attempted the question. Many knew that the median was 3.5. Some candidates stated the median was 2, from not ordering the scores and some thought it was 4, being most common. Others found the mean or the total score. Most candidates did not substitute to show *S* = 10 × 3.5 − 5 but worked in stages showing 10 × 3.5 = 35 and then 35 − 5 = 30. The use of any value between 1 and 4 was credited for a method mark.
			Total	**3**	
15			5 nfww	4	**B2** for [a =] 4 or **M1** for 9*a* = 36 or better and **M1** for showing substitution/use of their a e.g. 4 × *their* 4 + 4*b* = 36 oe or better or [b =] 9 − *their* 4 If another value for *a* is used to find *b* do not award B2 T&I only scores if ending at 4 or better may be e.g. $a + b = 9$ or $\frac{36 - 4 \times their\ 4}{4}$ **<u>Examiner's Comments</u>** A number of candidates did not attempt

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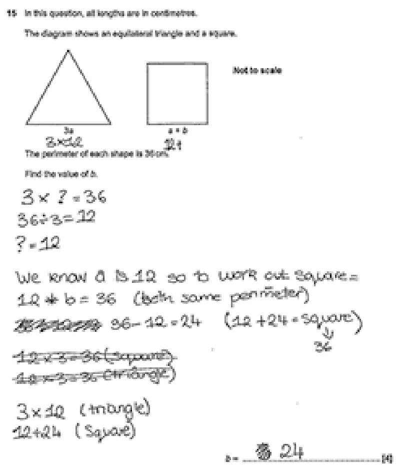
this question. Very few systematic solutions were seen. Very few correct algebraic solutions were seen. These might have begun with 9*a* = 36 but few did. Some candidates set up incorrect equations such as 3*a* = 36. Some candidates showed 36 ÷ 4 = 9 rather than 36 ÷ 9 = 4 that would have led directly to *a* = 4.

A common incorrect route that scored 0 marks was 36 ÷ 3 = 12 so *a* = 12 and then 36 − 12 = 24.

Using trial and improvement

Many candidates used a form of trial and improvement trying different values, usually with little success. They would have used their time more efficiently by planning a strategy that makes use of the given information.

Exemplar 2



This is a version of the common incorrect method described in the commentary on Question 15 that does not use the information correctly.

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<tr><td></td><td></td><td></td><td>Total</td><td>4</td><td colspan="2"></td></tr>
<tr><td>16</td><td></td><td></td><td>[x =] 4

[y =] −1</td><td>3</td><td>M1 for correct method to eliminate one variable
B1 for x = 4
B1 for y = −1
If 0 scored SC1 for a pair of</td><td>Allow one arithmetic error in subtraction of terms or in rearrangement

If previously rearranged must</td></tr>
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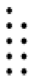
					values that satisfy one of the original equations	be correct rearrangement **Examiner's Comments** Many candidates answered this correctly. Sometimes these responses involved a correct method to eliminate one variable. Frequently candidates used a trial and improvement method which, as this was a relatively straightforward pair of simultaneous equations, yielded the correct solution relatively easily. Had the solutions been more obscure, the use of trial and improvement would have been a far more time consuming method to use. Some candidates tried to eliminate a variable by subtracting *y* only.
			Total	**3**		
17	a			1		May be at the end of the sequence **Examiner's Comments** Many correct diagrams were seen, a few carefully drawn. Some candidates had the correct number of dots but not the correct configuration.
	b		15 Add 2 [each time] or goes up in 2s oe or 2*n* − 1 oe or correct calculation leading to 15 using 7, 8, or values from given terms e.g. 7 + 8 or 2×7 + 1 or 8 [dots] and 7 [dots] or [1, 3, 5, 7, 9] 11, 13, 15	1 1		Ignore a drawing Do not accept "odd numbers" but accept "the eighth odd number" oe Mark the best part if no contradiction 8 + 7 may be 8 on left, one less on right 2 times previous pattern number + 1 oe

					Examiner's Comments Many candidates had the correct reason with the most popular being "add 2 every time". Some candidates then did not give 15 and 11 or 17 were common, possibly from miscounting. A few gave the reason as, "count the dots in the pattern" and some doubled pattern 4 and did not score any marks. Very few candidates used the *n*th term to find the number of dots.
			Total	**3**	
18	a		$6a$ final answer	1	Condone poor algebra e.g. $6\times a$ and $a\times 6$ but not a^6 **Examiner's Comments** Many candidates answered this correctly, however, candidates should be reminded that $6\times a$ can be simplified, although this response was credited as there was only 1 mark. The incorrect a^6 was seen along with $3a2$ and some other expressions.
	b		$\frac{1}{2}x^4$ or $\frac{x^4}{2}$ or $0.5x^4$ final answer	2	**B1** for $0.5x^k$ $k \neq 0$ or gx^4 $g \neq 0$ as answer Condone 1 before term in x Allow $\frac{x^5}{2x}$ and $\frac{2x^4}{4}$ for B1 **Examiner's Comments** Few candidates were able to accurately answer this question. Most candidates found it difficult and very few correct answers were seen. A few candidates scored a part mark for sorting out 0.5 or x^4. Some candidates incorrectly wrote $\frac{1}{2x^{a\ power}}$ which was not credited. The answers 8, $8x$ and 32 were common, all deriving from a misuse of 2^5.

			Total	**3**	
19	a		$x^2 + 4x + 3x + 12$ [= $x^2 + 7x + 12$] Ellis with a correct statement about definition of an identity or of an equation or Ellis with correct supporting work and statement	M1 B1	<u>Alternative Method</u> **M1** for shows LHS = RHS for at least three values of *x* **B1 dep** for Ellis with *their* correct statement e.g. a quadratic equation does not have three solutions [so by elimination it is an identity] 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 ≡" **Exemplar responses** **Response for the B marks** 1 Ellis – the expression before and after the equal sign are the same *('same' implies identical in form)* **1** 2 Ellis – (x + 4)(x + 3) is the same as x^2 + 7x + 12 **1** 3 Ellis – the statement in the box doesn't gives a value, an equation would be to find a specific number **1** 4 Identity – (x+4)(x+3) has the same answer expanded as x^2 + 7x + 12 *(condone identity instead of Ellis)* **1** 5 Ellis – 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 Ellis – (x + 4)(x + 3) is equal x^2 + 7x + 12 when expanded **0** 7 Ellis there is nothing to work out *(not enough)* **0**

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<tr><td></td><td></td><td></td><td></td><td></td><td>8 Ellis – it is identifying how each formula is equal to each other (equal to each other is not enough) 0
9 Ellis – you’re not asked to work anything out, it gives you the answer (they say you’re not asked to work it out rather than saying it cannot be solved) 0
<u>Examiner’s Comments</u>

The majority of candidates did not consider doing anything with the boxed statement so it was rare to see the brackets expanded correctly to gain the method mark. Few candidates were able to explain the features distinguishing an identity from an equation. A significant number of candidates thought that the presence of an = sign meant an equation and so identified Darcy as being correct. Responses that correctly stated Ellis/identity, were mostly not able to provide an acceptable reason. Many just said it was already answered.</td></tr>
<tr><td></td><td>b</td><td></td><td>$(x + 6)\ (x - 2)$

$^-6$ and 2 final answer</td><td>M2

B1FT</td><td>M1 for $(x + a)(x + b)$ where $a + b = 4$ or $ab = {}^-12$ or for $x + 6$ [= 0] and $x - 2$ [= 0]

strict FT for correct solutions from their quadratic factors
If 0 scored SC1 for answer ±2 and ±6

For M2 or M1 condone omission of final bracket

e.g. $(x + 1)(x + 3)$ as $a + b = 4$
or e.g. $(x - 3)(x + 4)$ as $ab = {}^-12$

e.g. FT $x = {}^-1$ and $x = {}^-3$ from $(x + 1)(x + 3)$

<u>Examiner’s Comments</u>

More candidates were able to make an attempt at this part than part (a) with a number of candidates able to factorise the quadratic successfully and subsequently solve it. After correct factorisation it was not uncommon to see the wrong signs in the solutions, i.e. $x = +6$ or $x = {}^-2$. Other attempts to factorise resulted in e.g. $(x + 4)(x - 3)$</td></tr>
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					gaining a method mark and some went on to earn a further mark for correctly stating the values of *x* for their factors. Candidates who did not know how to factorise a quadratic attempted other methods to solve the equation with some adding 12 and trying to solve *x*2 + 4*x* = 12. A few gave the correct solutions with no working which lost them 2 method marks.  The candidate has factorised the quadratic correctly. However, a common error when finding the solutions was to just copy the values from the brackets as in this case rather than writing out the next step of $x + 6 = 0$ or $x - 2 = 0$. Then solving these two equations to get the correct solutions of $x = {}^-6$ or $x = 2$. A total of 2 scored.
			Total	**5**	
20	a		$x + 140$	1	
	b		210 nfww	4	**B1** for 3*x* **M1** for 3*x* = *their* (*x* + 140) **A1FT** for *x* = 70 *their* (*x* + 140) cannot be numeric and must lead to an equation that can be solved when equated to 3*x* eg if *their* (*x* + 140) is 3*x* then M0 FT correctly solving *their* linear equation in *x* **<u>Examiner's Comments</u>** The most common outcome for this question was an incorrect answer in part (a) followed by part (b) not being

					attempted. The instruction to answer 'in terms of *x*' was widely not understood, with the vast majority of candidates giving numeric answers with no reference to *x*. Numeric answers were varied but included 140, 40 and 220. Some measured the angle despite the “Not to scale” instruction. The most common error for attempts to write the bearing in terms of *x* was 140*x* or stating $x = 140$. Occasionally letters such as S, B, SF, BF from the diagram were used. It was very rare that a candidate tried and answered part (b) correctly. Some attempted to use their numeric answers from part (a) and those who answered part (a) correctly struggled to continue through this part. It was very rare that candidates attempted to form and solve an equation in order to calculate the bearing, and 3*x* was only seen very occasionally. A common incorrect approach was multiplying the answer to part (a) by three. A rare answer of 210 generally was arrived at without using algebra.
			Total	**5**	
21	a		$5x + 10$ final answer	1	**<u>Examiner's Comments</u>** The vast majority of candidates gave the correct answer. However, a few approaches led to incorrectly multiplying out $5(x + 2)$ to give $5x + 2$, $2x + 5$, $5x + 7$ or $7x$. Others ignored the + sign giving $5(2x) = 10x$ or spoiled the correct answer, $5x + 10 = 15x$. A small minority attempted to solve as an equation: $5x = 2$ so $x = \frac{2}{5}$.
	b		$r = \frac{p+5}{3}$ or $r = \frac{p}{3} + \frac{5}{3}$	2	**M1** for $p + 5 = 3r$ or for $\frac{p}{3} = r - \frac{5}{3}$ or for answer $\frac{p+5}{3}$ or $\frac{p}{3} + \frac{5}{3}$ or for correct step to answer after incorrect first step shown

					Examiner's Comments Many candidates struggled with this question and far too many attempted to go straight to an answer without showing the step in between. A number of these got to an answer which contained either $p + 5$ or $p \div 3$ but without seeing the previous line of working method marks were lost. Some just swapped p and r, sometimes changing the sign too, which led to incorrect answers of $r = 3p - 5$ or $r = 3p + 5$. When there was evidence of using a balancing method, errors arose such as stating "+ 5" as a first step, but incorrectly processing this, often resulting in $5p = 3r$ as their first line of working. Some did go on to achieve M1 for correctly dividing by 3 as a second step, but often they ended up with $5p - 3 = r$ indicating a clear misunderstanding of inverse operations. Far less common was attempting to divide by 3 first but in nearly all cases candidates forgot to divide the 5 by 3 as well. **Assessment for learning** Some attempted to use a flow diagram, but many put p and r in the wrong place which led to the wrong answer. Centres need to instruct candidates that there are no method marks available for using a flow diagram so standard presentations need to be learnt and practised.
			Total	**3**	
22	a		$x \times x$ or $4(2x + 5)$ seen $x2 = 8x + 20$ or $x^2 = 4(2x + 5)$Correctly rearranging to$x^2 – 8x – 20 = 0$ without error	M1M1A1	**Dep**endent on first M1 and not from rearrangement of original equation Allow [area of] square = x^2 or [area of] rectangle = $8x + 20$

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<u>Examiner's Comments</u>

This question was rarely answered correctly. Few could construct the equation using the given expressions for lengths and forming areas. Many tried to find a solution from the given equation.</td></tr>
<tr><td></td><td>b</td><td></td><td>−2 10 nfww</td><td>3</td><td>B2 for one correct solution nfww

OR
M2 for $(x + 2)(x - 10) = 0$
or
M1 for $(x + a)(x + b)$ where $ab = -20$ or $a + b = -8$

OR
M2 for two correct trials using $-4 \le x \le 0$ and two correct trials using $8 \le x \le 12$
or
M1 for two correct trials using $-4 \le x \le 0$ or two correct trials using $8 \le x \le 12$

If 0 scored SC1 for answers 2 and –10</td><td>e.g. one trial is when $x = 2$, $2^2 - 8 \times 2 - 20 = -32$
Accept as trial $x = 2$ and –32

<table>
<tr><td>x</td><td></td><td></td><td></td><td></td></tr>
<tr><td>-4</td><td>16</td><td>32</td><td>-20</td><td>28</td></tr>
<tr><td>-3</td><td>9</td><td>24</td><td>-20</td><td>13</td></tr>
<tr><td>-2</td><td>4</td><td>16</td><td>-20</td><td>0</td></tr>
<tr><td>-1</td><td>1</td><td>8</td><td>-20</td><td>-11</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>-20</td><td>-20</td></tr>
</table>

<table>
<tr><td>8</td><td>64</td><td>-64</td><td>-20</td><td>-20</td></tr>
<tr><td>9</td><td>81</td><td>-72</td><td>-20</td><td>-11</td></tr>
<tr><td>10</td><td>100</td><td>-80</td><td>-20</td><td>0</td></tr>
<tr><td>11</td><td>121</td><td>-88</td><td>-20</td><td>13</td></tr>
<tr><td>12</td><td>144</td><td>-96</td><td>-20</td><td>28</td></tr>
</table>

<u>Examiner's Comments</u>

Few could correctly solve the equation. A small number of candidates gained marks for a correct root found by trial and improvement. As there were rarely solutions in this part.</td></tr>
<tr><td></td><td>c</td><td></td><td>Length [of square] cannot be negative</td><td>1</td><td></td><td></td></tr>
</table>

					Dependent on negative answer in (b) **Examiner's Comments** It could not often be answered.	Do not accept *x* cannot be negative
	d	i	100	1	**FT** (*their* positive root from **(b)**)^2 **Examiner's Comments** Very few thought of substituting values (even their incorrect ones) to find an area and length.	If two positive roots seen in (b) accept either or both used in (i) and in (ii) BUT, if one answer right and one wrong in any part, 0 marks
		ii	25	1	**FT** (*their* positive root from **(b)**) × 2 + 5	
			Total	**9**		
23			5 : 6 nfww	4	B3 for 5*kn* : 6*kn* *k* > 0 or equivalent correct unsimplified ratio seen OR **M1** for two ratios with a common number of mints implied by … : 10*k* **and** 10*k* : … seen, *k* > 0 with one correct ratio or 2.5n : 5 seen **A1** for 5*kn* : 10*k* : 6*kn*	Accept for all part marks *n* replaced by a consistent integer e.g. 2.5*n* : 3*n* or 5*n* : 6*n* or 10 : 12 etc May be seen as two separate ratios Eg 5*n* : 10 and 10 : 6*n* or 10 : 20 and 20 : 12 etc For **M1** the examples just require the common 10 or

					the common 20 etc **Examiner's Comments** Few candidates had techniques to solve this question. Some did write an answer, the most popular being 1 : 3 or 1n : 3n.
			Total	**4**	
24			$4t + 2u$ final answer	2	**B1** for $4t$ or $2u$ seen **Examiner's Comments** Responses here often managed 1 mark for one correct term, generally for 4t as it did not involve dealing with negatives. Responses of $4t – 8u$ were not uncommon, but answers of $4t2u$, – $6t$ – 8u and $4t + 8u$ were also seen.
			Total	**2**	
25	a		$a + 2b$ cao	1	Do not accept extras **Examiner's Comments** The responses to all parts were very patchy and it seemed as if many candidates might have been just making a random selection.
	b		$2y < x$ cao	1	Do not accept extras **Examiner's Comments** The best answered part, where many correctly identified an inequality.
	c		$2x = 5$ cao	1	

						Do not accept extras
			Total	**3**		
26			$w = \frac{P-2h}{2}$ oe	2	**M1** for $\frac{P-2h}{2}$ oe or correct first step eg $P - 2h = 2w$ or $\frac{P}{2} = \frac{2w}{2} + \frac{2h}{2}$ or for next correct step towards isolating w following first error **Examiner's Comments** This was poorly answered. Few candidates showed complete stages in their rearrangement and many went straight to a solution (often w = 2*P* + 2*h*). Some candidates wrote '÷ 2' but instead subtracted 2 from individual terms. Some candidates wrote '– 2*h*', but then added 2*h* to the left-hand side. Many incorrect methods were seen that disregarded algebraic rules, such as 'P = 2*w* + 2*h* (subtract 2 giving) *P* = *w* + *h*'.	Note $w = \frac{2h-P}{-2}$ oe is correct May be $\frac{P}{2} = w + h$ e.g. Following $2w = P + 2h$ $w = \frac{P+2h}{2}$
			Total	**2**		
27	a	i	36	1		Condone further terms if correct
		ii	added 7	1		Needs quantity and direction eg Add 7, plus 7, +7 Not *n*[th] +7
	b		$\frac{32-2}{4}$ is not an integer	2	**M1** for $\frac{32-2}{4}$ or 30 and 34	Accept any full alternative methods or arguments e.g. 32 is a multiple of

						4 and $4n+2$ is not a multiple of 4.
			Total	**4**		
28			[d =] 2.25 [c =] 1.7[0] with correct working	5	**B4** for 1 correct answer with correct working OR **M1** for $5d + 3c = 16.35$ oe **M1** for $2d + 6c = 14.7[0]$ oe **M1** for method to find a common coefficient, allow 1 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 answers correct with no or insufficient working or **SC1** for two answers which satisfy one of the original equations **<u>Examiner's Comments</u>** Few candidates realised the need to write equations, many just used trial and improvement with very few getting the correct answers. Candidates who realised the need to write equations often scored 2 marks.	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 correctly substituting into other equation A sign error is not an arithmetic error
			Total	**5**		
29	a		44	1		

	b		3.5 final answer	2	**M1** for 6y = 28 – 7 or better	Accept $3\frac{1}{2}$, $\frac{7}{2}$ or $\frac{21}{6}$ for 2 marks
			Total	**3**		
30	a		$6c^2d^2$ cao, final answer	2	**B1** for $6c^2$ or d^2 in final answer or correct answer seen and spoilt.	B1 for e.g. $6c^2 \times d^2$
	b		$7x(5 + x)$ final answer	2	**B1** for $7(5x + x^2)$ or $x(35 + 7x)$ as final answer or correct answer seen and spoilt	Accept $7x(5 + 1x)$ Condone final bracket missing
			Total	**4**		
31			10 nfww	4	**M1** for 5 × 4 **M1** for 200 or 199 used **M1dep** for *their* 200 ÷ *their* area, dep on first M1	nfww for 4 marks no errors in calculating values and at least one of 5, 4, 200 or 199 used Allow for 20 or for 4.9 × 4.1 [20.09] or with one unrounded value [19.6 or 20.5] Allow for 198.5 ÷ (4.9 × 4.1)
					<u>**Examiner's Comments**</u> Candidates who gained credit here multiplied length and width of the rectangle together, mostly using the exact dimensions of 4.9 and 4.1. A further mark was earned for dividing 198.5 (or their estimate of this) by the answer to their area. Some used perimeter, or just added together the length and width, scoring 0. Very few gained 3 or 4 marks here, since the key component of this question (to work out an **estimate** of the pressure) was largely ignored. This was another	

					question with a significant number of no response. **AfL** Candidates need to take particular note of key information written **in bold** in questions. When they see a question ask them to **estimate**, they should be rounding any values in the question to one significant figure before attempting any calculations.
			Total	**4**	
32	a		6 and ⁻3	2	**B1** for each **<u>Examiner's Comments</u>** Few were able to complete the table in this part fully correctly. A number of errors were seen, either due to the squaring or the use of negative numbers. Common errors included (0, 0), (⁻3, ⁻6), (⁻3, 12), (⁻3, 3) and (⁻3, ⁻3).
	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 **<u>Examiner's Comments</u>** Many appeared unfamiliar with drawing a quadratic graph as required in this part and a significant number of no responses were seen. Those plotting points usually did so correctly from their table, although a number of untidy plots involving 'large blobs' were seen. Few appreciated that these plots

					should be joined in a smooth continuous curve; some used straight lines, but many didn't join their points at all.
	c		$^-2.3$ to $^-2.2$ and 2.2 to 2.3	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. **<u>Examiner's Comments</u>** As this part relied on the drawing of a curve, correct methods and answers were rarely seen. Those who had drawn a curve did not appreciate that the line y = 2 also needed to be drawn in order to solve the equation by using the intersection points. A number of candidates attempted to solve this part using algebra, rearranging the equation to x^2 = 5 and some solved this to reach $x = \sqrt{5}$. However, as the question stated 'Use your graph', this was a method that did not gain credit.
			Total	**7**	
33			40 with correct working	6	**M1** for $x + 85 = 2x + 30$ **M1dep** for $\pm x = k$ or $kx = \pm 55$ ($k \neq 0$) **A1** for $x = 55$ or **M1** for at least two trials of x + "Correct working" requires evidence of at least **M1** AND **M1** ie we expect to see a minimum of an equation or trials leading to x = 55 and the substitution

					85 or evaluated for x = 55 **M1** for at least two trials of 2x + 30 or evaluated for x = 55 **A1** both expressions evaluated as 140 when x = 55 AND **M1** for *their* x + 85 or 2 × *their* x + 30 **M1** for y = 180 – (*their* x + 85) **oe** If 0 scored **SC2** for answer 40 with no working or insufficient working or **SC1** for x = 55 with no or insufficient working **<u>Examiner's Comments</u>** Almost all candidates did not identify that the intention of this question was to form an equation. A few displayed some evidence that suggested there was an understanding that corresponding angles were equal. Identifying x + 85 + y = 180 and/or 2x + 30 + y = 180 was seen and even solved simultaneously, but this was very rare. More commonly the two expressions x + 85 and 2x + 30 were added together, leading to 3x + 115 and this was a dead end for most. There were a small number of candidates who tried to use a trial an error approach, but for most this didn't progress very far. The majority made use of the fact that angles on a straight line add up to 180°, but this was often with a value that they hadn't identified as x. Those clearly identifying their

					value of x were able to go on and earn method marks for substituting this value in to either expression and proceeding to find their *y*.
			Total	**6**	
34			$x < 3$	3	**M1** for $2x + 10 < 16$ or $x + 5 < 8$ **M1** for next correct productive step FT *their* first step For method marks condone incorrect inequality sign or 'equals' **<u>Examiner's Comments</u>** Solving an inequality proved challenging for the majority of candidates and many seemed unaware that the standard algebraic techniques to solve an equation could be used here. A small number attempted it as an equation, resulting in the answer of $x = 3$. A few started correctly, but stopped at $2x + 10 < 16$. A number of embedded single answers were seen, for example $2(1 + 5) = 12 < 16$. Common algebraic errors lead to responses such as $x + 5 = 5x$, $2x + 10 = 12x$, and $2(x + 5) = 2x + 5$. The most efficient first step of $x + 5 = 8$ was rarely seen.
			Total	**3**	
35	a		35	1	**<u>Examiner's Comments</u>** Occasionally the function machine was misunderstood in this part and the input of 2 was interpreted by changing the first operation box to '+2'. Otherwise, this part was well answered, with just a few numerical errors made in otherwise correct methods.
	b		6	2	**M1** for ÷ 7 and – 3 **soi**

					or for 63 ÷ 7 = 9 **soi** **Examiner's Comments** In this part many candidates identified that it would be necessary to follow the function machine in reverse, but several made numerical errors. Use of '÷ 7' was more common than '− 3'. Some showed the correct complete inverse string, but then copied 9 to the answer line rather than 6. Of candidates who didn't identify the need to use inverse functions, a very common error was to use 63 as the input rather than the output number.
			Total	**3**	