GCSE · Edexcel · Maths

2 hours 31 questions

Exam Questions

Graphing Inequalities

Representing Inequalities as Regions / Finding Inequalities from Regions

Easy (10 questions)	/27
Medium (10 questions)	/38
Hard (11 questions)	/53
Total Marks	**/118**

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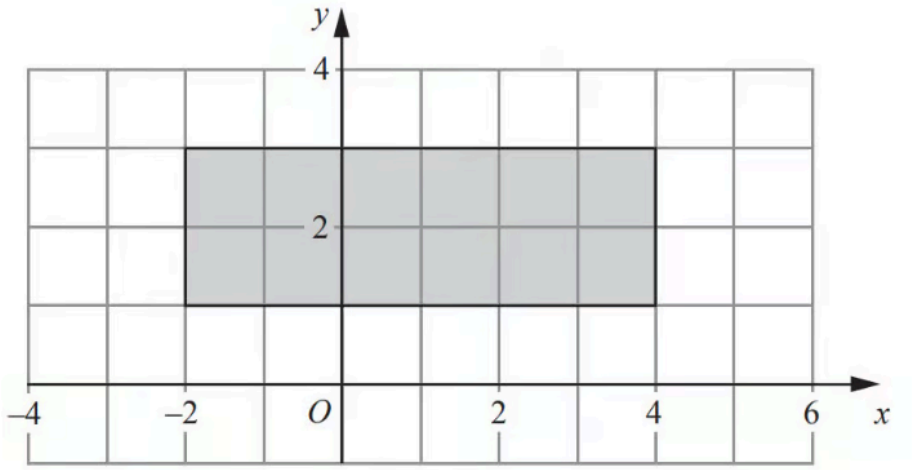
Easy Questions

1



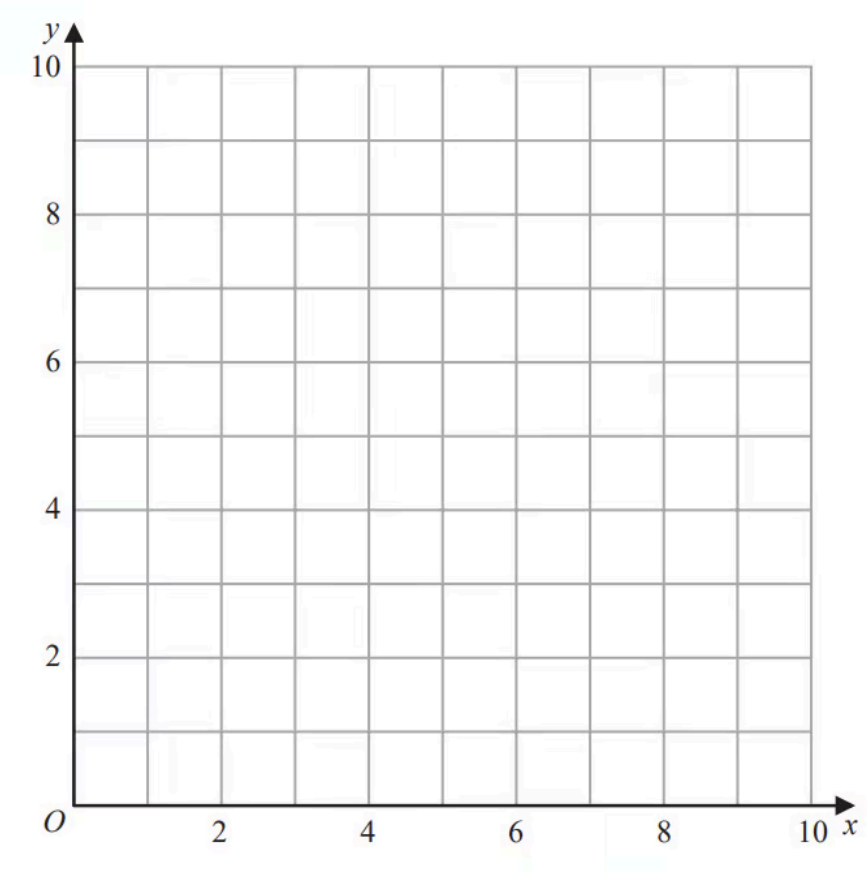
Write down inequalities to fully define the shaded region.

(3 marks)

2 Show, by shading on the grid, the region defined by **all three** of the inequalities

$x \leqslant 6$	$y \geqslant 2$	$y \leqslant x + 1$

Label the region $\mathbf{R}$

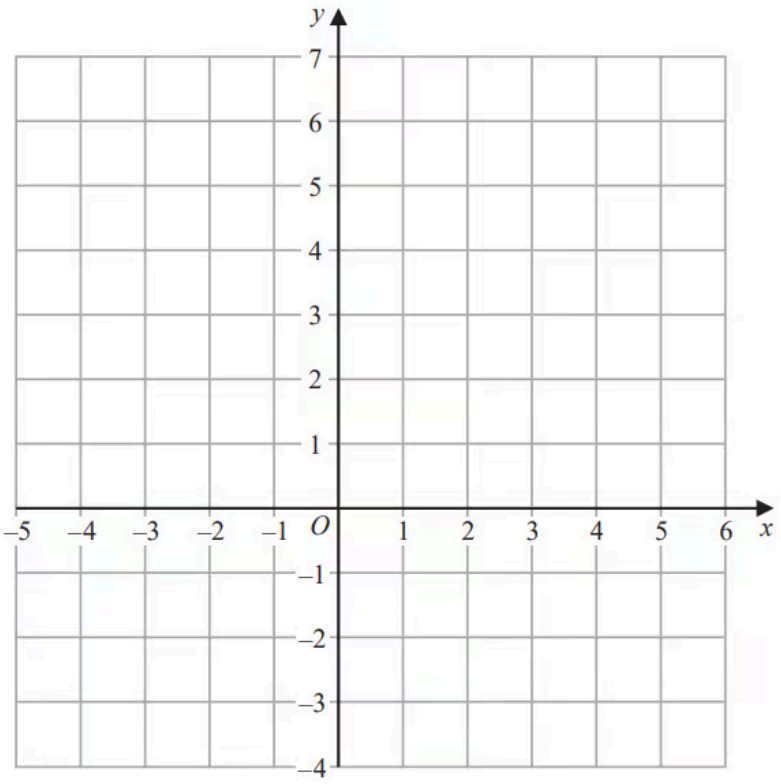


(3 marks)

3 Show, by shading on the grid, the region that satisfies all three of the inequalities

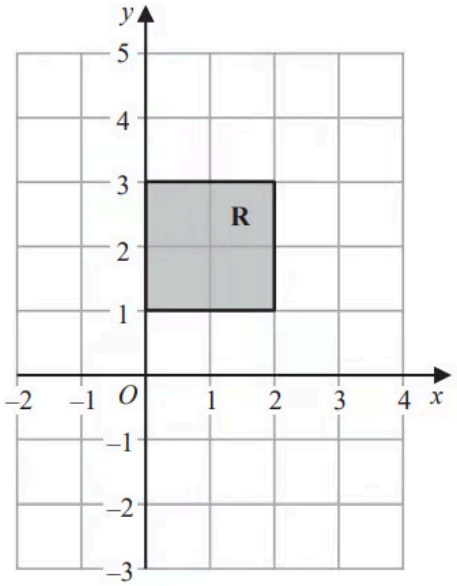
$$x \leq 4 \quad \text{and} \quad y \geq -2 \quad \text{and} \quad y \leq x$$

Label the region $\mathbf{R}$.



(3 marks)

4

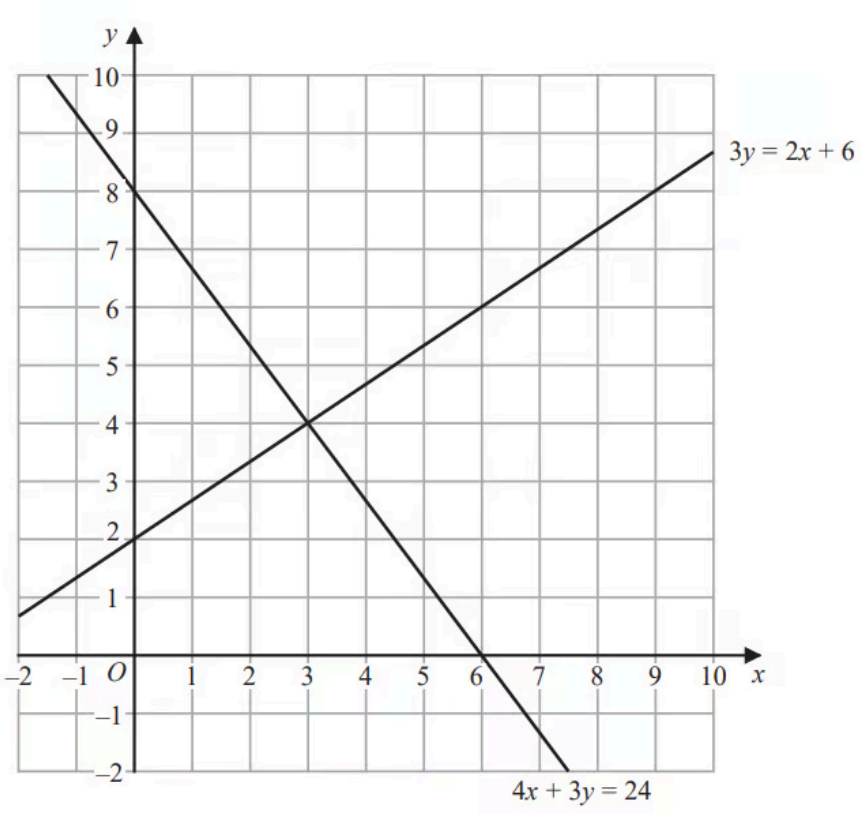


The region $\mathbf{R}$, shown shaded in the diagram, is bounded by four straight lines.

Write down the inequalities that define **R**.

(2 marks)

5 The diagram shows two straight lines drawn on a grid.



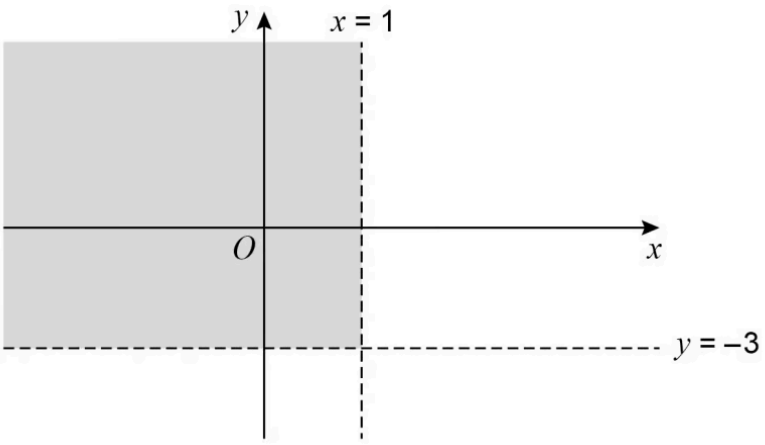
Show, by shading on the grid, the region defined by all five of the inequalities

$x \geqslant 0$	$y \geqslant 0$	$x + y \geqslant 4$	$3y \leqslant 2x + 6$	$4x + 3y \leqslant 24$

Label the region **R**.

(3 marks)

6 The sketch shows the lines $x = 1$ and $y = -3$



Which pair of inequalities describes the shaded region?

A. $x < 1$ and $y < -3$

B. $x < 1$ and $y > -3$

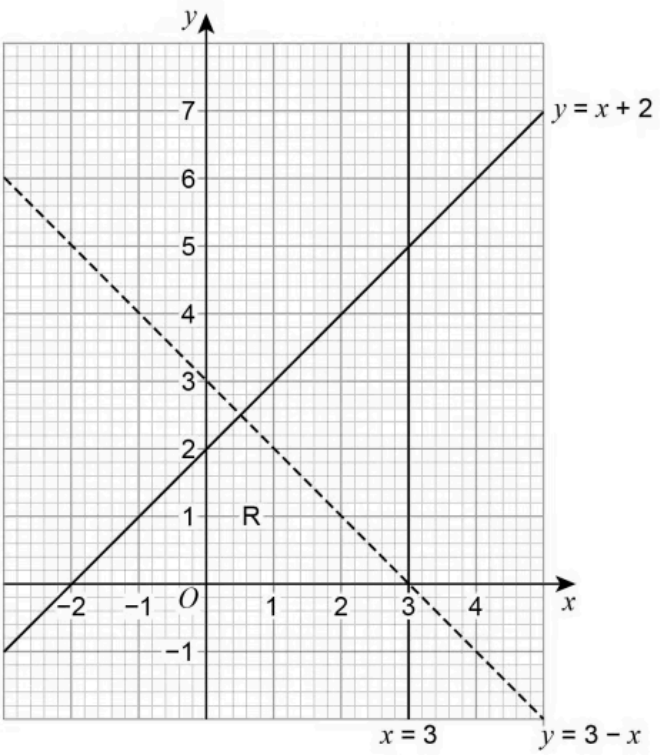
C. $x > 1$ and $y > -3$

D. $x > 1$ and $y < -3$

(1 mark)

7 Joe draws this graph to identify the region R represented by

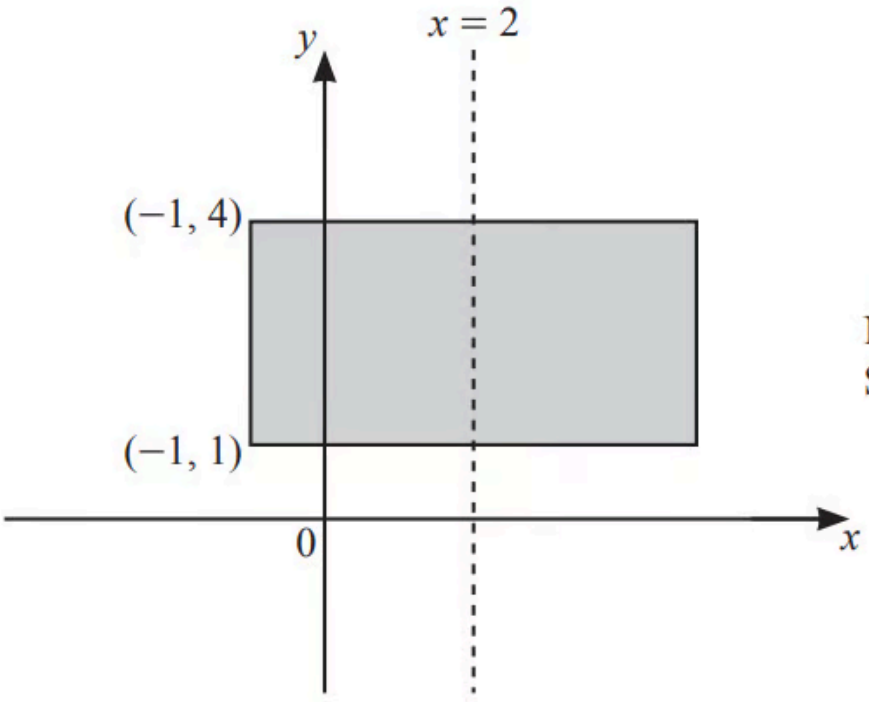
$y \leqslant x + 2$ and $y > 3 - x$ and $x < 3$



Make **two** criticisms of his graph.

(2 marks)

8



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 $a \leq x \leq b$ and $c \leq y \leq d$.
Find the values of a, b, c and d.

a = ...

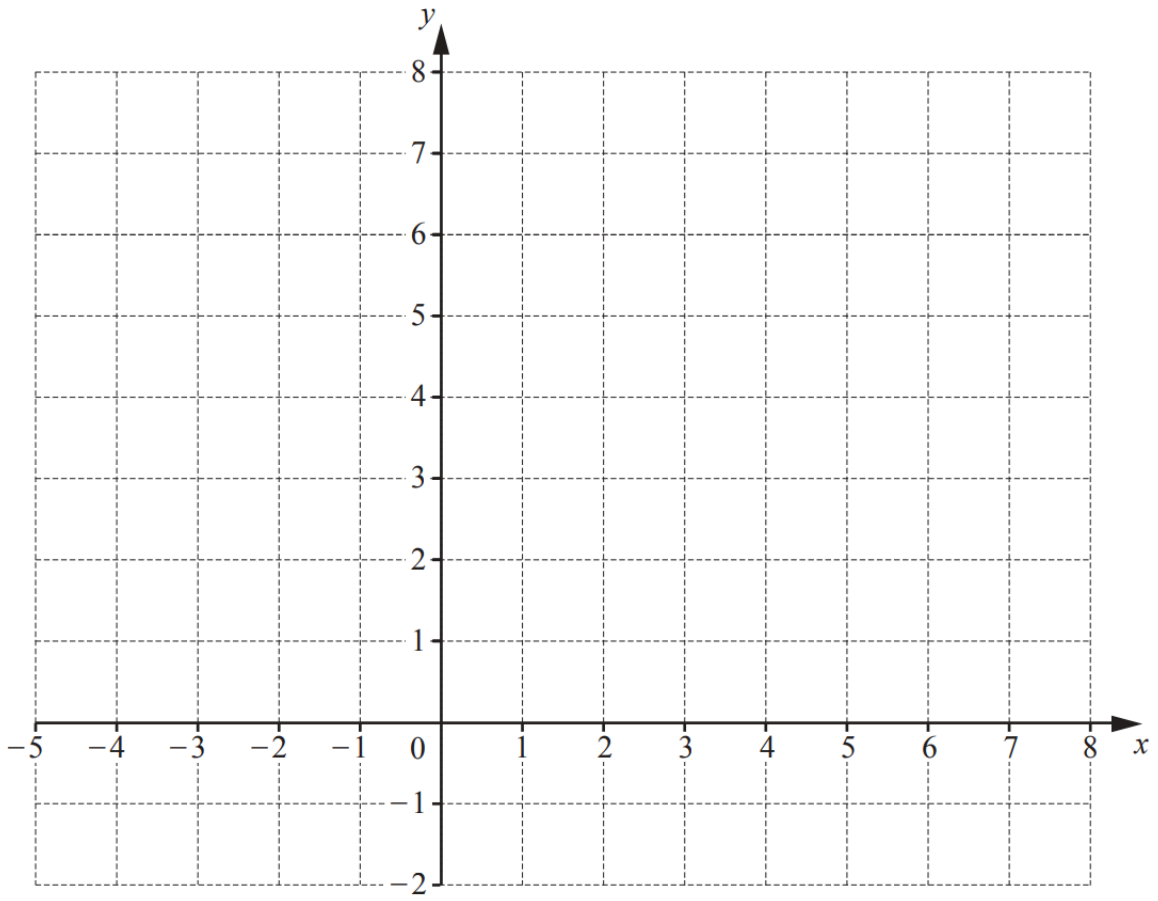
b = ...

c = ...

d = ...

(2 marks)

9

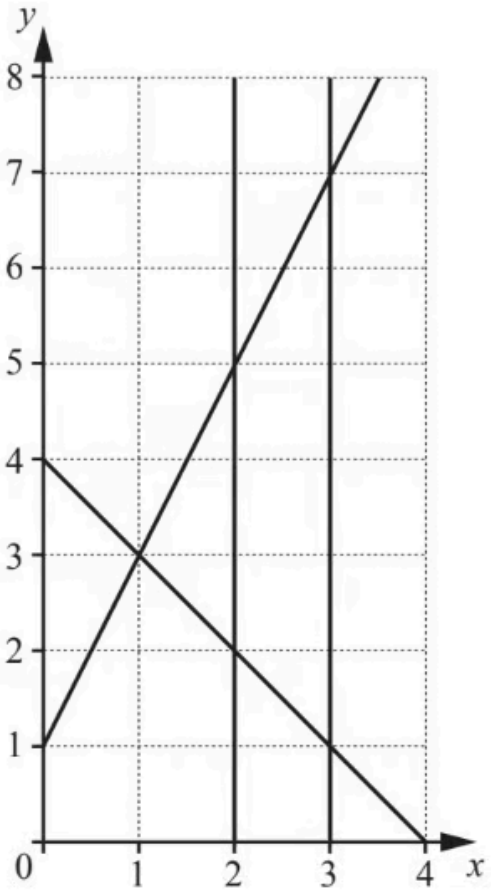


By shading the **unwanted** regions of the grid, draw and label the region R which satisfies the following three inequalities.

$y \leq 2$	$x < 3$	$y \leq x + 4$

(5 marks)

10



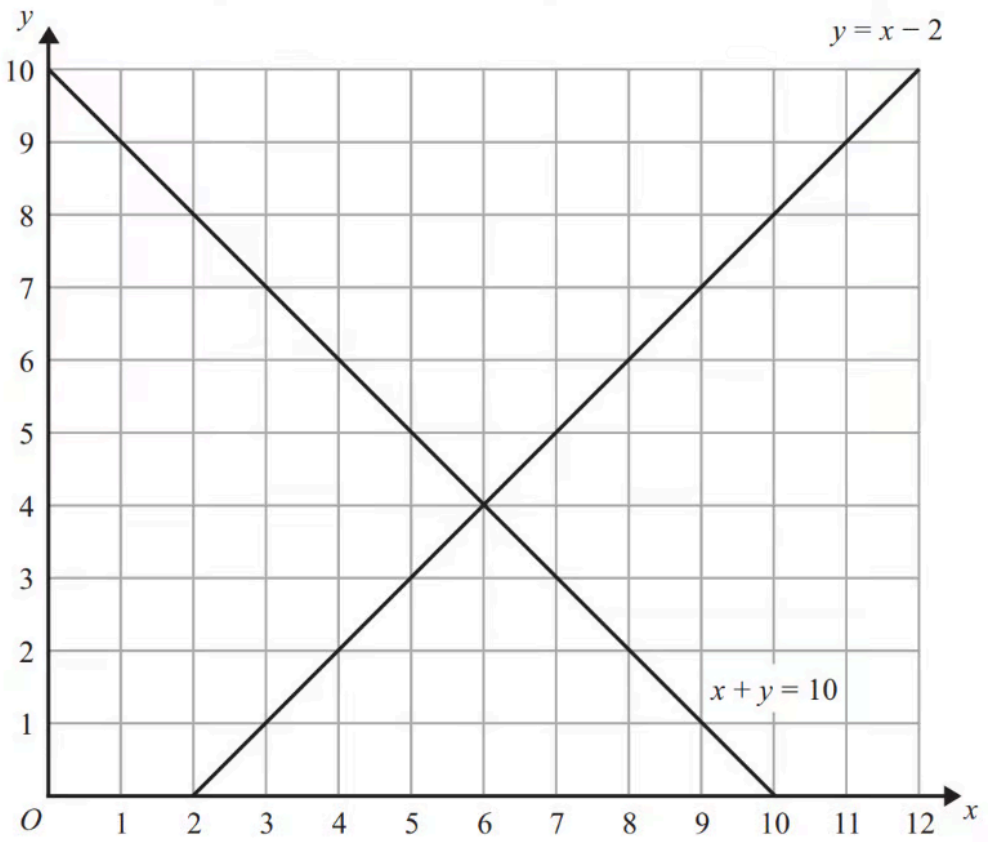
By shading the **unwanted** regions of the grid, find and label the region *R* that satisfies the following four inequalities.

$$x \leq 3 \qquad x \geq 2 \qquad y \leq 2x + 1 \qquad y \geq 4 - x$$

(3 marks)

Medium Questions

1 The lines $y = x - 2$ and $x + y = 10$ are drawn on the grid.

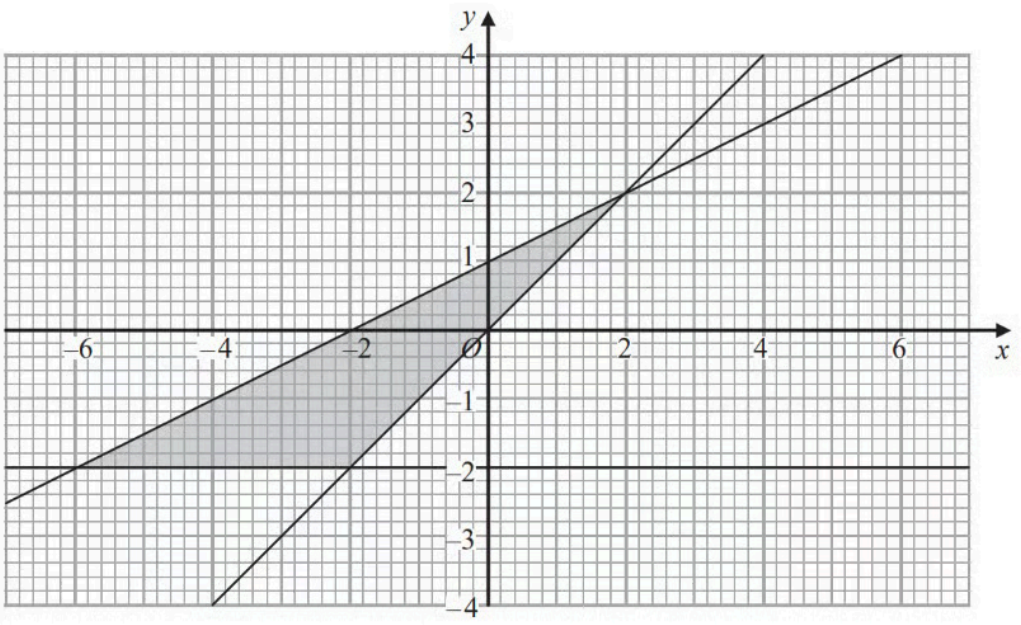


On the grid, mark with a cross (x) each of the points with integer coordinates that are in the region defined by

$$y > x - 2$$
$$x + y < 10$$
$$x > 3$$

(3 marks)

2



Write down the three inequalities that define the shaded region.

(4 marks)

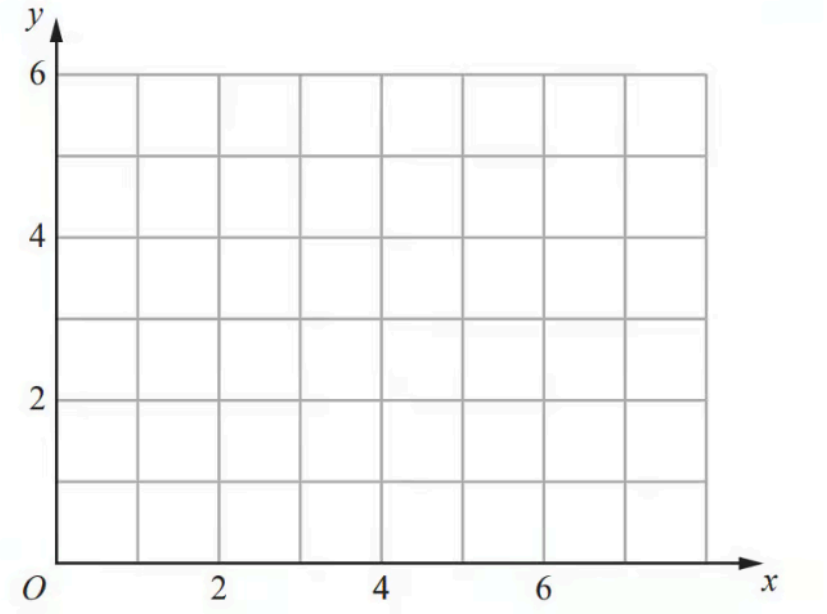
3 Show, by shading on the grid, the region defined by all three of the inequalities

$x \leqslant 5$

$y \geqslant 3$

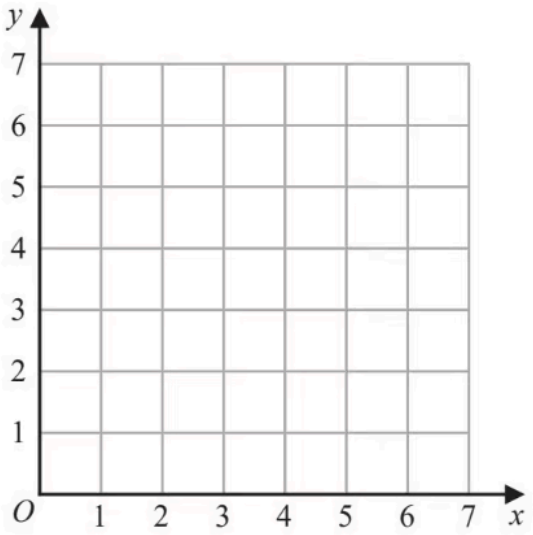
$y \leq x$

Label your region $\mathbf{R}$.



(3 marks)

4 (a)



On the grid, draw and **label** the straight line with equation

i) $x = 1.5$

[1]

ii) $y = x$

[1]

iii) $x + y = 6$

[1]
(3 marks)

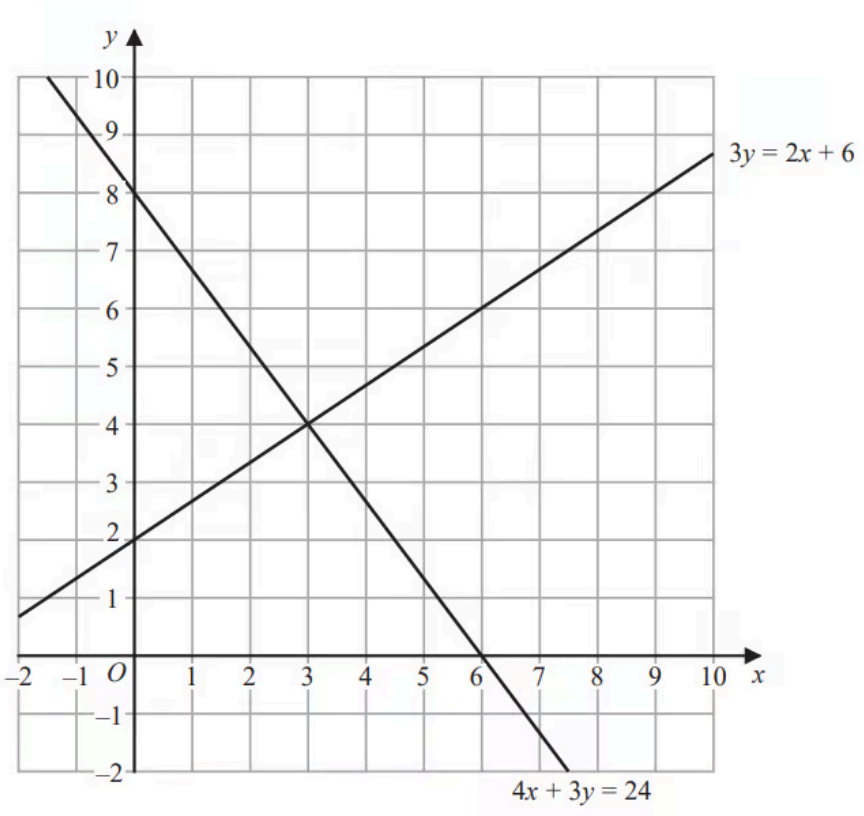
(b) Show, by shading on the grid, the region that satisfies **all three** of the inequalities

$$x \geqslant 1.5 \qquad y \geqslant x \qquad x + y \leqslant 6$$

Label the region **R**.

(1 mark)

5 The diagram shows two straight lines drawn on a grid.



Show, by shading on the grid, the region defined by all five of the inequalities

$x \geqslant 0$	$y \geqslant 0$	$x + y \geqslant 4$	$3y \leqslant 2x + 6$	$4x + 3y \leqslant 24$

Label the region **R**.

(3 marks)

6 The region **R**, shown shaded in the diagram, is bounded by three straight lines.

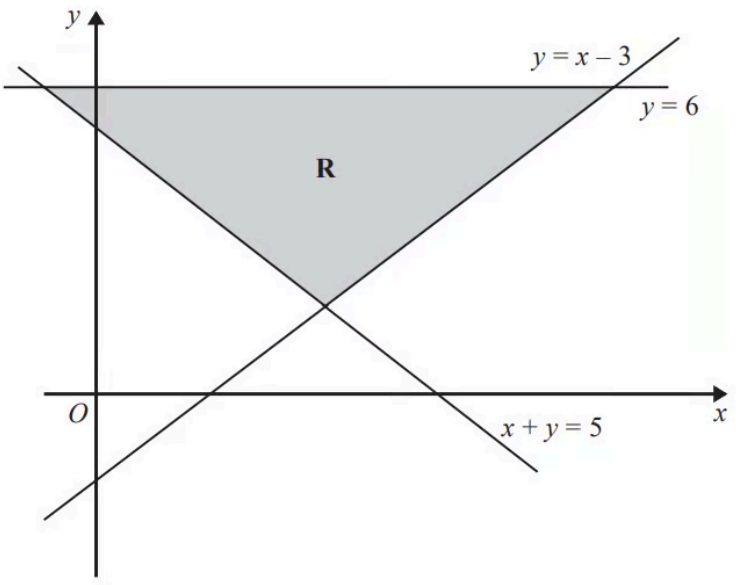


Diagram **NOT** accurately drawn

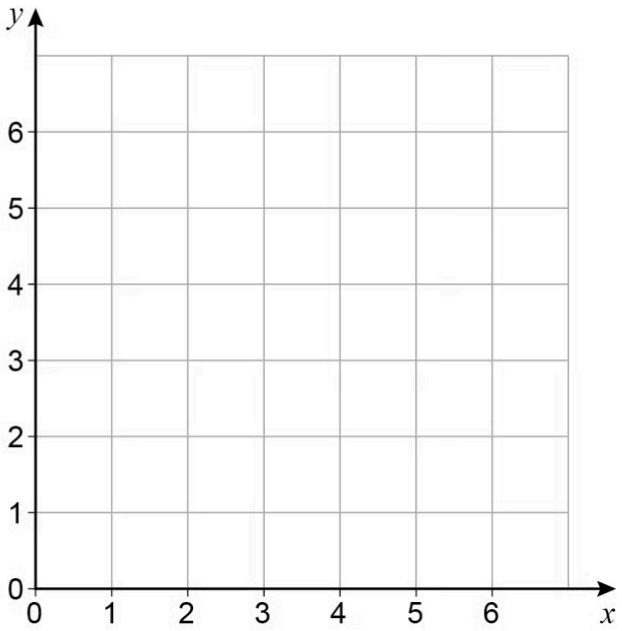
Write down the three inequalities that define the region **R**.

(2 marks)

7 On the grid, identify the region represented by

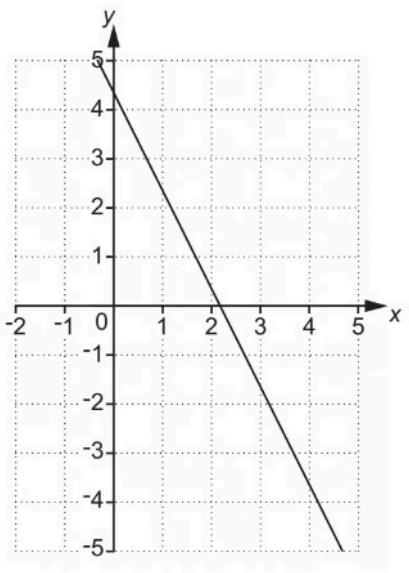
$$x \leqslant 5 \quad y \leqslant 4 \quad x + y > 6$$

Label the region R.



(3 marks)

8 The graph of $3y + 6x = 13$ is drawn on the grid.



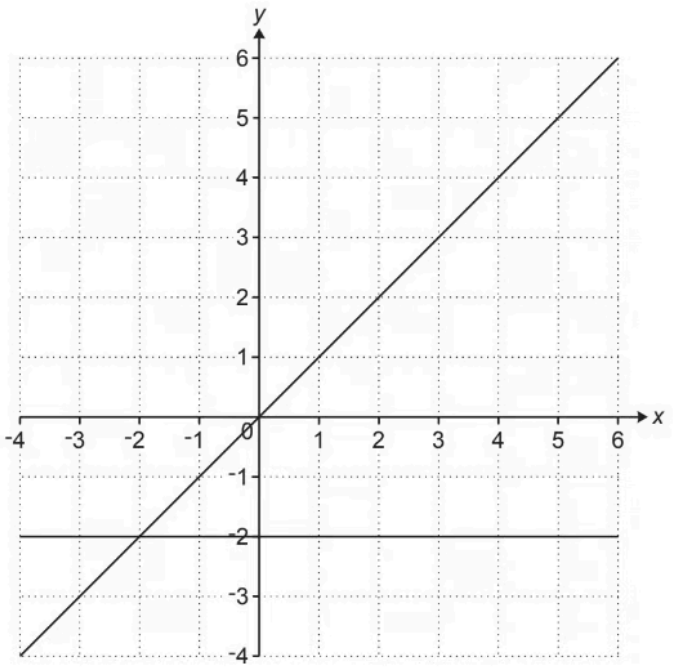
The region R satisfies these inequalities.

$$3y + 6x \geqslant 13 \qquad y \leqslant x - 2 \qquad x > 3$$

By drawing two more straight lines, find and label the region R.

(6 marks)

9 The graphs of $y = x$ and $y = -2$ are drawn on the grid.



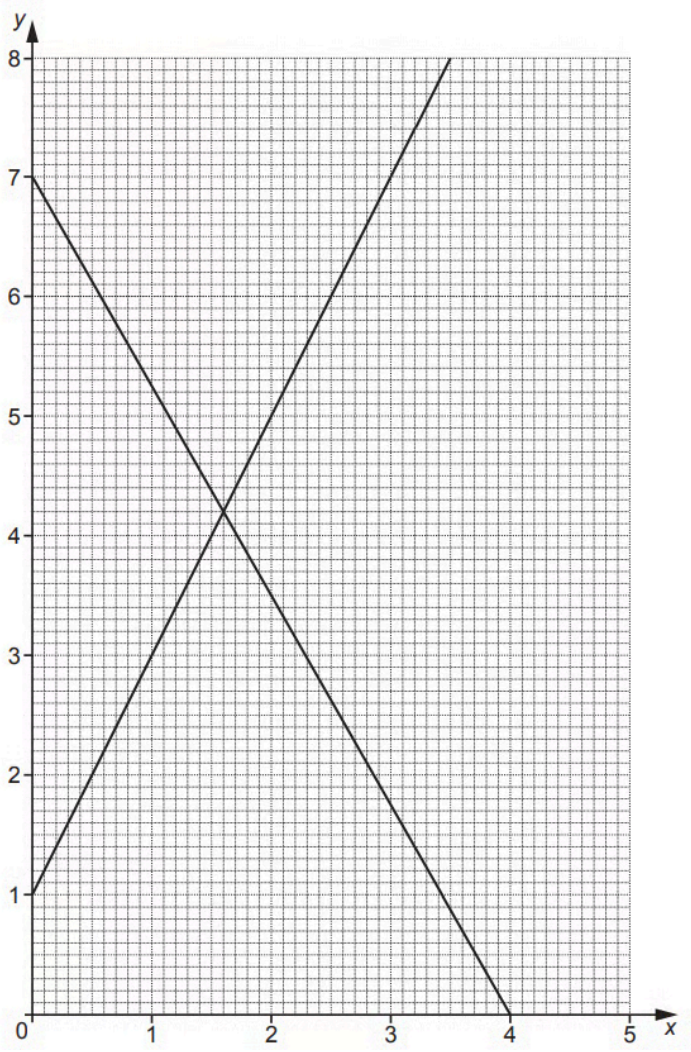
The region R satisfies the following inequalities.

$$y \geqslant -2 \qquad y \leqslant x \qquad y < 4 - 2x$$

By drawing one more line, find and label the region R.

(5 marks)

10 The diagram shows the lines $y = 2x + 1$ and $7x + 4y = 28$



The region R satisfies these inequalities.

$$y \leqslant 2x + 1 \qquad 7x + 4y \geqslant 28 \qquad y > 1$$

By drawing a third straight line, find and label the region R that satisfies these inequalities.

(5 marks)

Hard Questions

1 (a) Given that x and y are integers such that

$$3 < x < 7$$

$$4 < y < 9$$

and $x + y = 13$

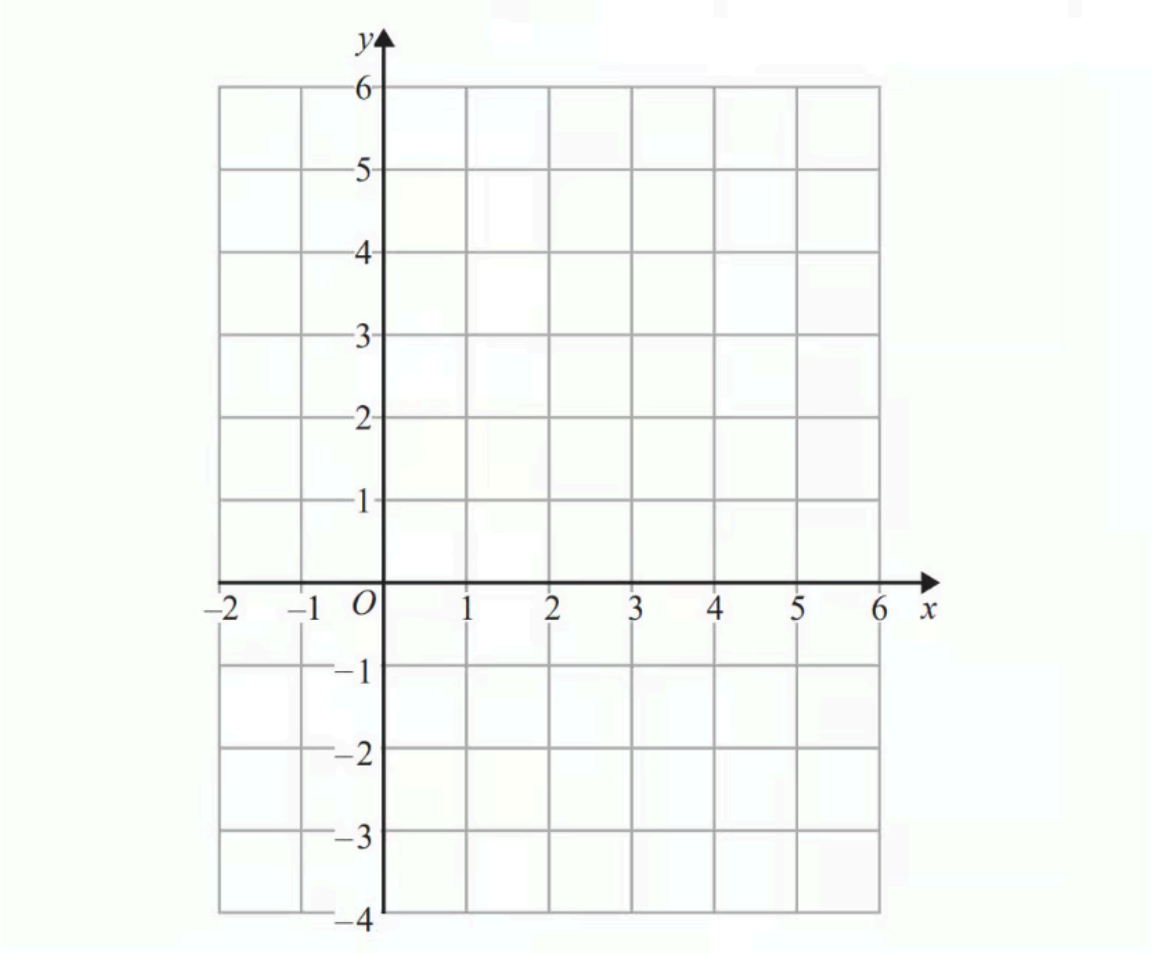
find all the possible values of x.

(2 marks)

(b) On the grid below show, by shading, the region defined by the inequalities

$y \geqslant -1$ $y \leqslant 4 - x$ $y \leqslant 3x - 1$

Mark this region with the letter R.

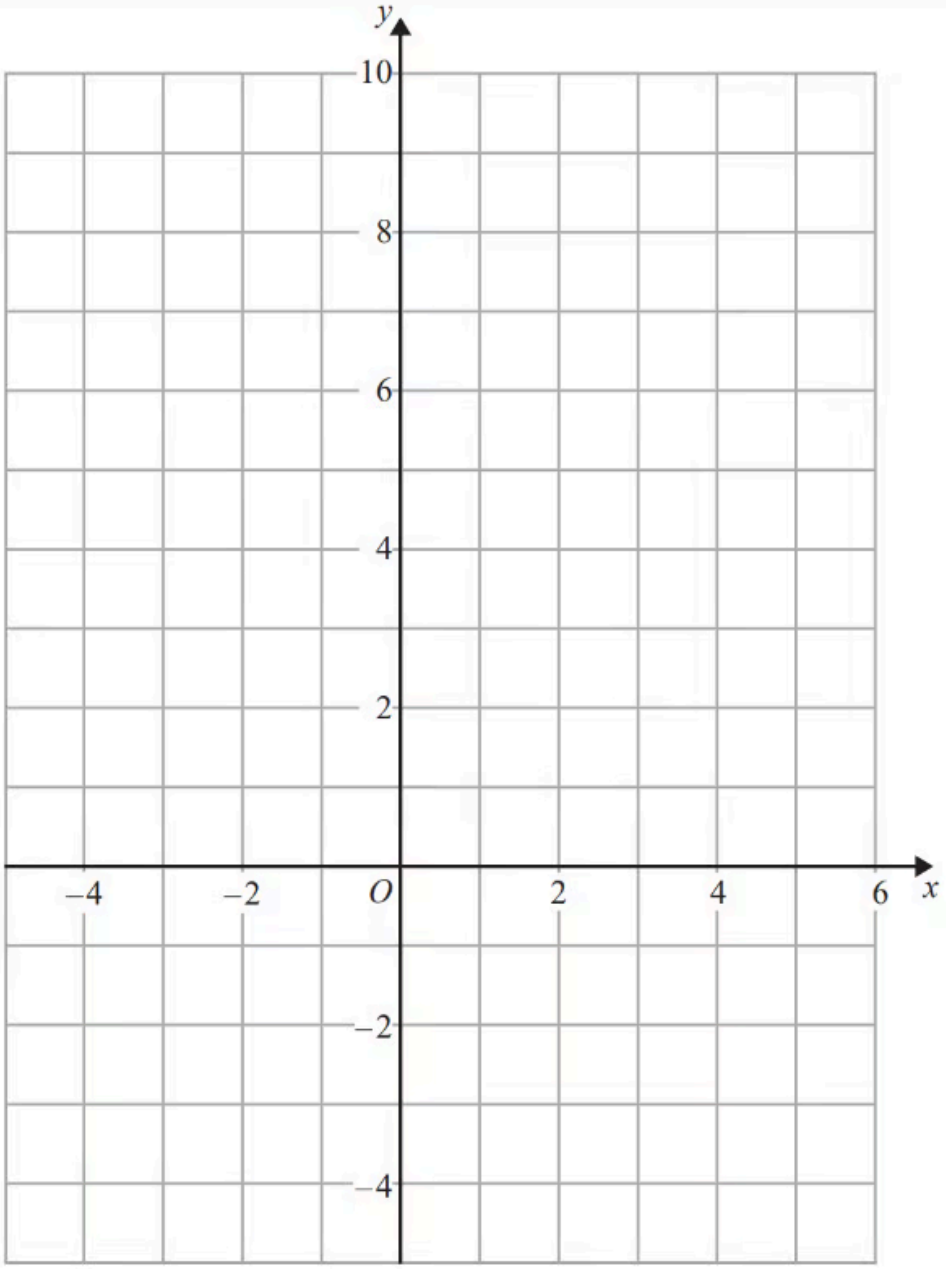


(4 marks)

2 On the grid, shade the region that satisfies all these inequalities.

$$x + y < 4 \qquad y > x - 1 \qquad y < 3x$$

Label the region **R**.

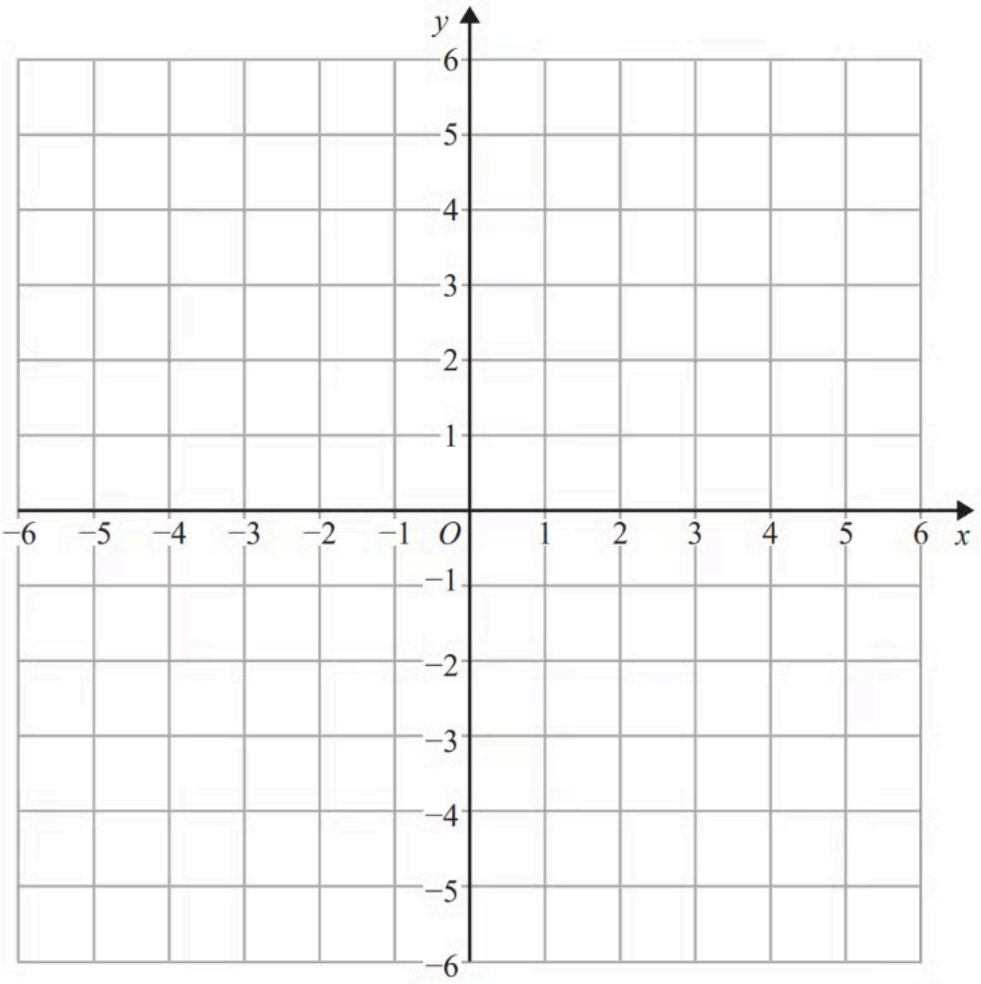


(4 marks)

3 On the grid, shade the region that satisfies all these inequalities.

$y > 1$ $x + y < 5$ $y > 2x$

Label the region **R**.

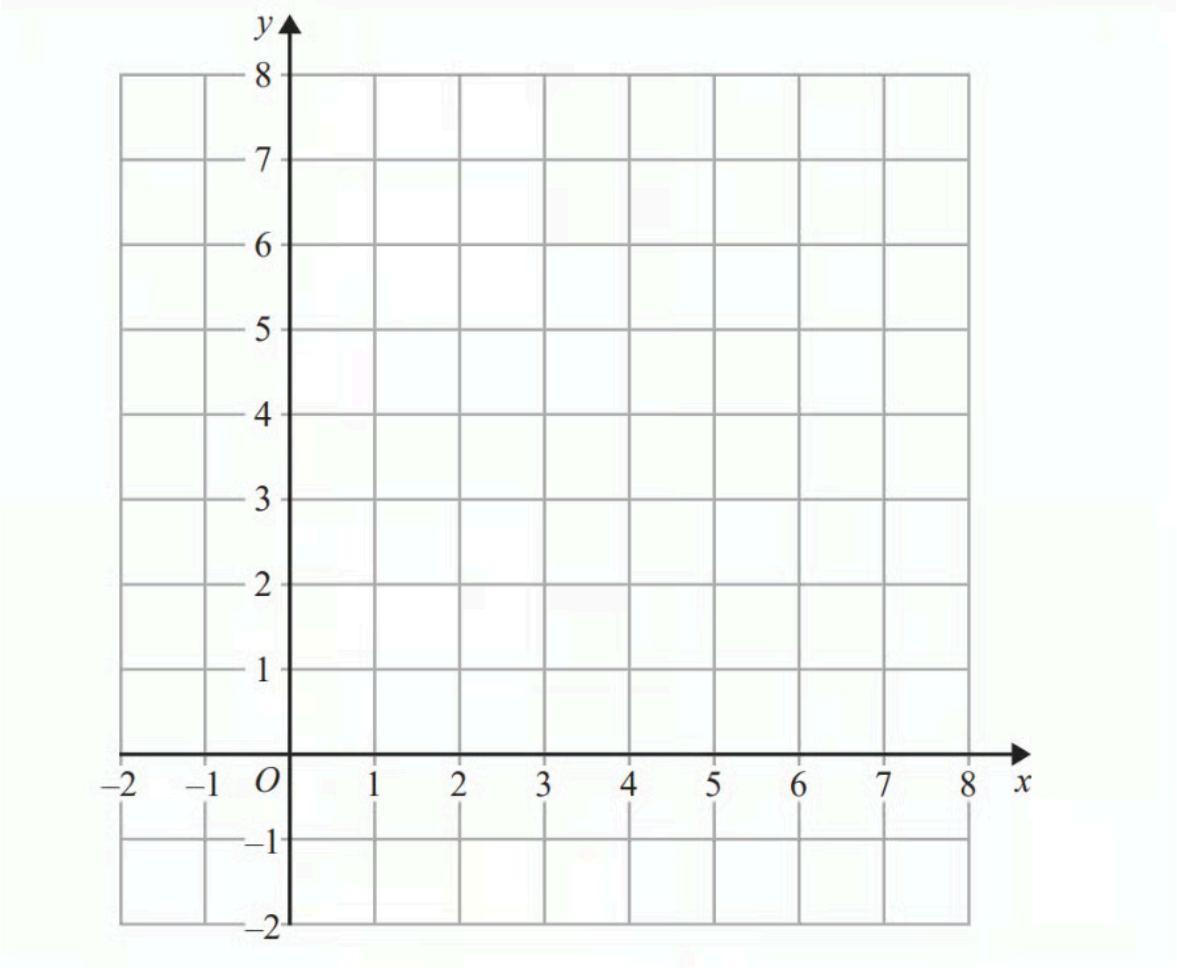


(3 marks)

4 On the grid show, by shading, the region that satisfies all three of the inequalities

$$x + y < 7 \qquad y < 2x \qquad y > 3$$

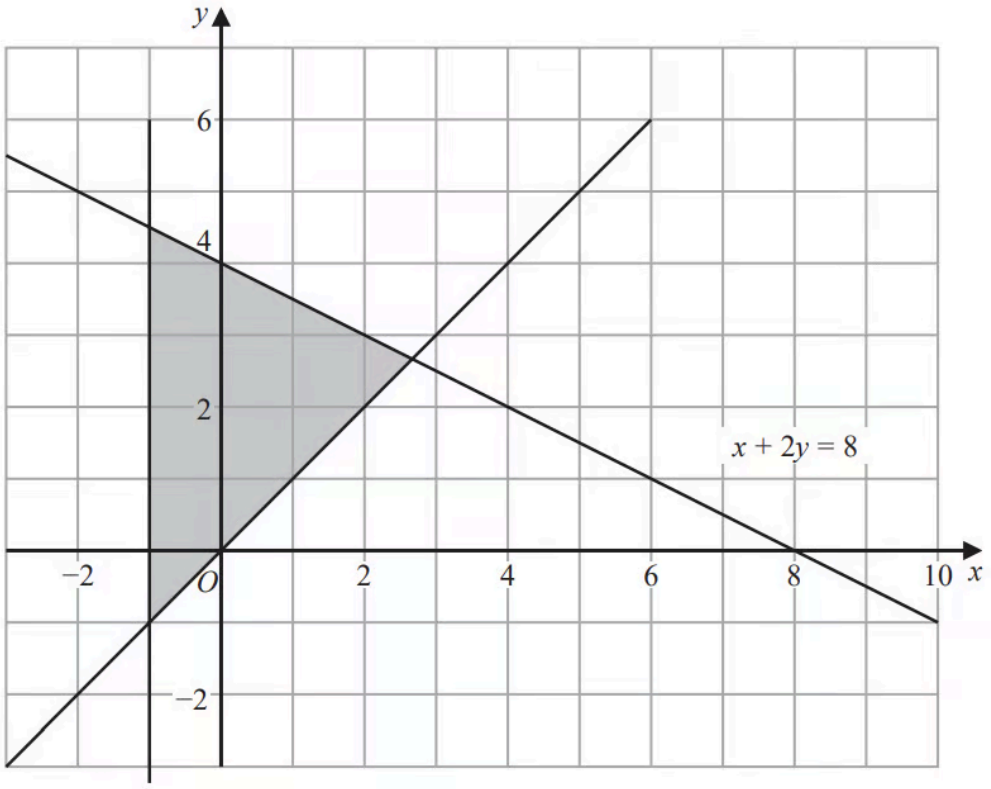
Label the region $\mathbf{R}$.



(4 marks)

5 The shaded region in the diagram is bounded by three lines.

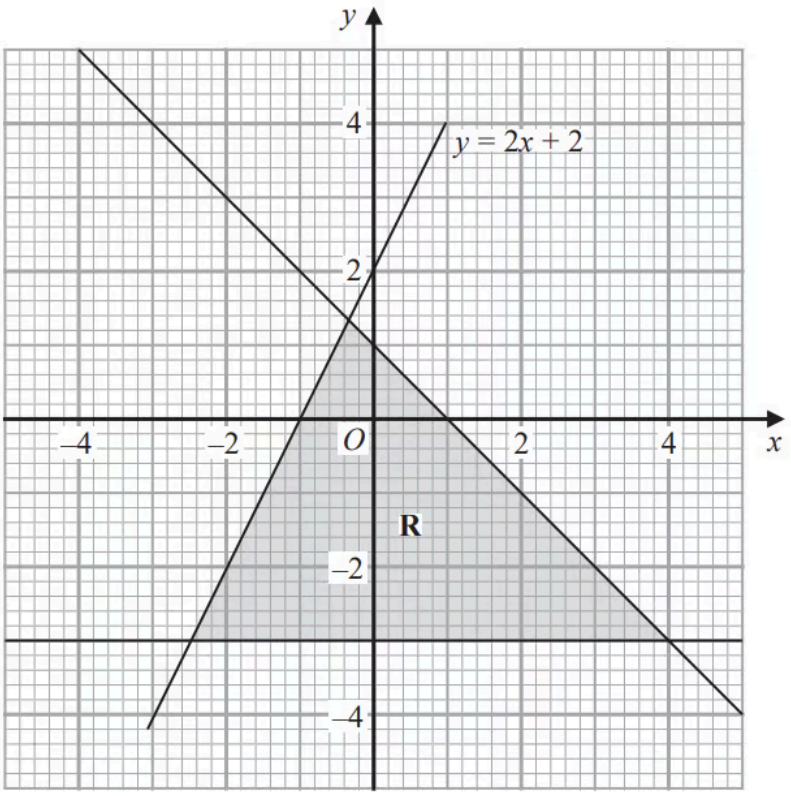
The equation of one of the lines is given.



Write down three inequalities that define the shaded region.

(3 marks)

6

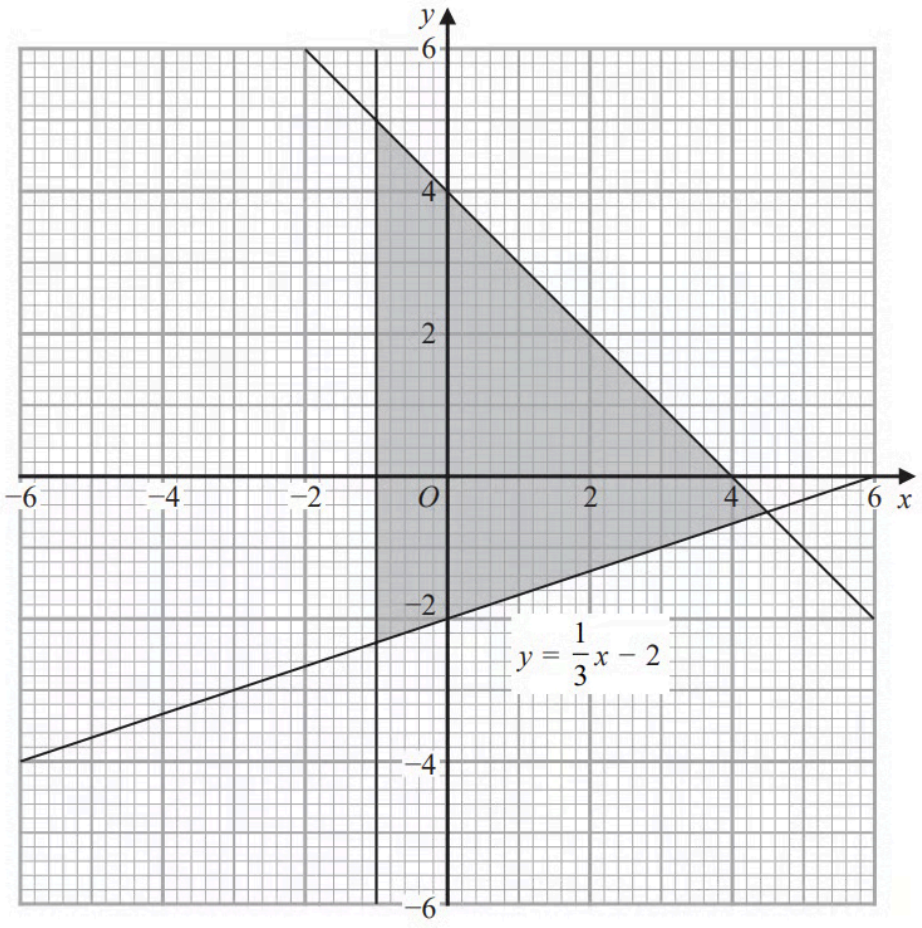


The region **R**, shown shaded in the diagram, is bounded by three straight lines. Write down the three inequalities that define **R**.

(3 marks)

7 The shaded region in the diagram is bounded by three lines.

The equation of one of the lines is given.



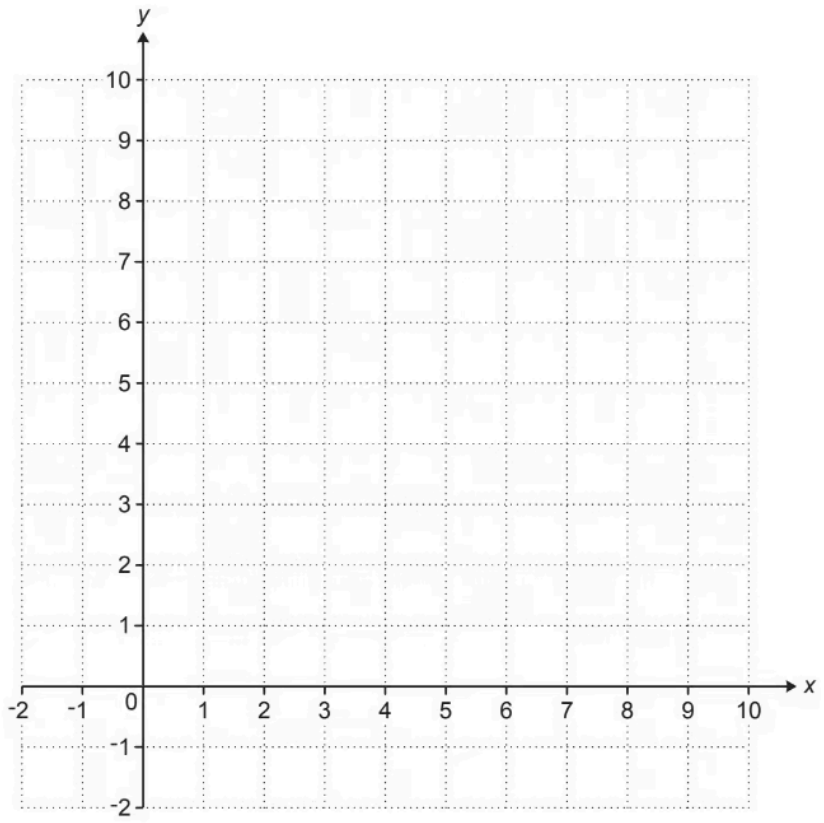
Write down the three inequalities that define the shaded region.

(3 marks)

8 Region **R** satisfies these inequalities.

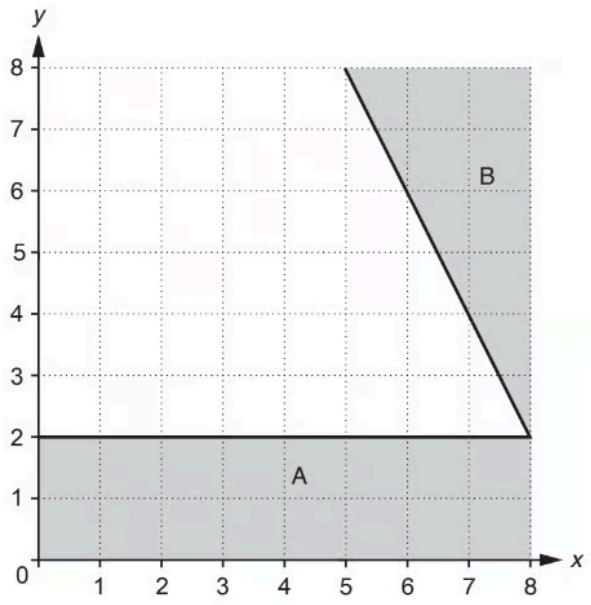
$$y > 3$$
$$y \geqslant x$$
$$x + y \leqslant 9$$

By drawing three straight lines on the grid, find and label the region **R**.



(6 marks)

9 (a) The diagram below shows a 1cm coordinate grid.



Find an inequality that defines region A and another inequality that defines region B.

(4 marks)

(b) Shade the region on the grid given by the inequality $y \geqslant 6$.

(2 marks)

(c) A fourth shaded region, given by the inequality

$$y \geqslant kx + 2 ,$$

is added to the grid.

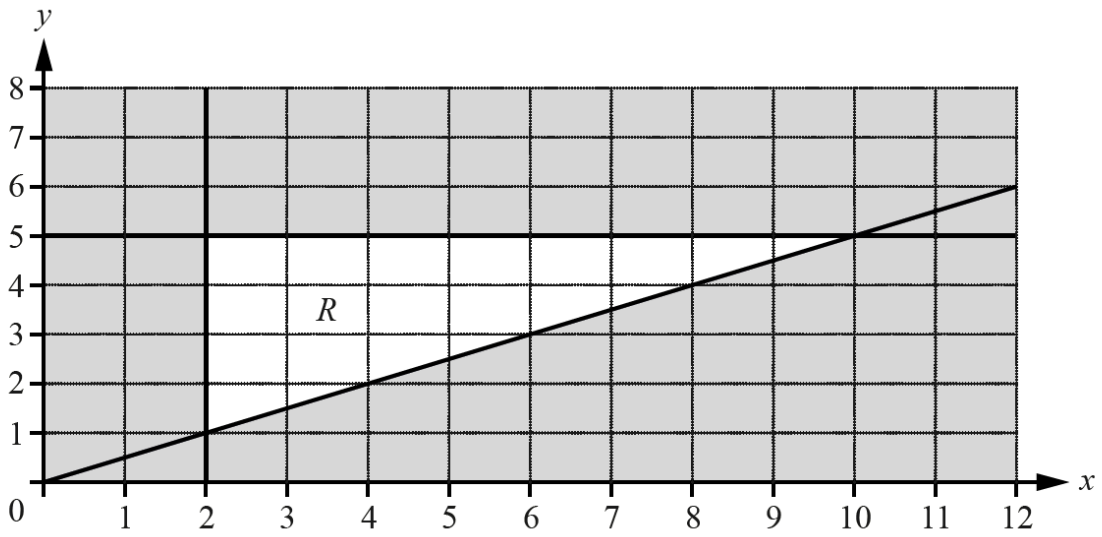
The **unshaded** region now has area 23cm^2.

Find the value of k.

k = ...

(5 marks)

10 (a)



Find the three inequalities that define the region R.

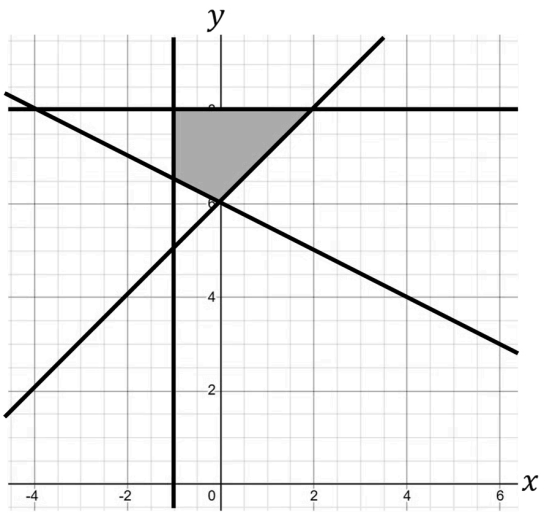
(4 marks)

(b) Find the point (x, y), with integer co-ordinates, inside the region R such that $3x + 5y = 35$.

(..... , ...)

(2 marks)

11 The shaded region shown on the grid is bounded by four straight lines.



Find the four inequalities that define the shaded region.

(4 marks)