IGCSE · Cambridge (CIE) · Maths

1 hour 20 questions

Exam Questions

Solving & Graphing Inequalities

Representing Inequalities as Regions / Finding Inequalities from Regions

Medium (6 questions)	/16
Hard (9 questions)	/36
Very Hard (5 questions)	/37
Total Marks	**/89**

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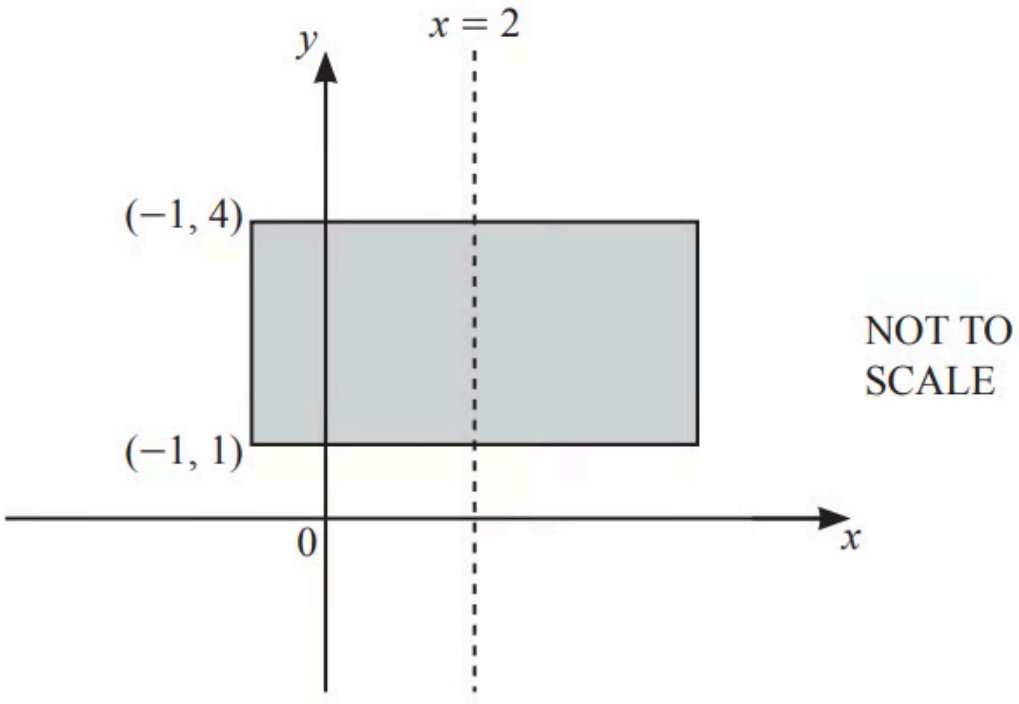
Medium Questions

1



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)

2 Solve the inequality.

$$\frac{x}{2} - 13 > 12 + 3x$$

(2 marks)

3 Solve the inequality.

$$3n - 5 > 17 + 8n$$

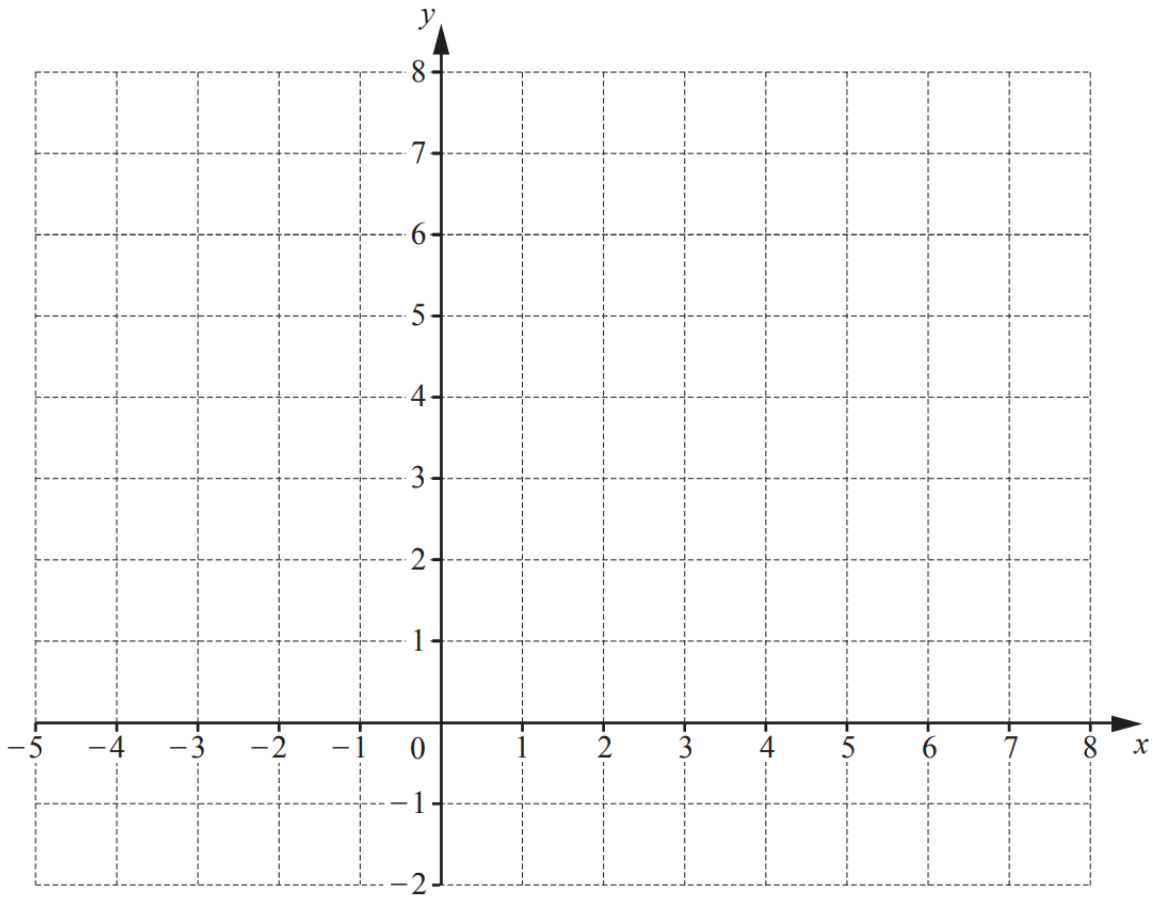
(2 marks)

4 Solve the inequality.

$$3x + 12 < 5x - 3$$

(2 marks)

5

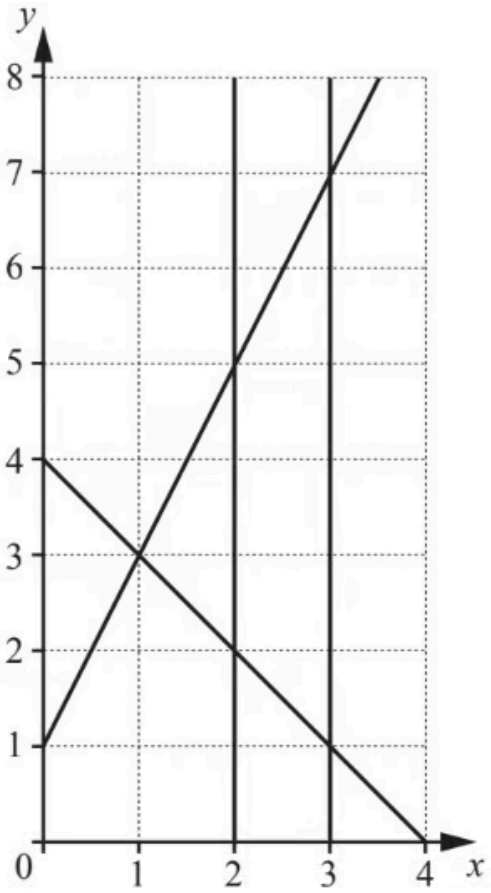


By shading the **unwanted** regions of the grid, draw and label the region R which satisfies the following three inequalities.

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

(5 marks)

6



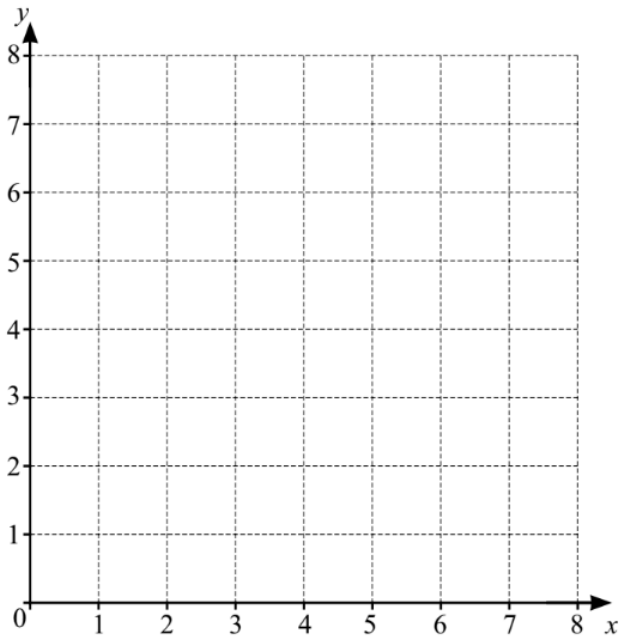
By shading the **unwanted** regions of the grid, find and label the region *R* that satisfies the following four inequalities.

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

(3 marks)

Hard Questions

1 (a)



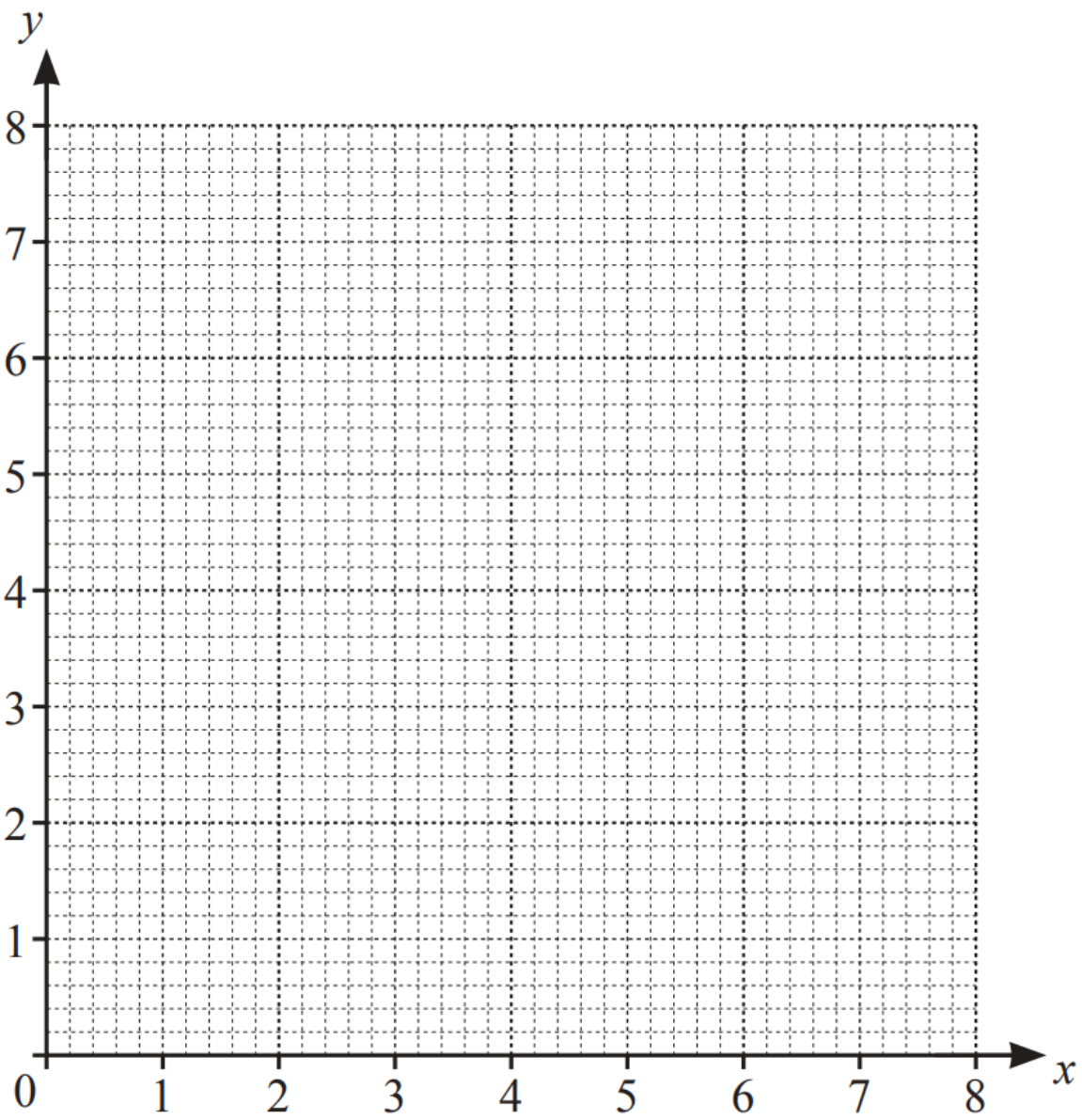
On the grid, draw the lines $y = x$ and $x + y = 7$.

(3 marks)

(b) Region R satisfies the three inequalities $y \geqslant 0$, $y \leqslant x$ and $x + y \geqslant 7$. On the grid, label the region R.

(1 mark)

2

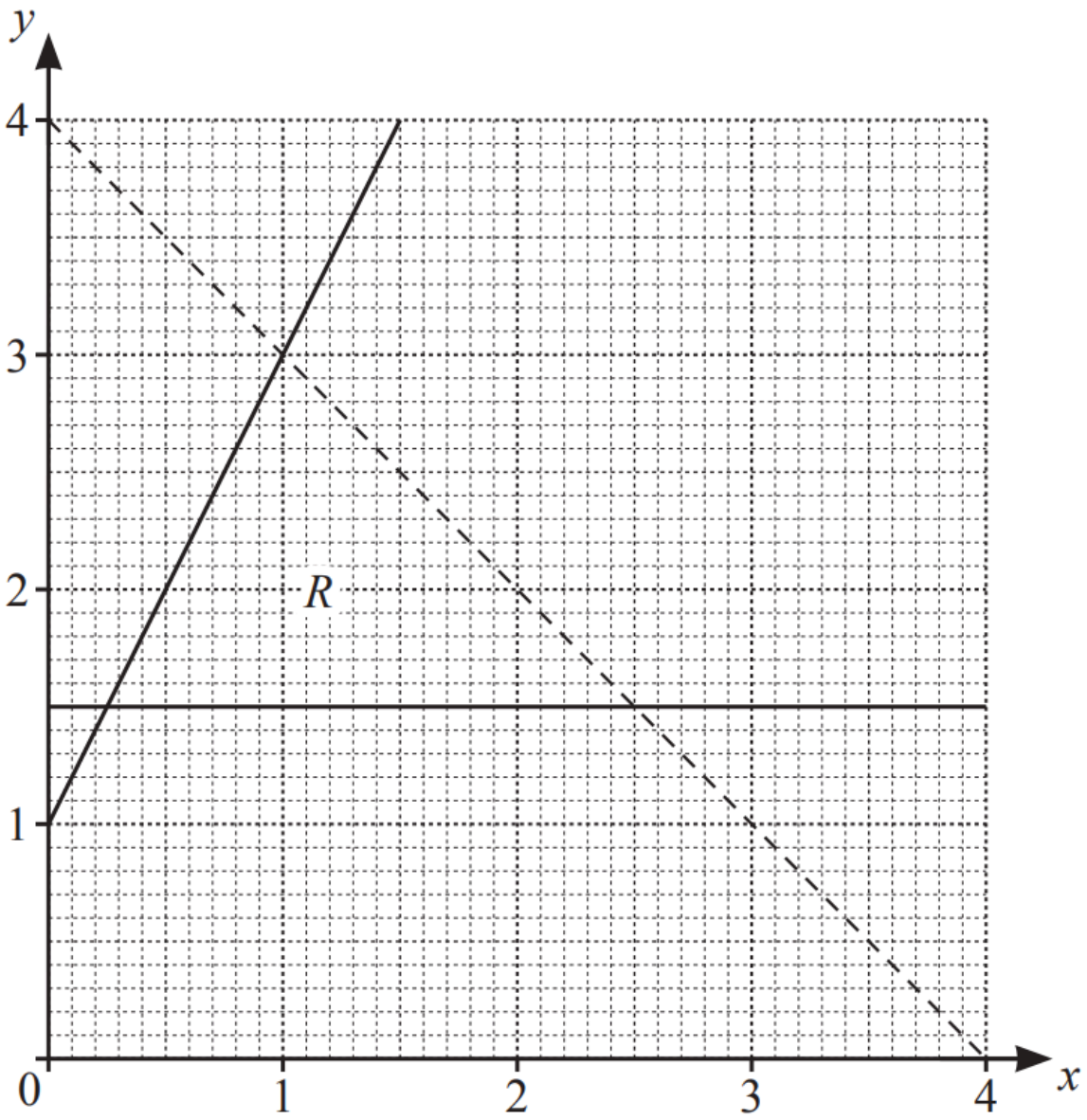


By drawing suitable lines and shading unwanted regions, find the region, R, where

$$x \geq 2, \quad y \geq x \quad \text{and} \quad 2x + y \leq 8.$$

(5 marks)

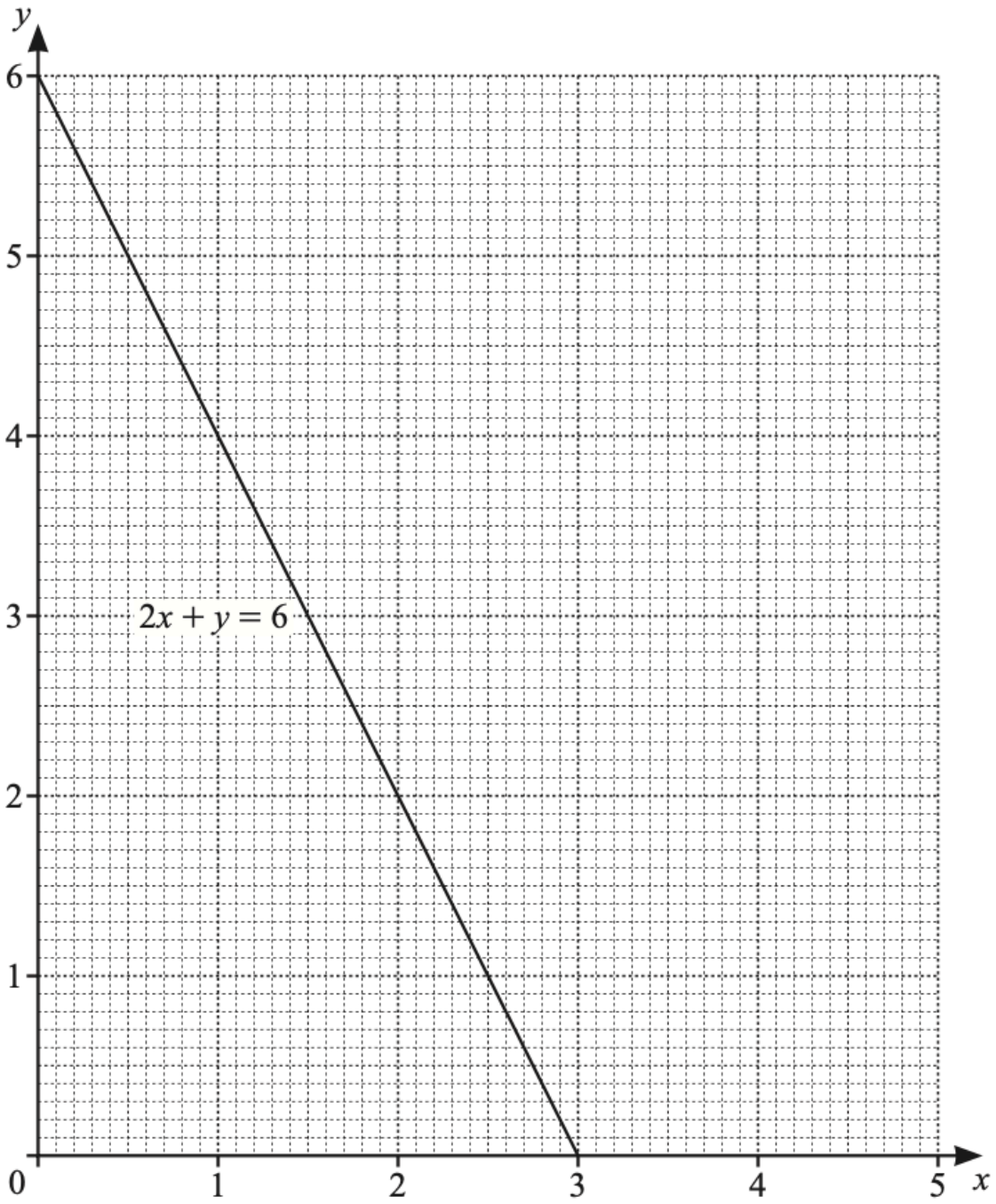
3



Write down the three inequalities that define the region R.

(4 marks)

4

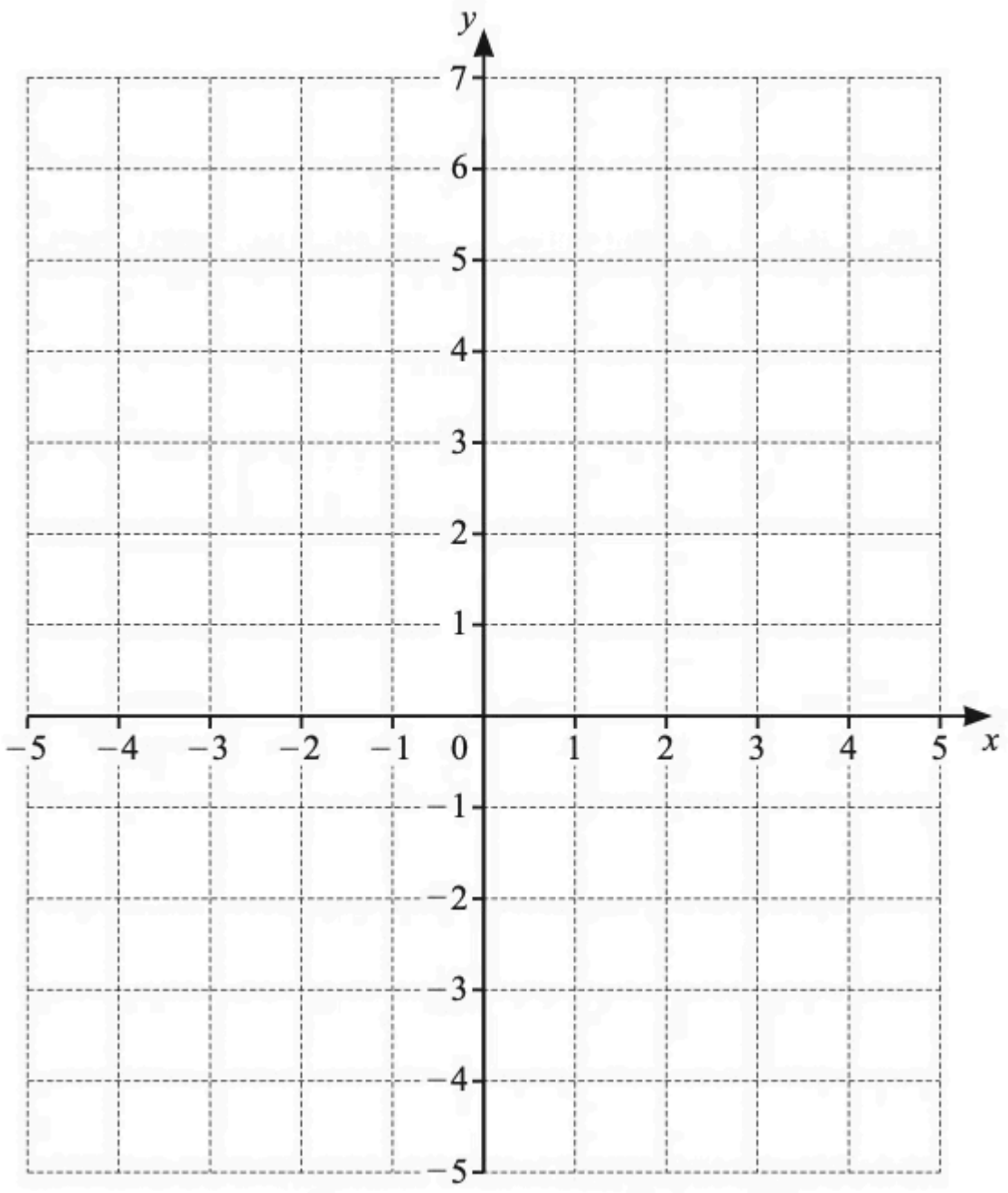


By shading the **unwanted** regions of the grid, find and label the region R that satisfies the following inequalities

$$y \leq 5 \qquad 2x + y \geq 6 \qquad y \geq x + 1$$

(4 marks)

5

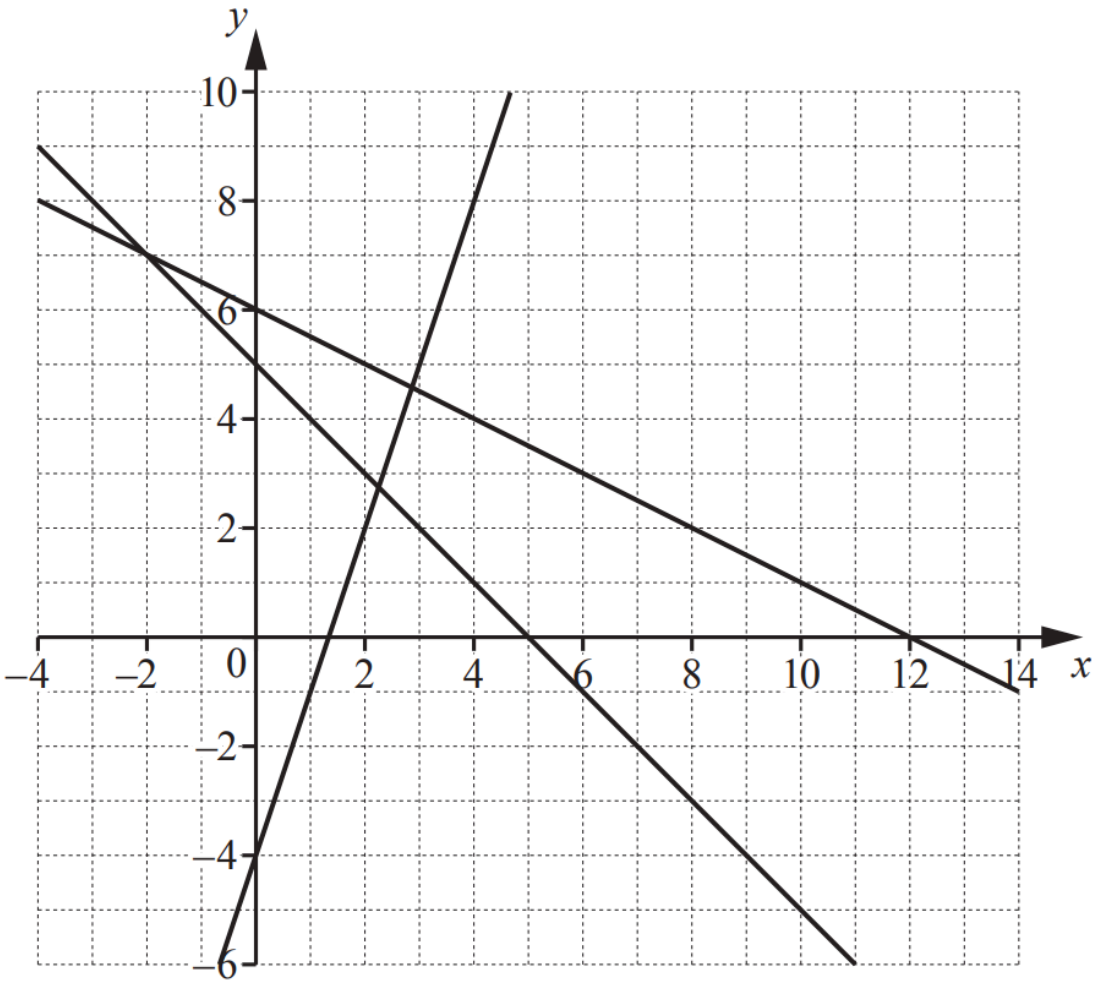


By shading the **unwanted** regions on the grid, draw and label the region R that satisfies the following inequalities.

$$-2 < x \leq 3 \qquad y \leq x + 3$$

(4 marks)

6

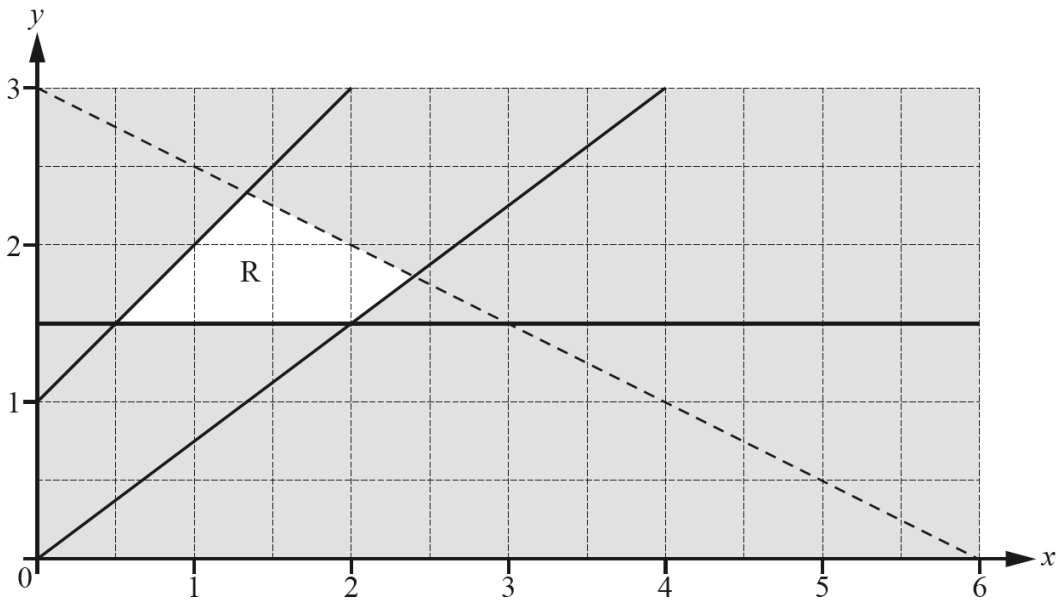


$$y \leq -\frac{1}{2}x + 6 \quad y \geq 3x - 4 \quad x + y \geq 5$$

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

(2 marks)

7

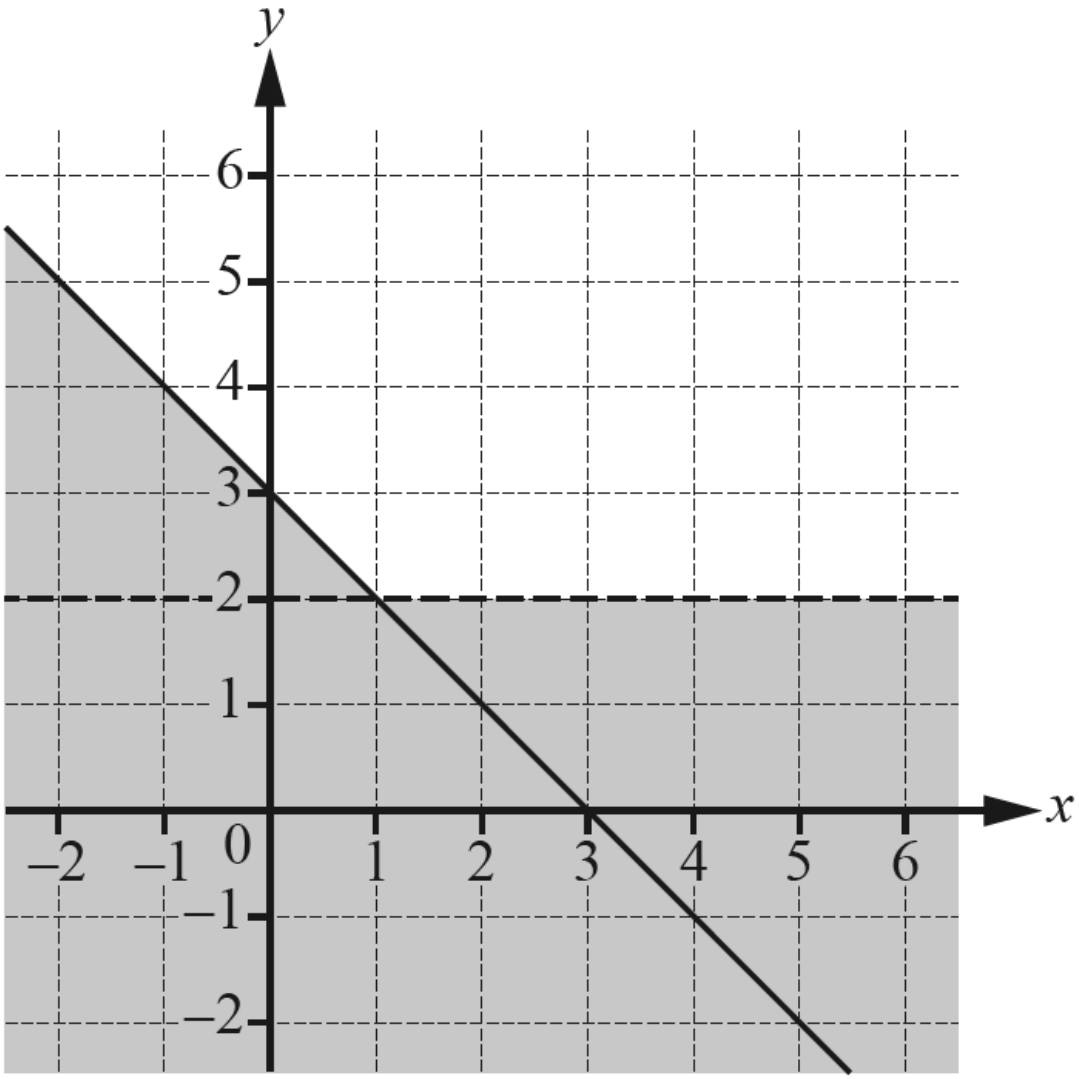


There are four inequalities that define the region R.
One of these is $y \leq x + 1$.

Find the other three inequalities.

(4 marks)

8



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

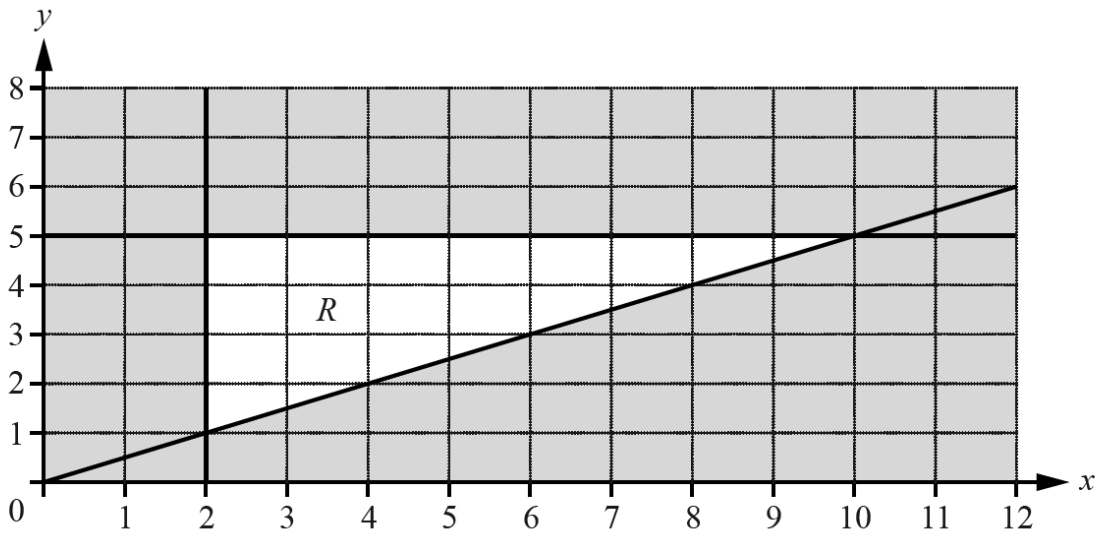
(3 marks)

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

(..... , ...)

(2 marks)

(b)



Find the three inequalities that define the region R.

(4 marks)

Very Hard Questions

1 (a) Raheem makes baskets and mats.
Each week he makes x baskets and y mats.

He makes fewer than 10 mats.
The number of mats he makes is greater than or equal to the number of baskets he makes.

One of the inequalities that shows this information is $y < 10$.

Write down the other inequality.

(1 mark)

(b) Raheem takes $2\frac{1}{4}$ hours to make a basket and $1\frac{1}{2}$ hours to make a mat.

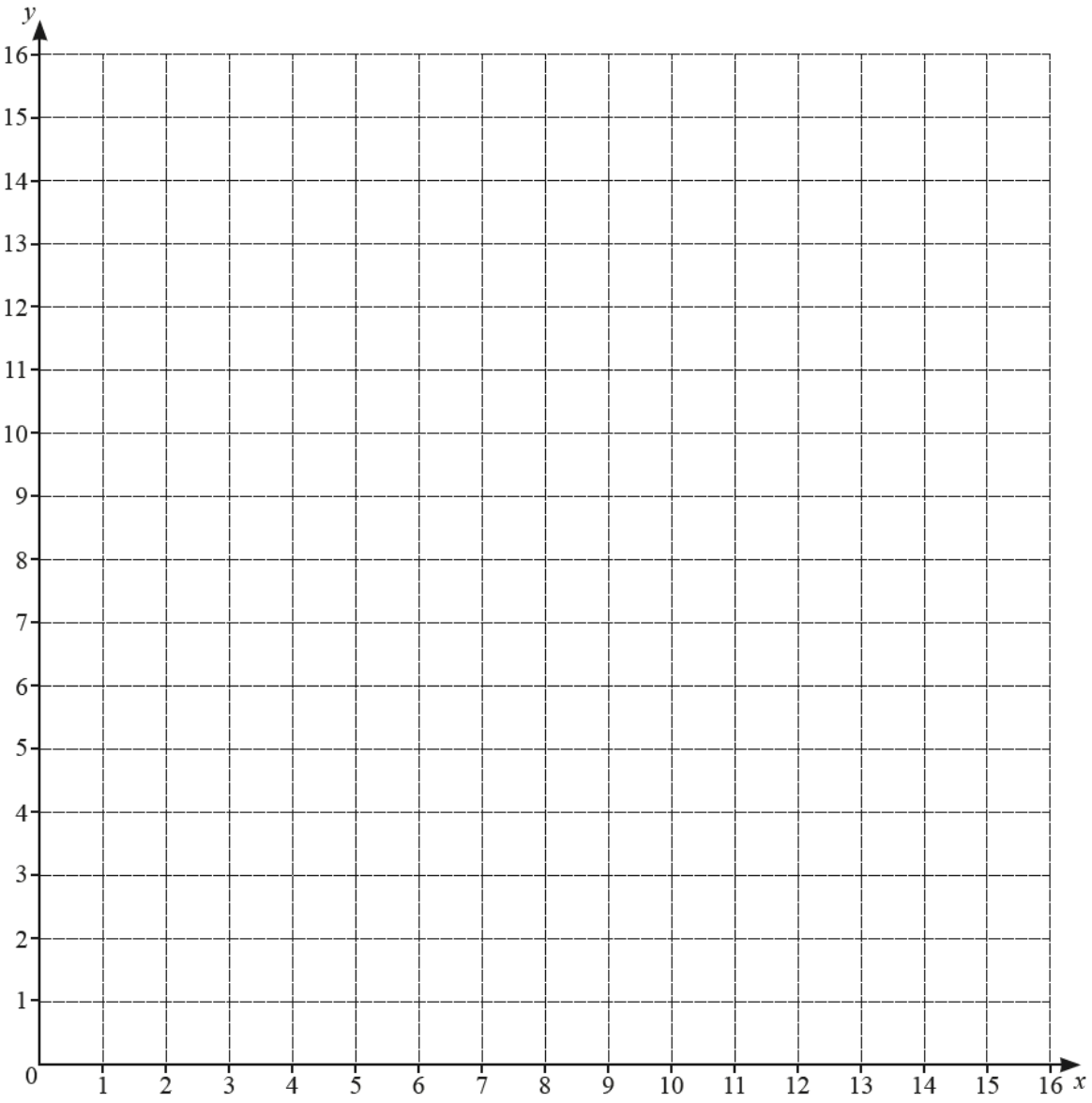
Each week he works for a maximum of 22.5 hours.

Show that $3x + 2y \leq 30$.

(2 marks)

(c) On the grid, draw three straight lines and shade the unwanted regions to show these

inequalities.



(5 marks)

2 (a) A car hire company has x small cars and y large cars.

The company has at least 6 cars in total.

The number of large cars is less than or equal to the number of small cars.

The largest number of small cars is 8.

Write down three inequalities, in terms of x and/or y, to show this information.

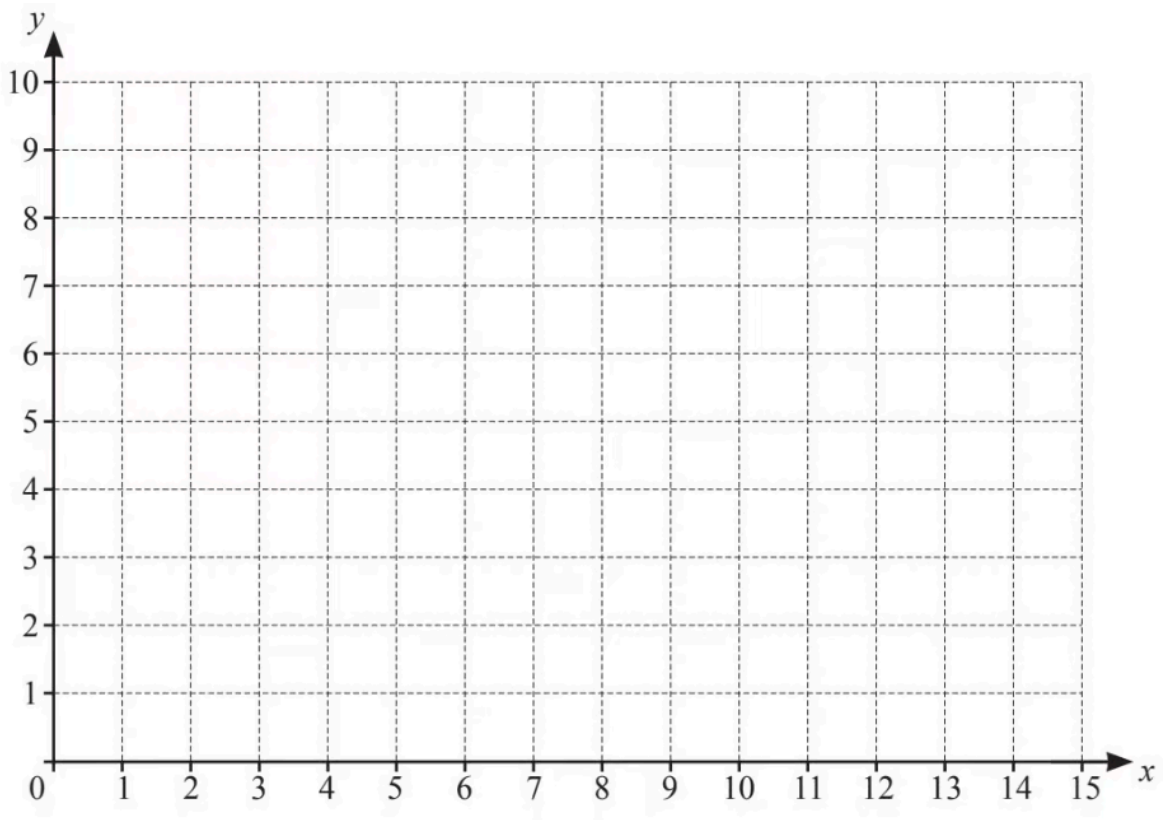
(3 marks)

(b) A small car can carry 4 people and a large car can carry 6 people. One day, the largest number of people to be carried is 60.

Show that $2x + 3y \leq 30$.

(1 mark)

(c)



By shading the **unwanted** regions on the grid, show and label the region *R* that satisfies all four inequalities.

(6 marks)

3 (a) Klaus buys x silver balloons and y gold balloons for a party.

He buys

- more gold balloons than silver balloons
- at least 15 silver balloons
- less than 50 gold balloons
- a total of no more than 70 balloons.

Write down four inequalities, in terms of x and/or y, to show this information.

.....

.....

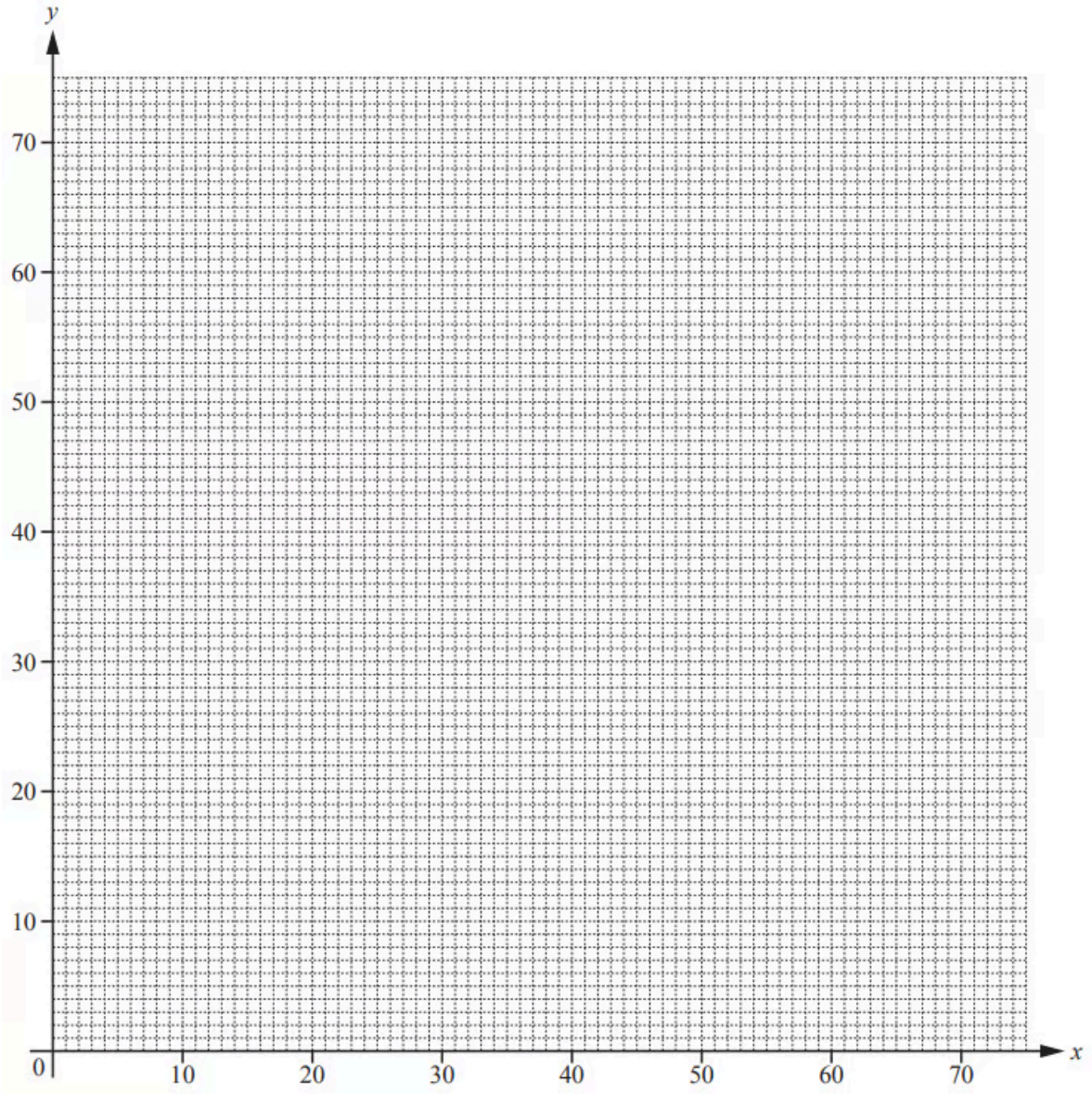
.....

.....

(4 marks)

(b) On the grid, show the information from **part (a)** by drawing four straight lines and

shading the unwanted regions.



(5 marks)

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

$$3 < x < 7$$
$$4 < y < 9$$
$$\text{and } x + y = 13$$

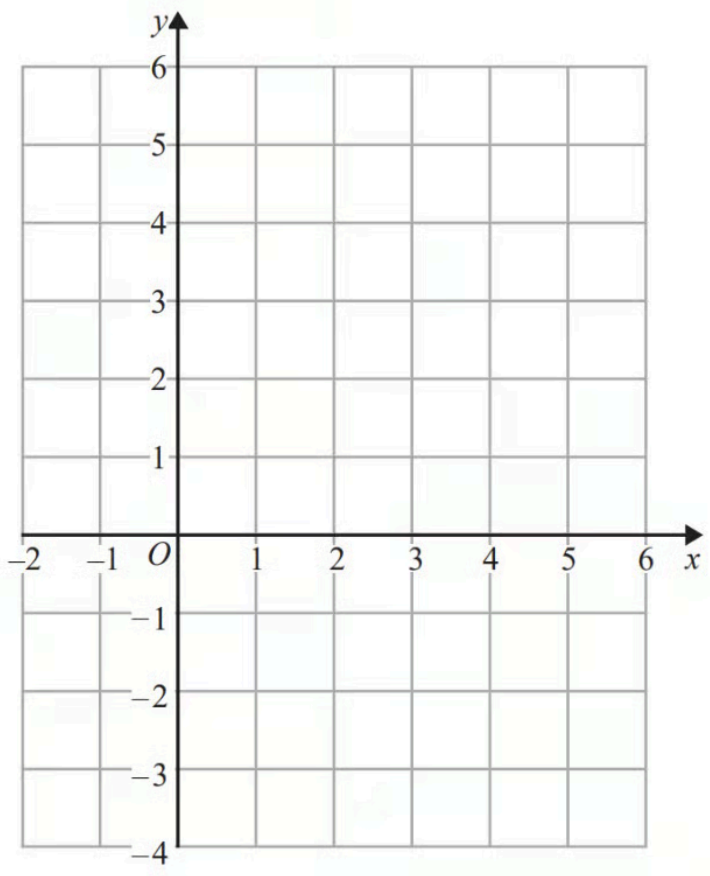
find all the possible values of x.

(2 marks)

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

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

Mark this region with the letter *R*.

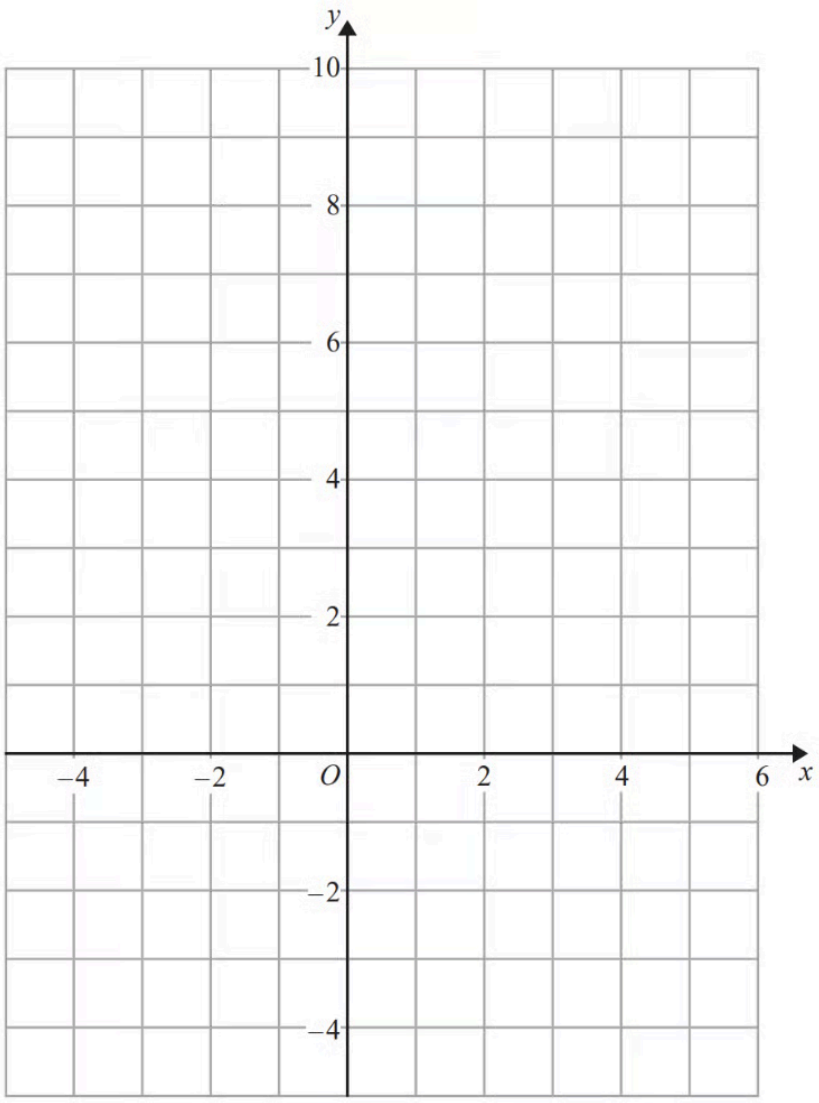


(4 marks)

5 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)