QT - Inequalities on Graphs
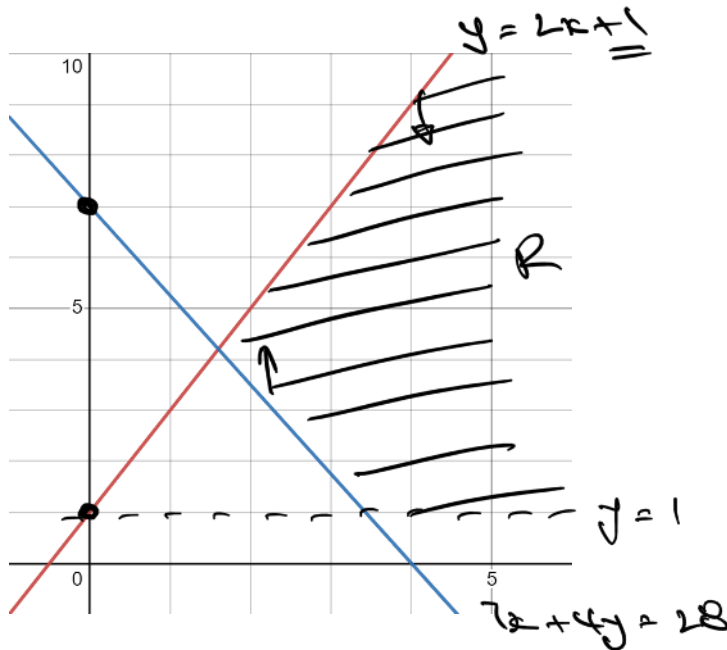
1. The diagram shows the lines y = 2x + 1 and 7x + 4y = 28. The region R satisfies these inequalities.   y ≤ 2x+ 1   7x+4y ≥ 28   y > 1
By drawing a third straight line, find and label the region R that satisfies these inequalities.
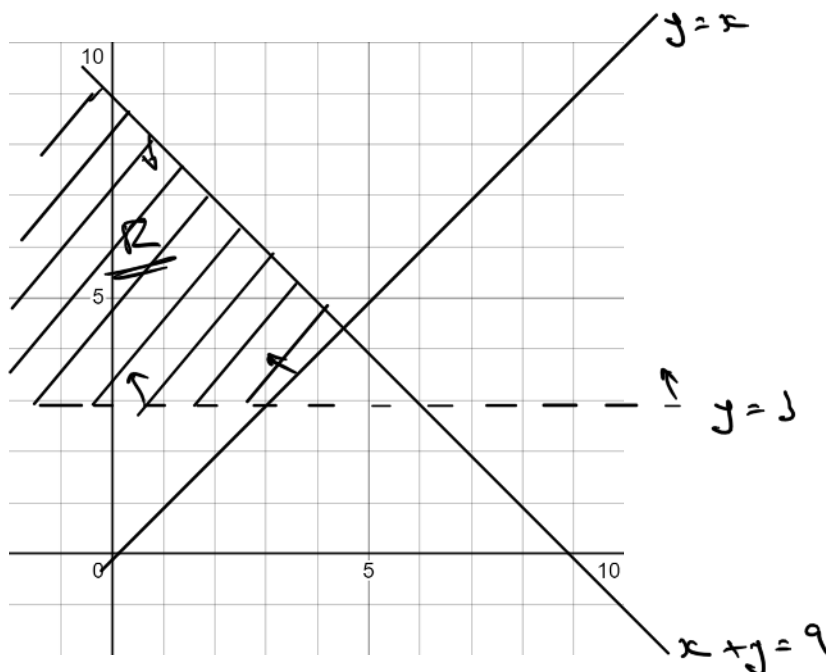   (4 marks)

$y = 2x+1$

$x = 0$
$y = 7(0) + 4y ≥ 28$
$4y ≥ 28$
$y ÷ 7$

$y = 1$

$7x + 4y ≥ 28$

2. Region R satisfies these inequalities: y > 3   y ≥ x   x + y ≤ 9
By drawing three straight lines on the grid, find and label the region R.   (4 marks)
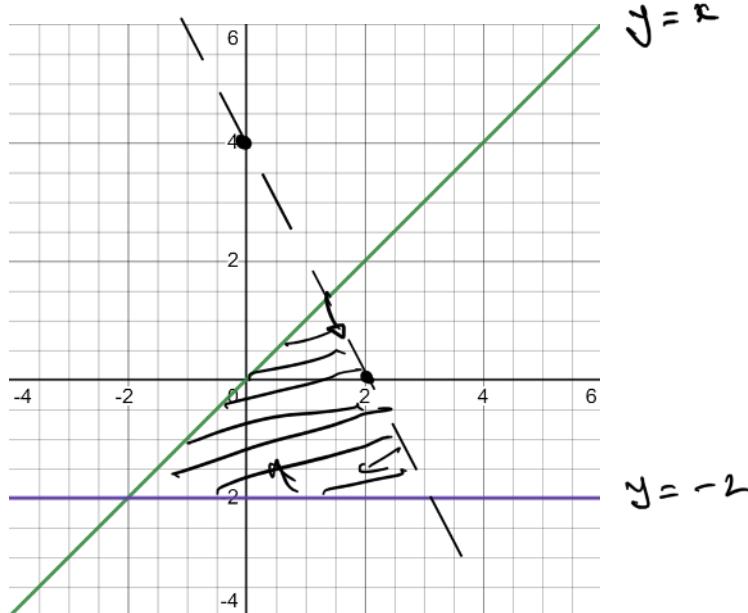
$y ≥ x$

$y = 3$

$x + y = 9$

QT - Inequalities on Graphs

3. The graphs of y = x and y = -2 are drawn on the grid. The region R satisfies the following inequalities: y ≥ -2   y ≤ x   y < 4 - 2x

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

$y = 4 - 2x$

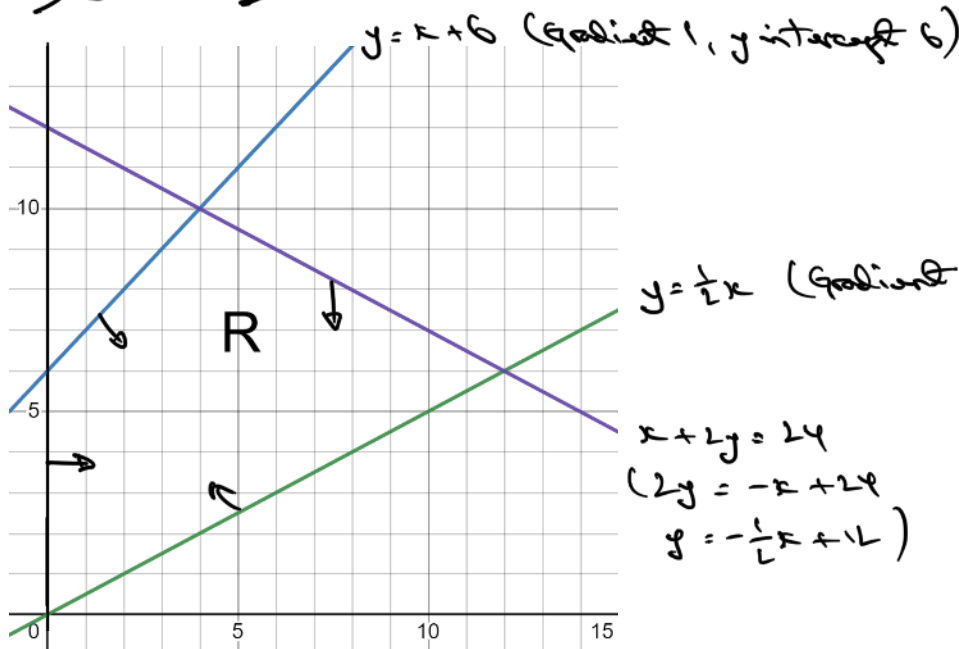$$\begin{array}{c|cc} x & 0 & 2 \\ \hline y & 4 & 0 \end{array}$$

$y = x$

$y = -2$

4. The region R is shown on this grid.

Region R is defined by four inequalities.

One of the inequalities is x ≥ 0.

Use the symbols ≤ and ≥ to complete the other three inequalities:

$x ≥ 0$ y __≥__ ½ x   x + 2y __≤__ 24   y __≤__ x + 6

$y = x + 6$ (Gradient 1, y intercept 6)

$y = \frac{1}{2}x$ (Gradient $\frac{1}{2}$, y intercept 0)

$x + 2y = 24$
$(2y = -x + 24$
$y = -\frac{1}{2}x + 12)$
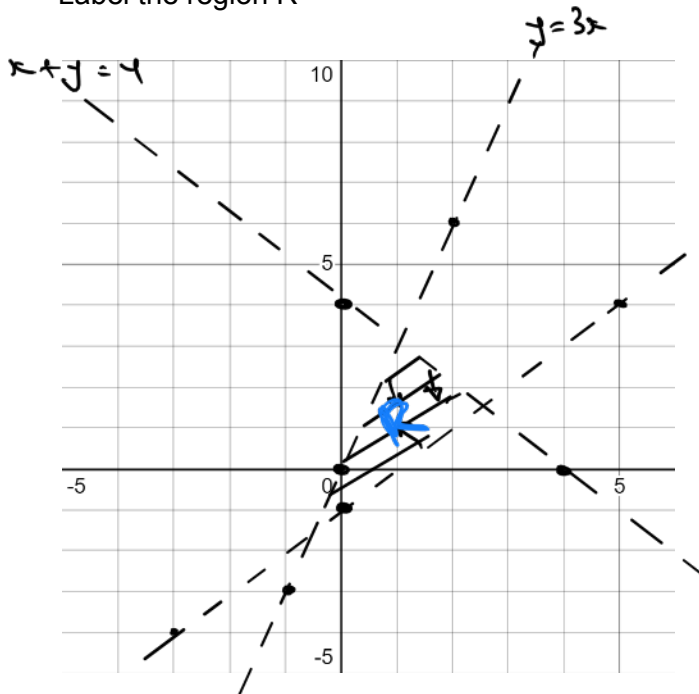
R

QT - Inequalities on Graphs

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

$y = 3x$

$x + y = 4$

$y = x - 1$

x	0	5	-3
y	-1	4	-4

$y = x - 1$

$y = 3x$

x	0	2	-1
y	0	6	-3

6. For her maths homework, Helen answered the following question.
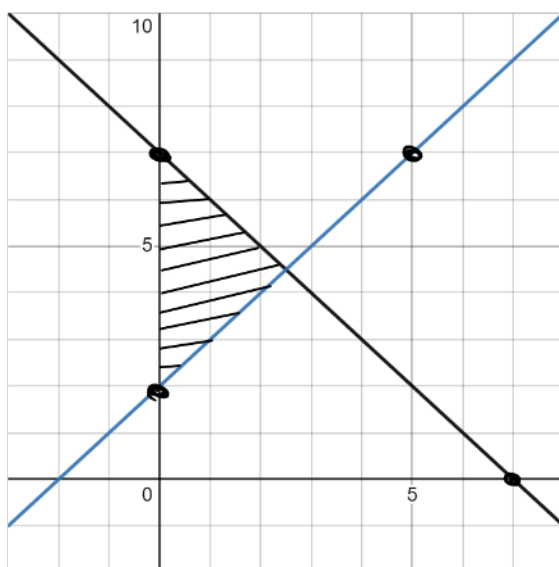Shade the region that is defined by all these inequalities.

$x + y \leq 6$ $\qquad$ $y \geq 0$ $\qquad$ $y \leq x + 2$

Here is Helen's answer. Helen made some mistakes when she answered the question.
Write down two mistakes Helen made.

$x + y = 6$

x	0	6
y	6	0

1. She has plotted $x + y = 7$

2. Helen has plotted $x \geq 0$

3. $y = x + 2$ ✓

x	0	5
y	2	7

shaded $y \geq x + 2$

should be

$y \leq x + 2$

QT - Inequalities on Graphs
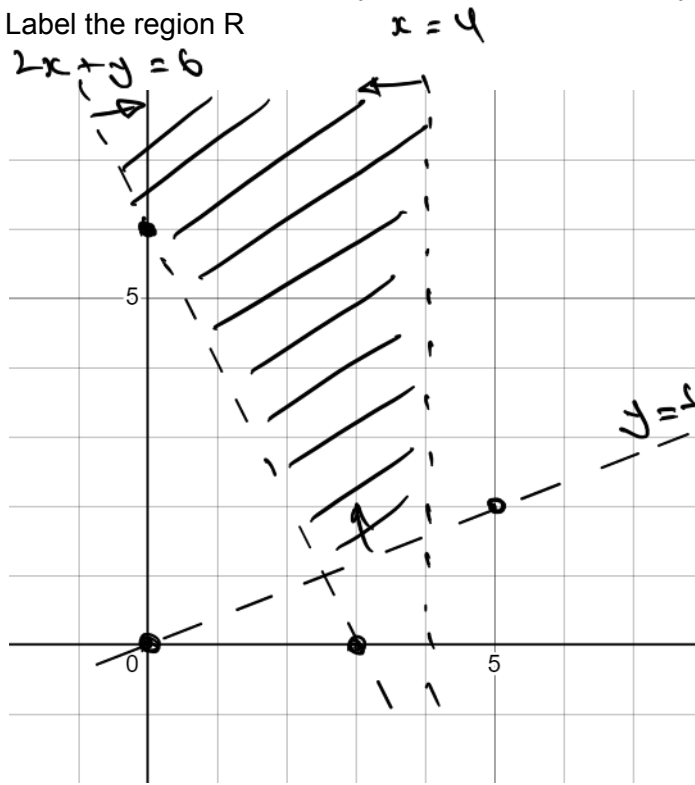
7. On the grid show, by shading, the region defined by the inequalities:

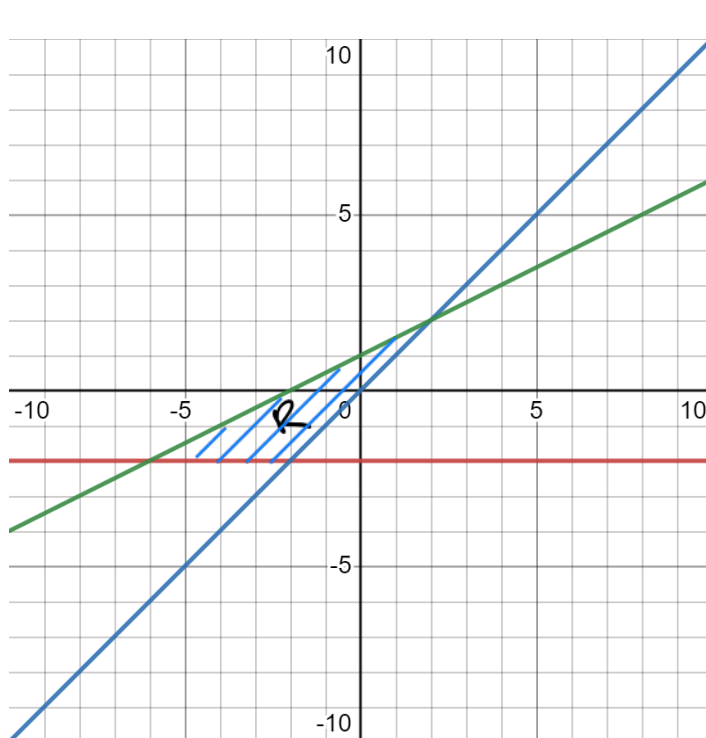$x < 4$ $2x + y > 6$ $y > \frac{1}{3}x$

Label the region R

$x = 4$

$2x + y = 6$

$2x + y = 6$

x	0	3
y	6	0

$y = \frac{1}{3}x$

$y = \frac{1}{3}x$

x	0	6
y	0	2

8. Write down the three inequalities that define the shaded region.

$y = x$

$y = \frac{1}{2}x + 1$

$y = 2$

$y \geq 2$

$y \geq x$

$y \leq \frac{1}{2}x + 1$