Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Inequalities and regions

Time allowed: 40 minutes

Subject code **0580**

Mathematics

Questions from Paper 1, Paper 2 and Paper 4

You must have: a ruler marked in centimetres and millimetres, a protractor, compasses, a pen, an HB pencil and an eraser.
You may use a calculator.

Total marks

/ 30

Instructions

- Answer every question in the space provided on this paper.
- Write in black or dark blue ink. Pencil may be used for diagrams and graphs.
- Fill in your name, centre number and candidate number above.
- Show your working: a correct method can earn marks even if the answer is wrong.
- Unless a question says otherwise, give answers that are not exact to 3 significant figures, and angles in degrees to 1 decimal place.

Information

- This paper has 10 questions worth 30 marks in total.
- The marks for each question or part are shown in brackets, for example [3].

Advice

- Read every question through once before you write anything.
- Use the marks in brackets to judge how long to spend on each part.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 x is an integer where $x > -4$ and $x \leqslant 2$.

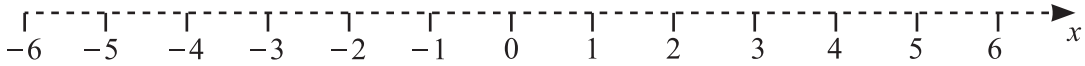
Write down all the possible values of x.

..... [2]

Solving linear inequalities Click for more variations

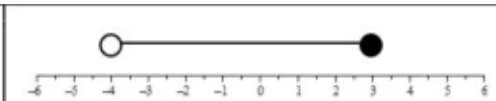
1	–3, –2, –1, 0, 1, 2	**2**	**B1** for 5 correct and none incorrect or 6 correct and one extra

2 Represent the inequality $-4 < x \leqslant 3$ on the number line.



[2]

Solving linear inequalities Click for more variations

2		**2**	**B1** for open circle at –4 **and** closed circle at 3 or for a line between –4 and 3 (any circles)

3 Solve.

$12x - 3 \geqslant 4x + 13$

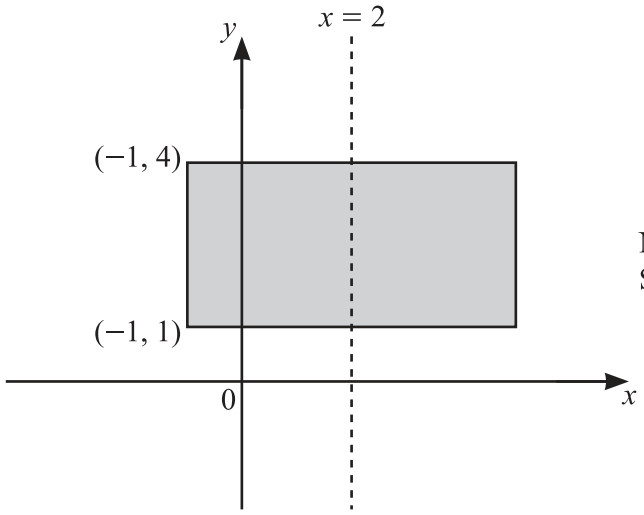
..... [2]

Solving linear inequalities Click for more variations

3	$x \geqslant 2$ final answer	**2**	**M1** for $12x - 4x \geq 13 + 3$ oe

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4



NOT TO SCALE

The diagram shows a rectangle with a line of symmetry at $x = 2$.
Two vertices of the rectangle are at $(-1, 1)$ and $(-1, 4)$.

The shaded region is defined by the inequalities $a \leqslant x \leqslant b$ and $c \leqslant y \leqslant d$.

Find the values of a, b, c and d.

$a =$ .....

$b =$ .....

$c =$ .....

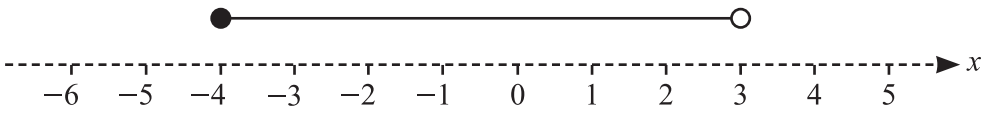
$d =$ ..... [2]

Finding inequalities from regions Click for more variations

4	[a =] −1 [b =] 5 [c =] 1 [d =] 4	**2**	**B1** for two or three correct or **SC1** for [a =] $x \geqslant -1$ [b =] $x \leqslant 5$ [c =] $y \geqslant 1$ [d =] $y \leqslant 4$

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5 **(a)** Write down the inequality represented on the number line.



..... [2]

(b) Write down the smallest integer that satisfies the inequality $d > -3\frac{1}{4}$.

..... [1]

(a) Solving linear inequalities (b) Solving linear inequalities Click for more variations

5(a)	$-4 \leqslant x < 3$	**2**	**B1** for $-4 \leqslant x$ or $x < 3$
5(b)	–3 cao	**1**	

6 Solve.

$$4 - 3x \geqslant \frac{6 - x}{5}$$

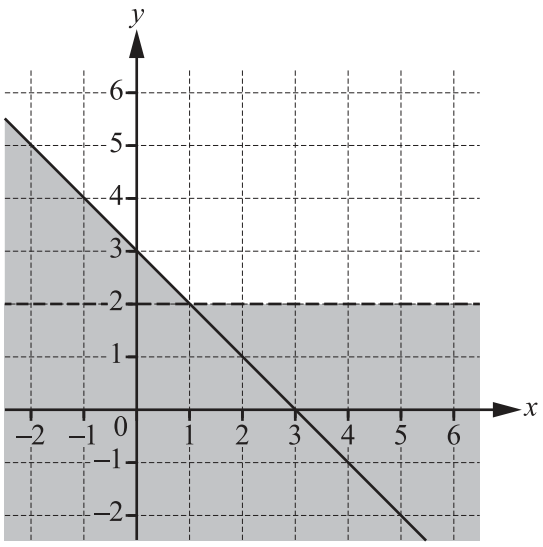
..... [3]

Solving linear inequalities Click for more variations

6	$x \leqslant 1$ final answer	**3**	**M1** for $20 - 15x \geqslant 6 - x$ or $4 - 3x \geqslant \frac{6}{5} - \frac{x}{5}$ **M1** for correctly isolating terms in x FT *their* first step of dealing with the 5 $20 - 6 \geqslant -x + 15x$ or $-3x + \frac{x}{5} \geqslant \frac{6}{5} - 4$

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7



Find the two inequalities that define the region on the grid that is **not** shaded.

.....

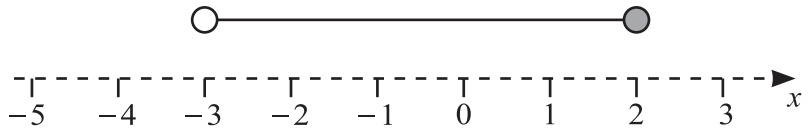
..... [3]

Finding inequalities from regions Click for more variations

7	$y > 2$ oe final answer $y \geqslant 3 - x$ oe final answer	**3**	**B1** for $y > 2$ oe final answer **B2** for $y \geqslant 3 - x$ oe final answer or **B1** for $y = 3 - x$ oe soi or **SC2** for $y \geqslant 2$ oe **and** $y > 3 - x$ oe final answer

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8 **(a)**



Write down the inequality represented in the diagram.

..... [2]

(b) Write down the integer values of x that satisfy the inequality $-4 < 2x \leqslant 8$.

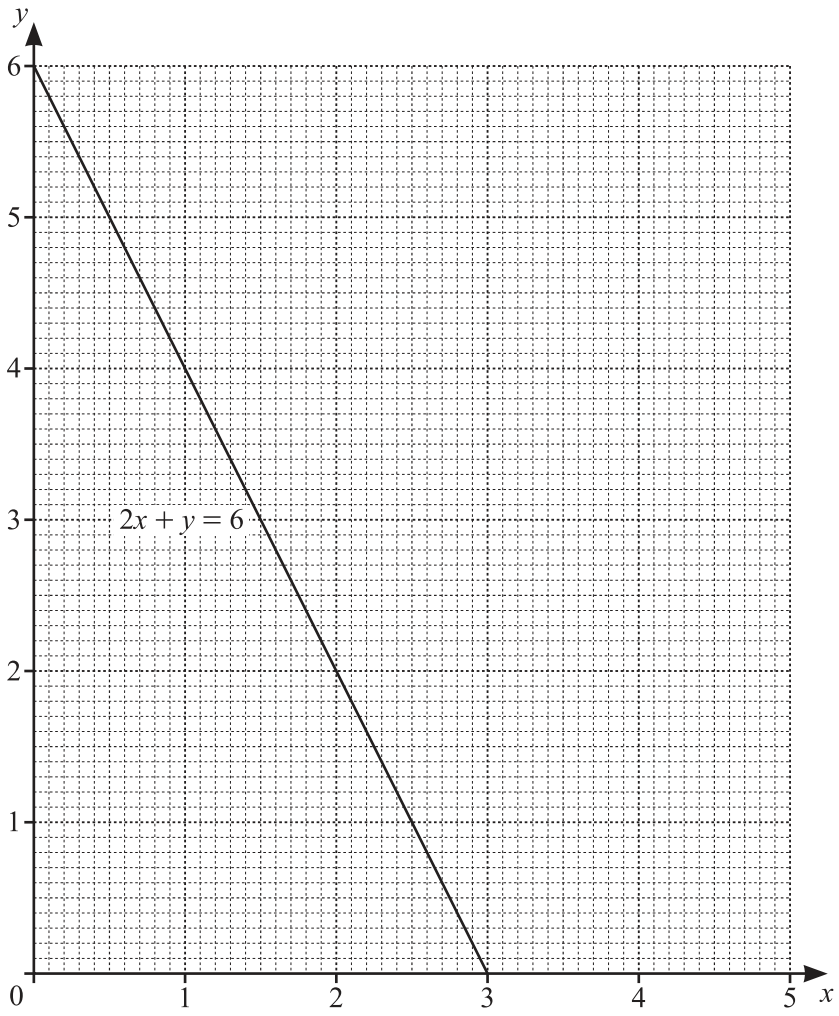
..... [2]

(a) Solving linear inequalities (b) Solving linear inequalities Click for more variations

8(a)	$-3 < x \leqslant 2$	**2**	**B1** for $-3 < x$ or $x \leqslant 2$
8(b)	−1, 0, 1, 2, 3, 4	**2**	**B1** for 5 correct (and no extras) or 6 correct with one extra or **B1** for $-2 < x \leqslant 4$

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9



By shading the **unwanted** regions of the grid, find and label the region R that satisfies the following inequalities.

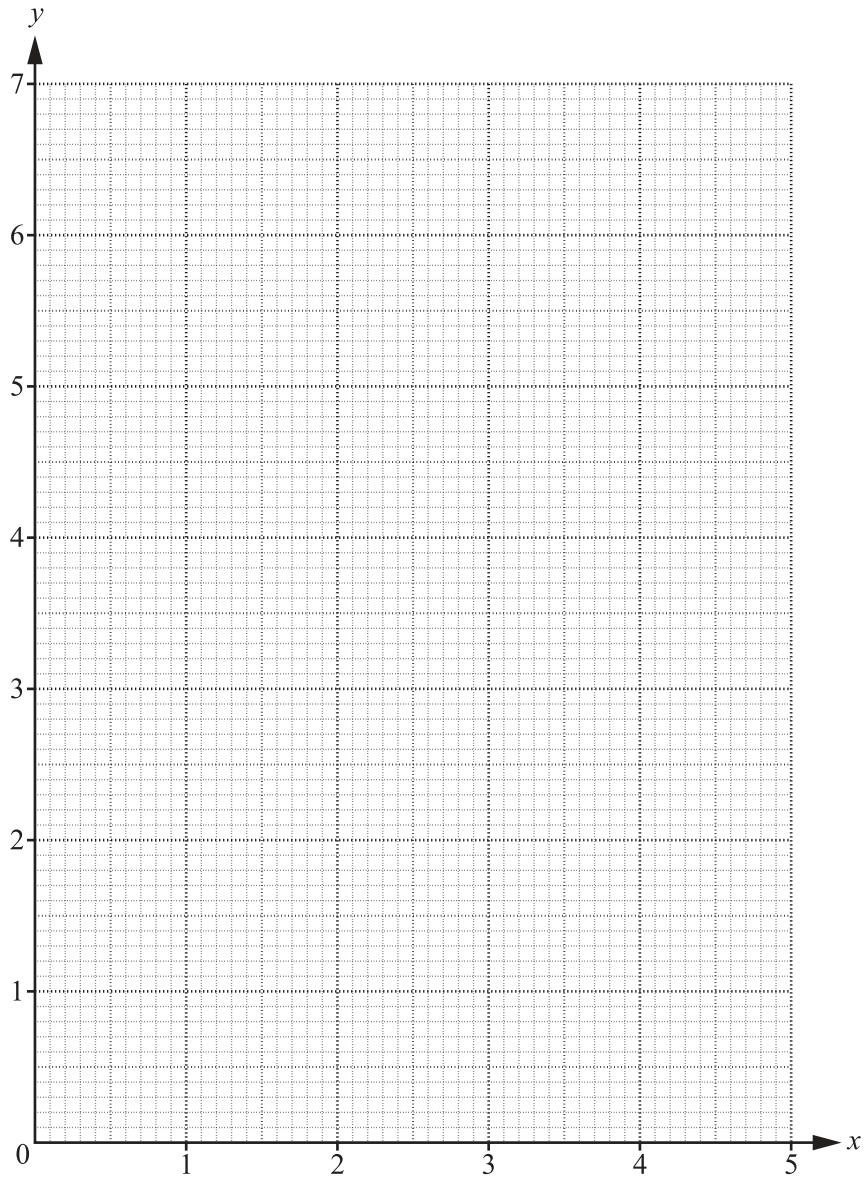
$$y \leqslant 5 \qquad 2x + y \geqslant 6 \qquad y \geqslant x + 1$$ [4]

Representing inequalities as regions Click for more variations

9	$y = 5$ ruled $y = x + 1$ ruled Correct region indicated	**4**	**B2** for two correct lines or **B1** for one correct line **B2** for indication of correct region or **B1** for shading that satisfies two of the inequalities

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10



The region R satisfies these inequalities.

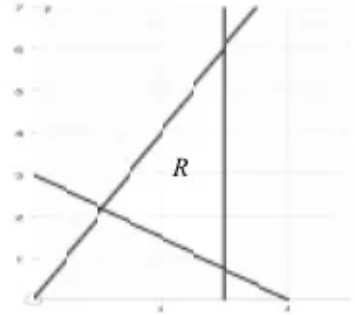
$y \leqslant 2x$ $\quad$ $3x + 4y \geqslant 12$ $\quad$ $x \leqslant 3$

On the grid, draw and label the region R that satisfies these inequalities.
Shade the **unwanted** regions.

[5]

Representing inequalities as regions Click for more variations

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10	Correct shading with three ruled accurate solid boundary lines  	**5**	**B2** for $3x + 4y = 12$ line through (0, 3) and (4, 0) or **B1** for a diagonal line through one of these points **B1** for $y = 2x$ line through (0, 0) and (1, 2) or through (1, 2) and (3, 6) **B1** for $x = 3$ line

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