

< X < _____ [3]</pre>

2.

(i) Solve.

5x + 1 > x + 13

_____ [3]

(ii) Write down the largest integer that satisfies 5x - 1 < 10.

_____ [1]

3. Solve this inequality.



3x < x + 8

[2]



[2]



(b). Find **all** the **integer** values of *w* that satisfy this inequality.

9 < 3w < 20

On the grid below, the line y = x + 3 is shown.



Indicate clearly the region y > x + 3 by shading the area **not** required.

(b). Indicate clearly the region x + y < 5.



Shade the area not required.

[2]

[1]

(c). You are given that *x* and *y* are integers that satisfy these **three** inequalities.



y < x + 3 x + y < 5 y > 2

Use your diagram to find x and y.

x = _____

y = _____ [3]



FJ











Show clearly the region ${\bf R}$ which satisfies all of these inequalities.



[3]

9.



Choose the correct regions to complete these sentences.

Regions _____ and _____ satisfy the inequality $x + y \square 6$.

Region _____ satisfies the inequalities $x + y \le 6$ and $y \ge \frac{1}{2}x + 2$.

[2]

10. Solve the inequality.

5x - 2 < 3x + 18

[3]

11. Solve this inequality.

5x - 3 > 17



13. Solve the inequality.

 $x^2-5x-6\leq 0$

_____[2]

..... [4]

END OF QUESTION PAPER

Q	uestio	n	Answer/Indicative content	Marks	Part marks and guidance			
1			2 ≤ <i>x</i> ≤ 5	3	M1 for factorising $(x - 5)(x - 2)$ soi A1 for 2 and 5	Answer may be on a number line in which case the ends must be clearly seen		
			Total	3				
2		i	<i>x</i> > 3	3	M1 for 4 <i>x</i> soi M1 for 12 soi			
		ii	2	1				
			Total	4				

3 $x < 4$ final answer2M1 for $3x - x < 8$ or better ANDCondone use of = or incorrect after $ax < b$ seenCondone use of = or incorrect after $ax < b$ 3M1 for $X < \frac{b}{a}$ after $ax < b$ seenCondone use of = or incorrectCondone use of = or incorrect after 0 scored SC1 for answer 4 or $x \dots 4$ with any incorrect equality or inequality symbol or answer $3 \times 4 < 4 + 8$ Condone use of = or incorrect methods can only score for correct answer or correct embedded answer3This was answered well with any incorrect equality or answer $3 \times 4 < 4 + 8$ This was answered well with many candidates scoring full marks. Candidates snew to collect terms in x on one side of the inequality symbol with an equals sign during the working. While most recovered this in their final answer, others used > or = instead of <. Some candidates used the trial and eror approach of substituting values into the inequality symbol with an equals sign during the working. While most recovered the inter answer, others used > or = instead of <. Some candidates used the trial and eror approach of substituting values into the incorrect answer system to a $x < 3$. A common incorrect answer as $x < 2$ following	Question	Answer/Indicative content	Marks	Part marks a	nd guidance
[$[$ $[$ $] []$	3 3	Answer/Indicative content x < 4 final answer	Marks 2	Part marks aM1 for $3x - x < 8$ or better ANDM1 for $x < \frac{b}{a}$ after $ax < b$ seenmax 1 mark if answer incorrectAfter 0 scored 	nd guidance Condone use of = or incorrect inequality symbol in place of < for all method marks $a \neq 1, b \neq 0$ Trial and improvement methods can only score for correct answer or correct embedded answer Examiner's Comments This was answered well with many candidates scoring full marks. Candidates knew to collect terms in x on one side of the inequality symbol and numbers on the other, and only a few errors were made at this stage. Some candidates replaced the inequality symbol with an equals sign during the working. While most recovered this in their final answer, others used > or = instead of <. Some candidates used the trial and error approach of substituting values into the inequality which often led to an incorrect answer such as x < 3. A common incorrect
Total 2		Total	2		3x + x < 8 which could gain partial credit if the working was shown.

Q	uestio	n	Answer/Indicative content	Marks	Part marks a	nd guidance
4	а	i	<i>m</i> > –5	2	M1 for correct first step eg $2m > -4$ –6 or better, dividing through by 2 or for ($m =, m <, <$) –5	Condone <i>x</i> , <i>n</i> etc used instead of <i>m</i>
		ii	-7 -6 -5 -4 -3 -2 -1	1FT	Condone solid circle Correct or FT from <i>their</i> attempt at an inequality only Examiner's Comments The majority of candidates could solve the inequality correctly and represent their solution appropriately on a number line although weaker candidates struggled with subtracting 6 from -4, often getting to 2. Only a few answered as an equation.	Allow any reasonable representation
	b		3	1	Examiner's Comments Many understood the significance of the hollow circle as a strict inequality and 2 was the most common wrong answer. There were many answers such as 2.1 or 2.01 indicating misunderstanding of the word 'integer'.	
			Total	4		

Q	uestio	n	Answer/Indicative content	Marks	Part marks and guidance		
5	а		<i>y</i> > 12 final answer	2	M1 for $3y > 25 + 11$ or $y > \frac{their (25\pm11)}{3}$ or better Or SC1 for $y = 12, y < 12, y$ $\leq 12, y \geq 12$ or 12 Examiner's Comments Most candidates successfully solved the inequality in both parts of this question. Errors were mostly in transposing the -11 or in dividing 36 by 3. A small number ended with the solution to an equation		
	b		4, 5, 6	2	M1 for $(3 \text{ to } 4) < w < (6 \text{ to } 7)$ or for $[3w =]12, 15, 18$ or for two of the three given (and no incorrect values) or for 4, 5, 6 and one incorrect value Examiner's Comments This was challenging, but apart from a few who were not sure how to present their answer and left it in various inequality forms, this part was also quite well done.		
			Total	4			

Qı	uestio	n	Answer/Indicative content	Marks	Part marks and guidance		
6	а		Shading above given line	1		For each part shading should extend along length of line but may be of minimal width	
	b		Dotted line $x + y = 5$ drawn	1	At least from (1, 4) to (5, 0)	Condone solid line	
			Shading above <i>their x</i> + <i>y</i> = 5	1			
	C		x = 1, y = 3	3	B1 for dotted $y = 2$ drawn And B1FT for shading below <i>their</i> $y = 2$ Examiner's Comments In part (a), shading above the line $y = x + 3$ was generally very well answered. Candidates had understood to shade the area not required. Drawing the line $x + y = 5$ in part (b) was less well answered. However, many candidates who did not draw the line correctly still recognised the need to shade above their line. Common wrong answers were to draw the line $x + y = 4$ or the two lines $x = 5$ and $y = 5$. Although candidates' success in part (c) was largely dependent on whether or not they answered parts (a) and (b) correctly, many were still able to gain one or two marks simply by drawing y = 2 and shading below the line. Answer: $x = 1$, $y = 3$	Condone solid line FT <i>their</i> horizontal line	
			Total	6			

Q	uestio	n	Answer/Indicative content	Marks	Part marks a	nd guidance
7	а		<i>x</i> ≤ 4	2	M1 for $3x \le 8 + 4$ or better AND M1 for $x \le \frac{b}{a}$ after $ax \le b$ seen max 1 mark if answer incorrect OR SC1 for answer 4 or $x \dots 4$ with any incorrect equality or inequality symbol or answer $3 \times 4 - 4 \le 8$	Condone use of = or incorrect inequality symbol in place of \leq for all method marks $a \neq 1, b \neq 0$ condone e.g. '4 or less' as answer for SC1
	b		4	1	FT <i>their</i> inequality in (i) Examiner's Comments Most candidates reached the correct inequality answer. Far fewer candidates than in previous sessions gave the answer in an incorrect form such as x = 4. Again, most candidates could represent the inequality correctly on the number line, although a few terminated their line with a circle rather than an arrow, or they went in the wrong direction.	Condone any indication at 4 Condone missing arrow at other end but do not accept indication of the line terminating Accept any length line
			Total	3		

Questio	on	Answer/Indicative content	Marks	Part marks and guidance		
8		Correct region R indicated	3	B2 for region on the correct side of two inequalities B1 for region on the correct side of one inequality Examiner's Comments In most cases it was clear which region the candidate intended as their answer. Some candidates did not show clear shading along with the label R, thus making it difficult to identify their selected region. Candidates should be advised to either shade in and label the region they intend, or to shade 'out' and clearly label the unshaded part to indicate that is what they have selected. Many candidates scored 2 out of the 3 available marks for a region with the $y \ge x + 2$ boundaries, with the $y \ge x + 2$ boundaries, with the $y \ge x + 2$ boundaries drew extra lines for the boundaries despite the grid showing all of the required boundary lines and this having been stated in the question.	Do not assume axes are boundaries unless identified by shading i.e. if no shading, assume that the region is bounded by the inequality lines If no label R, assume shading identifies region unless clearly shading out each individual inequality If their region is bounded by lines other than those given maximum B1 may be awarded	
		Total	3			

Question		n	Answer/Indicative content	Marks	Part marks and guidance		
9			Q and R	1	SC1 for P S	in either order	
			Р	1	Q		
					Examiner's Comments		
					Clearly only answers were required in this question. The common incorrect answer to the first statement was P and S showing that the correct line had been selected but they had not understood the inequality. The second statement had more incorrect answers; S was the most common one.		
			Total	2			

Question		Answer/Indicative content	Marks	Part marks and guidance		
10		<i>x</i> < 10 or 10 > <i>x</i>	0 or $10 > x$ 3 Mark final answer M2 for $5x - 3x < 18 + 2$ or better		Condone use of = or incorrect inequality symbol instead of < for all method marks	
				Or M1 for $5x - 3x - 2 < 18$ or better collecting x Or $5x < 3x + 18 + 2$ or better collecting constants AND	Implied by $2x < m$ Implied by $kx < 20$ $m \neq 0, k \neq 1$	
				M1 for $x < \frac{m}{k}$ after $kx < m$ seen	Accept improper fraction or correct 3 s.f. decimal	
				Max 2 marks if answer incorrect		
				Or B2 for answer 10 or $x \dots$ 10 with = or any incorrect inequality symbol or answer 5 × 10 – 2 < 3 × 10 + 18		
				Examiner's Comments		
				Many candidates showed clearly laid out and correct algebra in part (c) reaching the correct final answer. Some candidates used an = sign in their working rather than the inequality: those who then gave their final answer as an inequality gained full credit, but those who gave a final answer of 10 or $x = 10$ only gained two of the available three marks. Some errors in rearrangement were seen, usually in subtracting 2 rather than adding it, but in these cases partial credit could be awarded if some correct steps were seen. A small number of candidates attempted to solve using trial and improvement		

Q	uestio	n	Answer/Indicative content	Marks	Part marks and guidance		
					methods, but these generally failed to reach a correct answer.		
			Total	3			
11			<i>x</i> > 4 final answer	2	M1 for $5x > 17 + 3$ or for $x > \frac{b}{a}$ after $ax > b$ seen, $a \neq 1$, $b \neq 0$ OR SC1 for answer 4 or x 4 with any incorrect equality or inequality symbol or answer $5 \times 4 - 3 > 17$ or $5 \times 4 - 3 = 17$ Examiner's Comments This was also well answered with most candidates giving the correct inequality, $x > 4$, as the answer. Some candidates who treated the question as an equation in order to solve it, failed to revert to an inequality for their final answer and $x = 4$ or simply 4 were common errors that were awarded 1 mark.	Condone use of = or incorrect inequality symbol for method mark	
			Total	2			

Q	uestio	'n	Answer/Indicative content	Marks	Part marks and guidance		
12			x > 4	2	M1 for a correct first step e.g. 3x > 10 + 2, 3x - 12 > 0 Examiner's C This question simple inequa equation was answered. A f candidates los inequality sign and gave an a 4.	For M1, condone wrong inequality symbol or equals omments on solving a dity and an very well few st the n in part (a) answer of $x =$	
			Total	2			

Question	n	Answer/Indicative content	Marks		Part marks a	nd guidance
13		-1 ≤ <i>x</i> ≤ 6 oe	4	M2 for $(x - 6)(x + 1) [\le 0]$ oe Or M1 for $(x + a)(x + b) [\le 0]$ where $ab = -6$ or $a + b = -5$ B1 for -1 and 6 soi Examiner's Co The more able approached th found the max minimum value inequality by fa surprising to so of candidates of quadratic form solutions. This errors as cand struggled to re formula accura made errors w substitution. M candidates we with this new t	For M2 or M1, condone [= 0] M2 for correct formula or complete square condone 1 error M1 for (<i>x</i> -2.5) ² oe seen or for correct formula with 2 errors Could be seen as roots on sketch of graph or in wrong inequality orments e candidates as for the actors. It was ee a number using the pula to find the soften led to lidates ecall the ately and also <i>rith</i> lany ere unfamiliar opic area.	
		Total	4			