

Inequalities

Foundation and Higher tiers

Total marks: 63

Marks

- M** Method mark, for a correct method. It can be implied by a correct answer.
- A** Accuracy mark, for a correct answer. It needs the method mark before it.
- B** A mark for a correct value or statement, with or without working.
- ft** Follow through: the mark is given for using an earlier wrong answer correctly.
- oe** Or equivalent.
- [a, b]** Any value from a to b inclusive.

Questions

Q	Skill	Spec	Tier	Grade	Calculator	Marks
1	Reading an inequality from a number line	A22	Common	3	No	2
2	Integers that satisfy an inequality	A22	Common	4	No	2
3	Solving an inequality	A22	Common	4	No	2
4	Solving an inequality and showing it on a number line	A22	Common	4	No	3
5	Dividing an inequality by a negative number	A22	Common	5	No	2
6	Solving a double inequality	A22	Common	5	No	3
7	Inequalities from a perimeter	A22 A21	Common	6	No	4
8	Solving a quadratic inequality	A22 A18	Higher	7	No	3
9	Showing a region on a graph	A22	Higher	7	No	3
10	Inequalities from a region on a graph	A22	Higher	7	No	3
11	Quadratic inequality in set notation	A22 A18	Higher	8	No	3
12	Integers satisfying a linear and a quadratic inequality	A22	Higher	8	No	4
13	Solving an inequality with decimals and showing it on a number line	A22	Common	4	Yes	3
14	Forming and solving an inequality in context	A22 A21	Common	4	Yes	3
15	The largest integer that satisfies an inequality	A22	Common	4	Yes	3
16	Forming and solving an inequality in context	A22 A21	Common	5	Yes	3

Q	Skill	Spec	Tier	Grade	Calculator	Marks
17	Inequalities from an area and a length	A22 A21	Common	5	Yes	4
18	Comparing costs with an inequality	A22 A21	Common	5	Yes	4
19	Checking a claim about an inequality	A22	Common	5	Yes	3
20	A double inequality from a formula	A22 A2	Common	5	Yes	3
21	Solving an inequality with a fraction	A22	Common	5	Yes	3
	Total					63

Question 1 A22 · Common · Grade 3 · 2 marks

Q	Answer	Mark	Comments
1	$-2 < x \leq 3$	B2	B1 for one end correct, such as $-2 \leq x \leq 3$ or $-2 < x < 3$

Question 2 A22 · Common · Grade 4 · 2 marks

Q	Answer	Mark	Comments
2	3, 4, 5, 6, 7	B2	B1 for $2.5 < n \leq 7$, or for one value missing or one extra value

Question 3 A22 · Common · Grade 4 · 2 marks

Q	Answer	Mark	Comments
3	$4x > 14$	M1	oe, or $4x = 14$
	$x > 3.5$	A1	oe, such as $x > \frac{7}{2}$

Question 4 A22 · Common · Grade 4 · 3 marks

Q	Answer	Mark	Comments
4(a)	$3x - 6 \leq 9$ or $x - 2 \leq 3$	M1	oe
	$x \leq 5$	A1	
4(b)	a filled circle at 5 with a line or arrow going to the left	B1ft	ft their (a)

Question 5 A22 · Common · Grade 5 · 2 marks

Q	Answer	Mark	Comments
5	No, with a reason	B1	such as 'dividing by -3 turns the sign round', or $x = -5$ gives 22, which is not less than 19
	$x > -4$	B1	

Question 6 A22 · Common · Grade 5 · 3 marks

Q	Answer	Mark	Comments
6(a)	$-6 < 3x \leq 15$	M1	oe, or one end correct
	$-2 < x \leq 5$	A1	
6(b)	7	B1ft	ft their (a)

Question 7 A22 A21 · Common · Grade 6 · 4 marks

Q	Answer	Mark	Comments
7	$5x + 7$	M1	the perimeter, oe
	$40 < 5x + 7 < 52$	M1	oe, or one of the two inequalities
	$6.6 < x < 9$	A1	oe, both ends
	7 and 8	A1	

Question 8 A22 A18 · Higher · Grade 7 · 3 marks

Q	Answer	Mark	Comments
8	$(x - 5)(x + 3)$	M1	or -3 and 5 found as the solutions of $x^2 - 2x - 15 = 0$
	a sketch of the curve crossing at -3 and 5, or a test of a value in each region	M1	implied by a correct answer
	$x < -3$ or $x > 5$	A1	oe. Not $5 < x < -3$

Question 9 A22 · Higher · Grade 7 · 3 marks

Q	Answer	Mark	Comments
9	the triangle with vertices (0.5, 1), (4, 1) and $(1\frac{2}{3}, 3\frac{1}{3})$ shaded and labelled R	B3	B2 for a region bounded by all three lines but on the wrong side of one; B1 for the correct side of one line shown

Question 10 A22 · Higher · Grade 7 · 3 marks

Q	Answer	Mark	Comments
10	$y \leq 4$	B1	condone strict inequalities once
	$y \geq 2x - 2$	B1	
	$x + y \geq 1$	B1	oe, such as $y \geq 1 - x$

Question 11 A22 A18 · Higher · Grade 8 · 3 marks

Q	Answer	Mark	Comments
11	$(2x - 3)(x + 4)$	M1	or -4 and 1.5 found as the solutions of $2x^2 + 5x - 12 = 0$
	$-4 \leq x \leq 1.5$	A1	oe
	$\{x : -4 \leq x \leq 1.5\}$	A1	oe, such as $\{x : x \geq -4\} \cap \{x : x \leq 1.5\}$

Question 12 A22 · Higher · Grade 8 · 4 marks

Q	Answer	Mark	Comments
12	$n^2 - 3n - 10 < 0$ or $(n - 5)(n + 2)$	M1	oe
	$-2 < n < 5$	A1	oe
	$n > 1$	B1	
	2, 3, 4	A1	and no others

Question 13 A22 · Common · Grade 4 · 3 marks

Q	Answer	Mark	Comments
13(a)	$2.6x \geq 6.5$	M1	oe, or $2.6x = 6.5$
	$x \geq 2.5$	A1	oe
13(b)	a filled circle at 2.5 with a line or arrow going to the right	B1ft	ft their (a)

Question 14 A22 A21 · Common · Grade 4 · 3 marks

Q	Answer	Mark	Comments
14	$137.60 + 1.85c \geq 500$	M1	oe, any letter
	$c \geq 195.8...$ or $362.4 \div 1.85$	M1	oe
	196	A1	

Question 15 A22 · Common · Grade 4 · 3 marks

Q	Answer	Mark	Comments
15	$2.2x < 9.1$	M1	oe
	$x < 4.13...$	M1	oe, or $\frac{91}{22}$
	4	A1	

Question 16 A22 A21 · Common · Grade 5 · 3 marks

Q	Answer	Mark	Comments
16	$85 + 24b \leq 630$	M1	oe, any letter
	$b \leq 22.7...$	M1	oe, or $\frac{545}{24}$
	22	A1	

Question 17 A22 A21 · Common · Grade 5 · 4 marks

Q	Answer	Mark	Comments
17	$4.6(2x + 1.3) < 38.64$	M1	oe, or $9.2x + 5.98 < 38.64$
	$x < 3.55$	A1	oe
	$2x + 1.3 > 4.6$	M1	oe
	$1.65 < x < 3.55$	A1	oe

Question 18 A22 A21 · Common · Grade 5 · 4 marks

Q	Answer	Mark	Comments
18	$27.10m < 18.50 + 24.75m$	M1	oe
	$2.35m < 18.5$	M1	oe, ft their inequality
	$m < 7.87...$	M1	oe, or $\frac{18.5}{2.35}$
	$m \leq 7$	A1	oe, such as 1 to 7 months, or $m < 8$

Question 19 A22 · Common · Grade 5 · 3 marks

Q	Answer	Mark	Comments
19	$-0.6x < -5.06$ or $4.75 + 0.31 < 0.6x$	M1	oe
	$x > 8.43...$	M1	oe, or $4.75 - 0.6 \times 8 = -0.05$ and -0.05 is not less than -0.31
	No, with 9 as the smallest	A1	or no, with 8 shown not to work

Question 20 A22 A2 · Common · Grade 5 · 3 marks

Q	Answer	Mark	Comments
20	$61.7 \leq 1.8C + 32 \leq 78.8$ or $(61.7 - 32) \div 1.8$ or $(78.8 - 32) \div 1.8$	M1	oe
	16.5 and 26	A1	both ends
	$16.5 \leq C \leq 26$	A1	oe

Question 21 A22 · Common · Grade 5 · 3 marks

Q	Answer	Mark	Comments
21	$2x - 3.4 \geq 5(x - 2.99)$ or $2x - 3.4 \geq 5x - 14.95$	M1	oe, the fraction cleared
	$11.55 \geq 3x$ or $-3x \geq -11.55$	M1	oe
	$x \leq 3.85$	A1	oe, such as $3.85 \geq x$