

INEQUALITY GRAPHS

DATE OF SOLUTIONS: 15/05/2018
 MAXIMUM MARK: 47

SOLUTIONS

GCSE (+ IGCSE) EXAM QUESTION PRACTICE

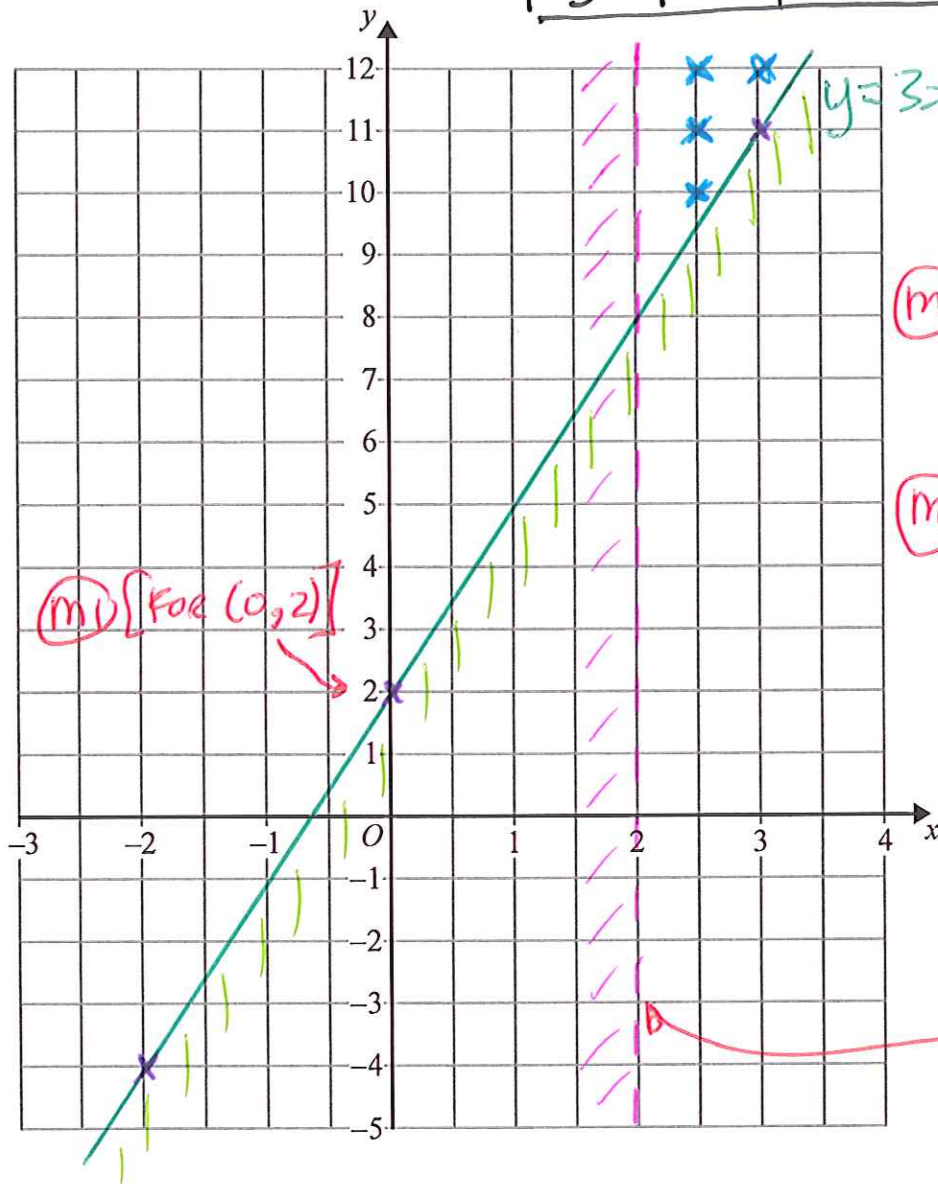
1. [Edexcel, 2015]

Inequality Graphs [5 Marks]

(a) On the grid, draw the graph of $y = 3x + 2$ for values of x from -2 to 3

$y = mx + c$

x	-2	0	3
y	-4	2	11



(M1) [(-2, -4) AND (3, 11)]

(M1) [LINE DRAWN]

(M1) [LINE]

(3)

(b) Mark with a cross (x) a point on the grid that satisfies both the inequalities

$x > 2$ and $y > 3x + 2$

Label this point P.

P IS ANY OF THE FOUR POINTS

(2)

'x' (M1)

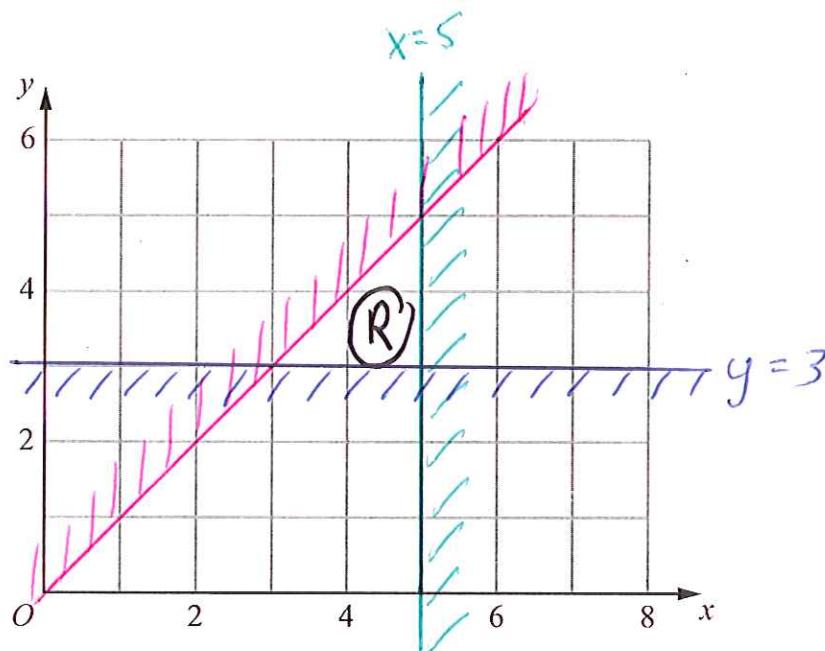
Show, by shading on the grid, the region defined by all three of the inequalities

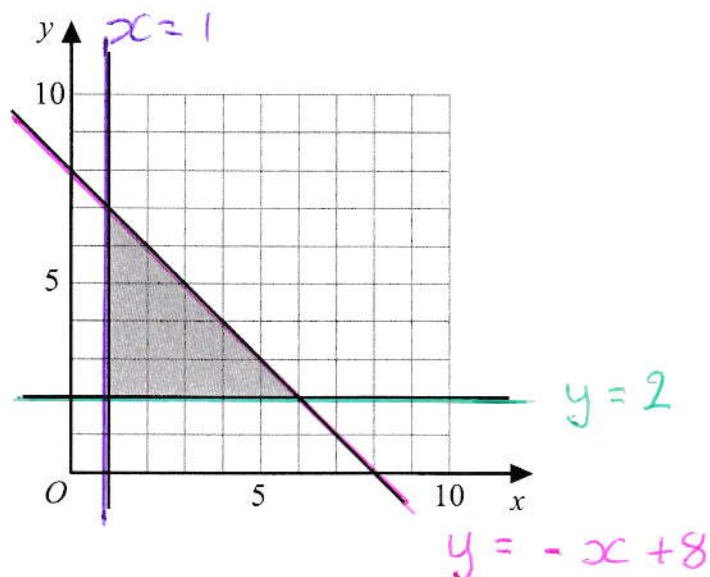
$$x \leq 5$$

$$y \geq 3$$

$$y \leq x$$

Label your region R.





Write down the 3 inequalities that define the shaded region.

$$x \geq 1$$

(1)

$$y \geq 2$$

(1)

$$y \leq -x + 8$$

(1)

THIS CAN

(3)

ALSO BE EXPRESSED

$$\text{AS } \underline{\underline{y + x \leq 8}}$$

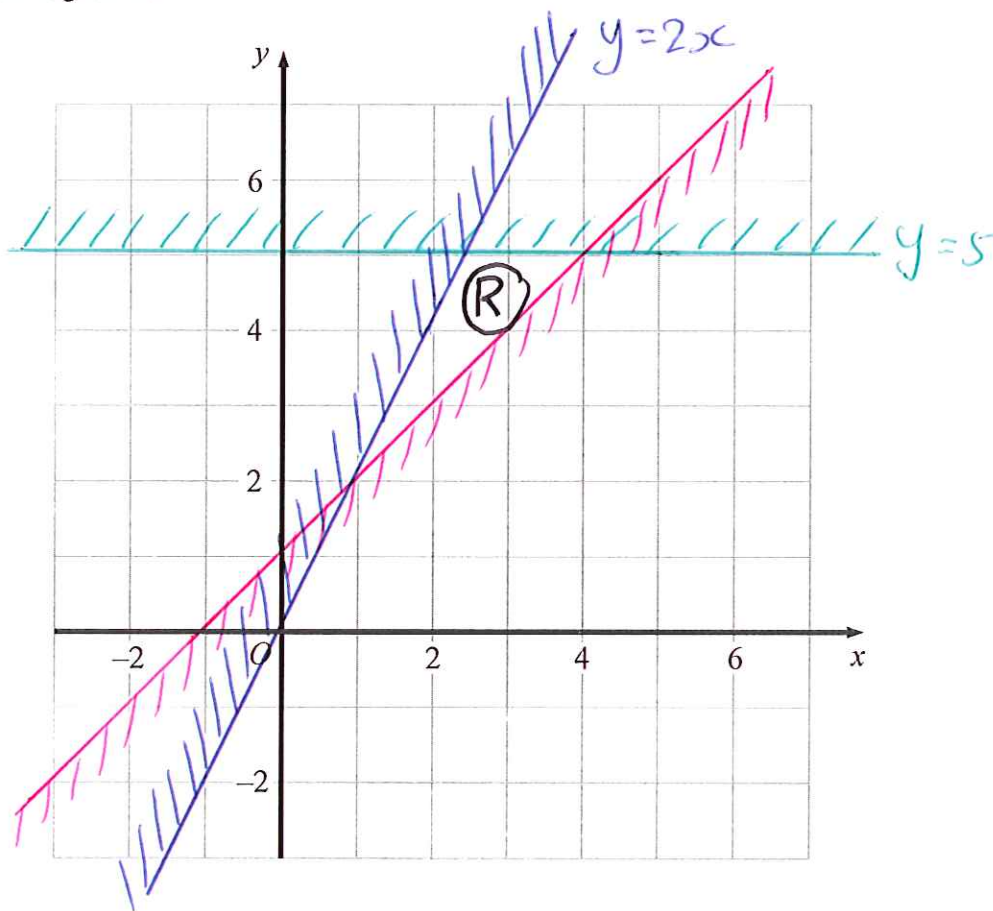
Show, by shading on the grid, the region which satisfies all three of these inequalities.

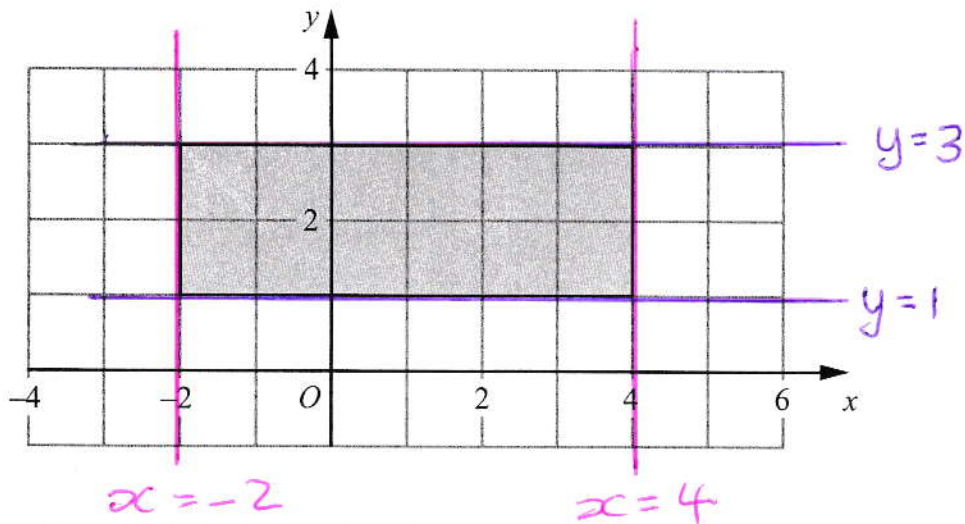
$$y \leq 5$$

$$y \leq 2x$$

$$y \geq x + 1$$

Label your region **R**.





Write down inequalities to fully define the shaded region.

$$-2 \leq x \leq 4$$

$$1 \leq y \leq 3$$

A3

[-1 e e o o]

(3)

ACCEPT

$$x \geq -2$$

$$x \leq 4$$

ACCEPT

$$y \geq 1$$

$$y \leq 3$$

'LACK ERROR
OR OMISSION'

(a) Complete the table of values for $2x + y = 4 \Rightarrow y = -2x + 4$

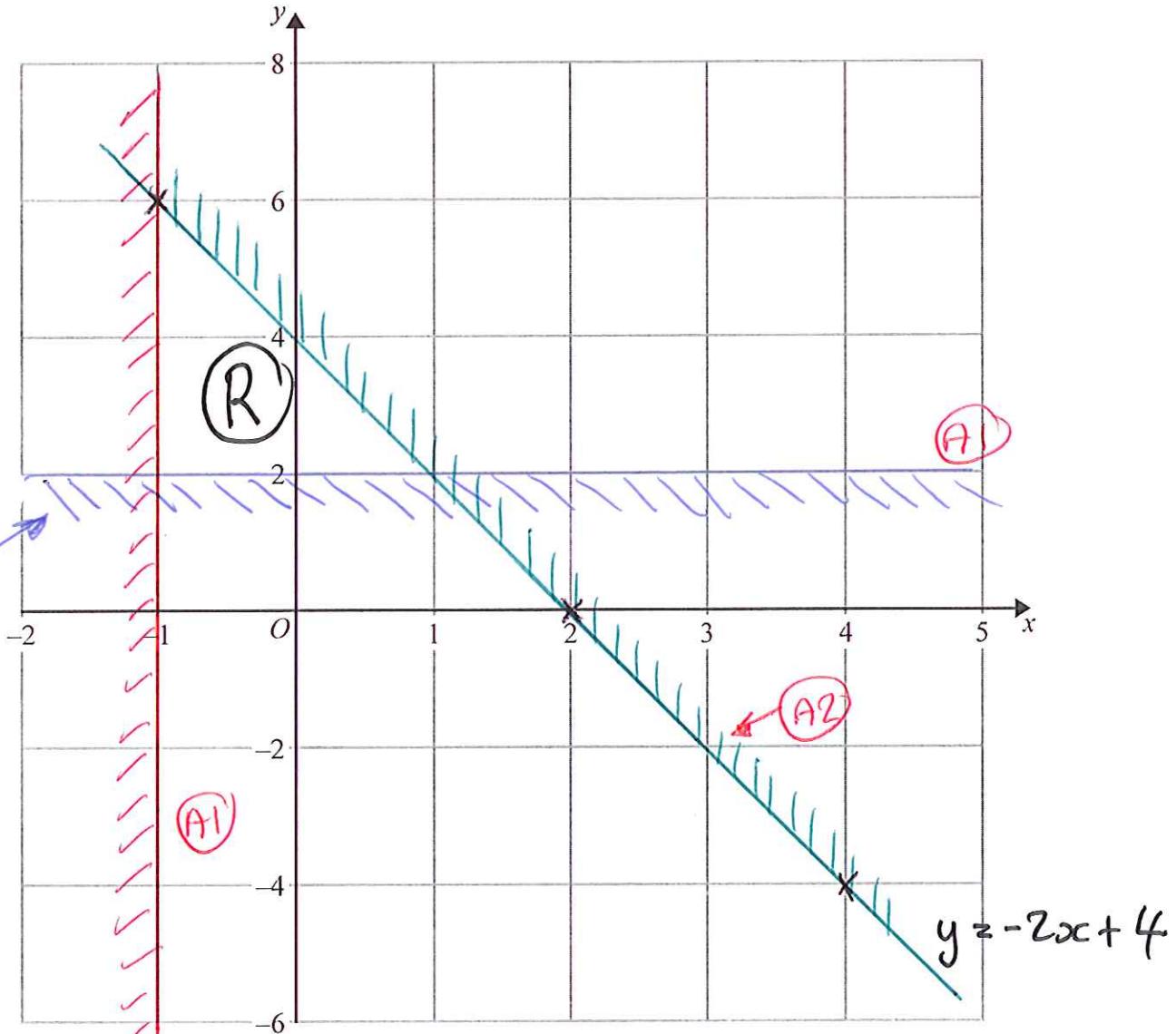
x	-1	2	4
y	6	0	-4

(A2)

(2)

(b) On the grid, draw the graph of $2x + y = 4$ for values of x from -1 to 4

(2)



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

$$x \geq -1, y \geq 2 \text{ and } 2x + y \leq 4$$

Label the region R.

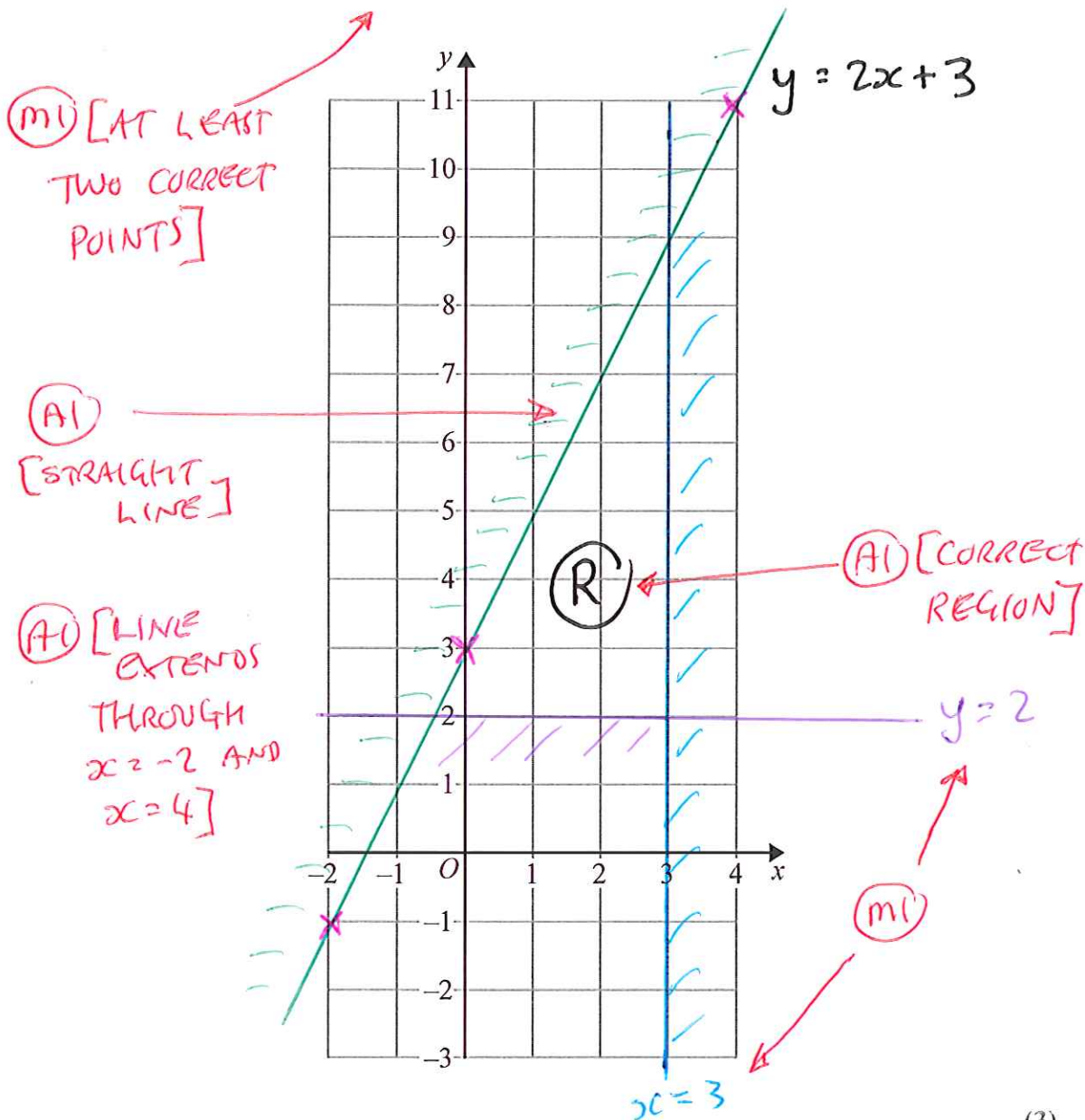
(2)

(a) On the grid, draw the graph of $y = 2x + 3$ for values of x from -2 to 4

x	-2	0	4
y	-1	3	11

$$y = 2(-2) + 3$$

ETC.

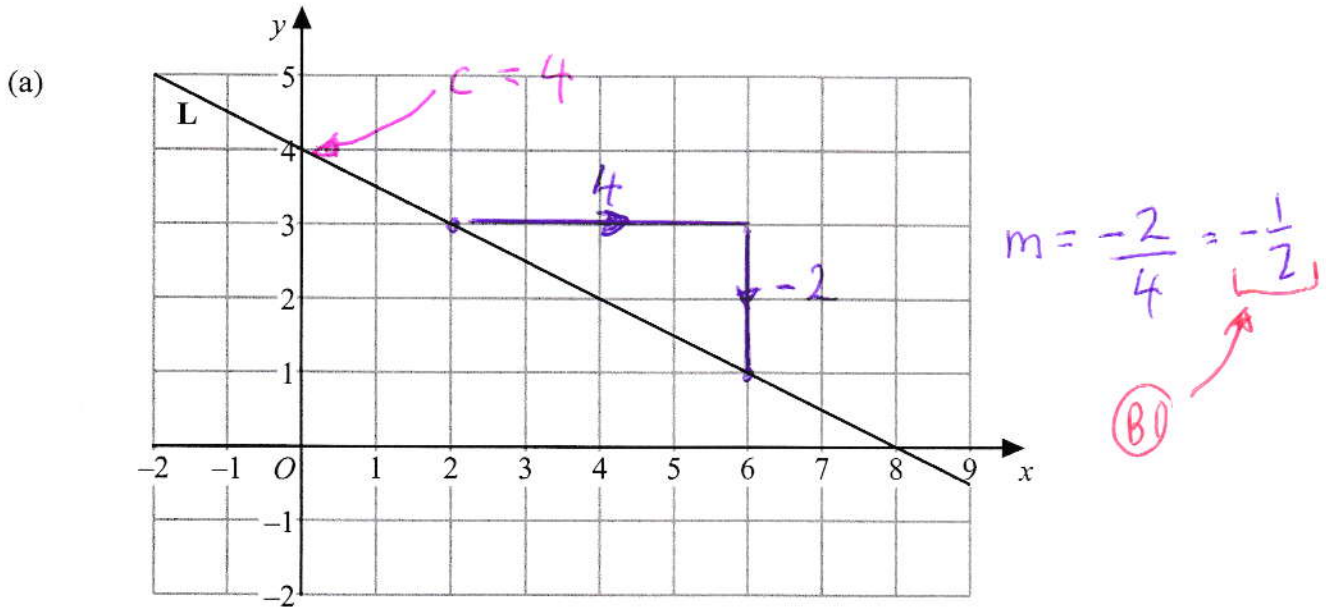


(b) Show, by shading on the grid, the region that satisfies **all three** of the inequalities

$$x \leq 3 \quad \text{and} \quad y \geq 2 \quad \text{and} \quad y \leq 2x + 3$$

Label your region **R**.

(2)

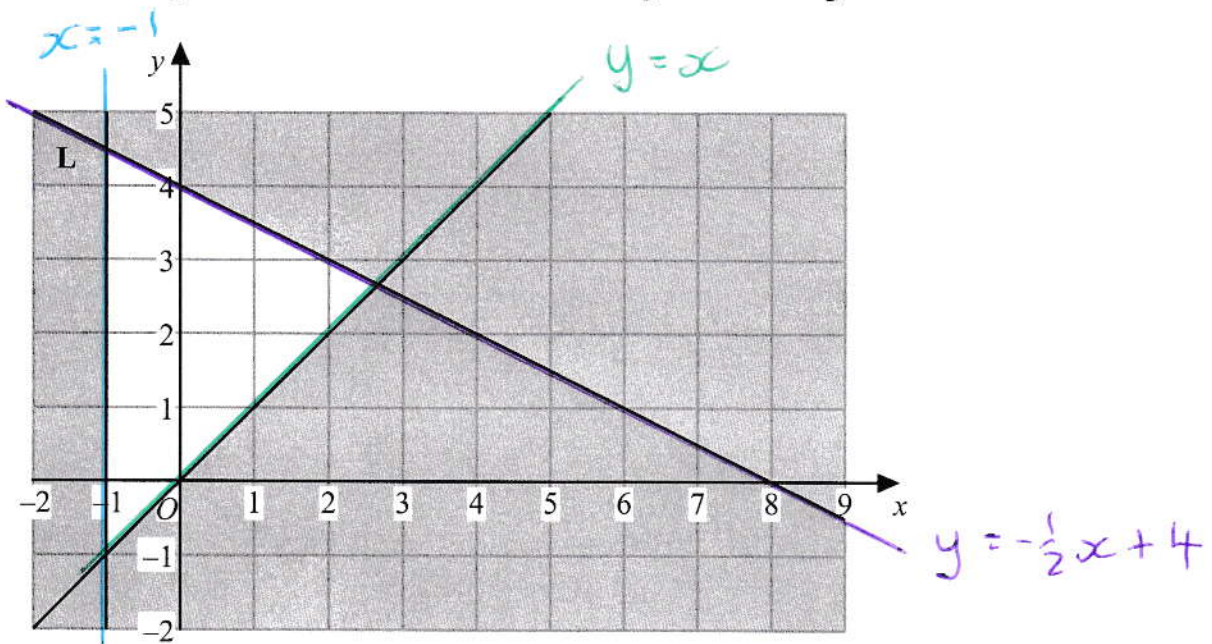


Find the equation of the line L.

$$y = -\frac{1}{2}x + 4$$

(3)

(b) Find the three inequalities that define the **unshaded** region in the diagram below.



$$y \leq -\frac{1}{2}x + 4$$

$$y \geq x$$

$$x \geq -1$$

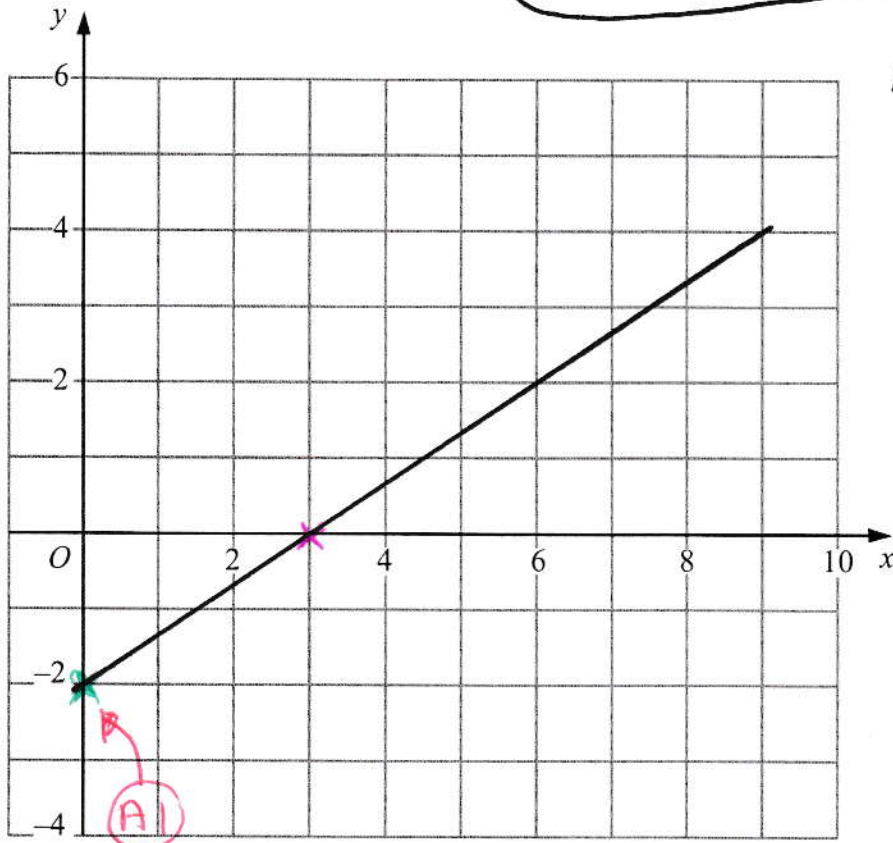
(A1)

(A1)

(A1)

(3)

(a) On the grid, draw the graph of $2x - 3y = 6$ from $x = 0$ to $x = 9$



AT $x=0$

$-3y = 6$

$\Rightarrow y = -2$

$\therefore (0, -2)$

AT $y=0$

$2x = 6$

$\Rightarrow x = 3$

$\therefore (3, 0)$

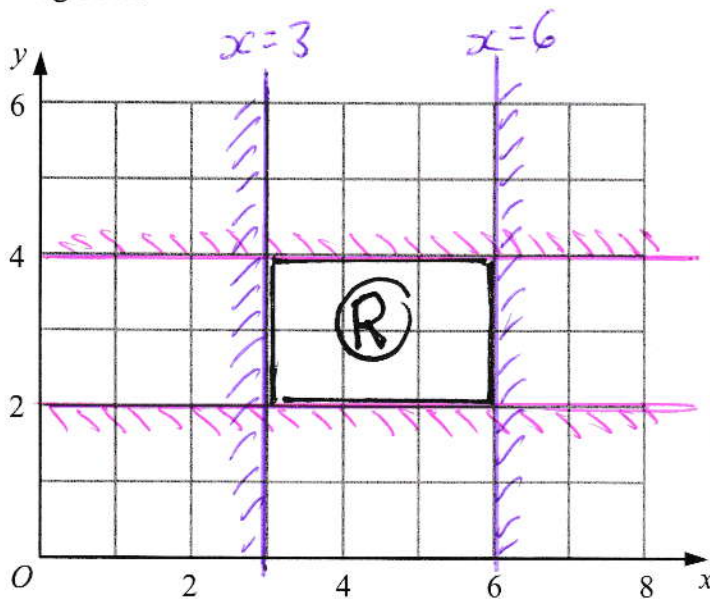
[FOR INTERCEPT]

(A1) [FOR GRADIENT] (2)

(b) On the grid, show by shading the region which satisfies the inequalities

$3 \leq x \leq 6$ and $2 \leq y \leq 4$

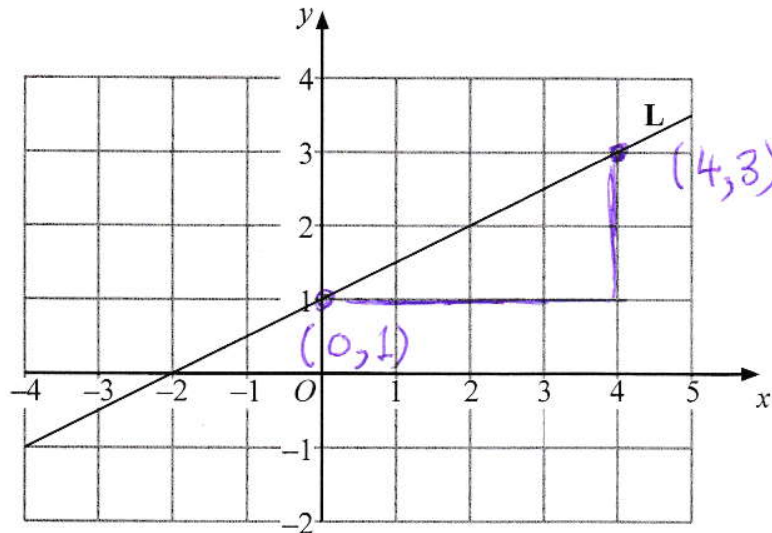
Label your region R.



(A1) FOR CORRECT LABELLING 'R'

(3)

A line L passes through the points (0, 1) and (4, 3).



(a) (i) Find the gradient of the line L.

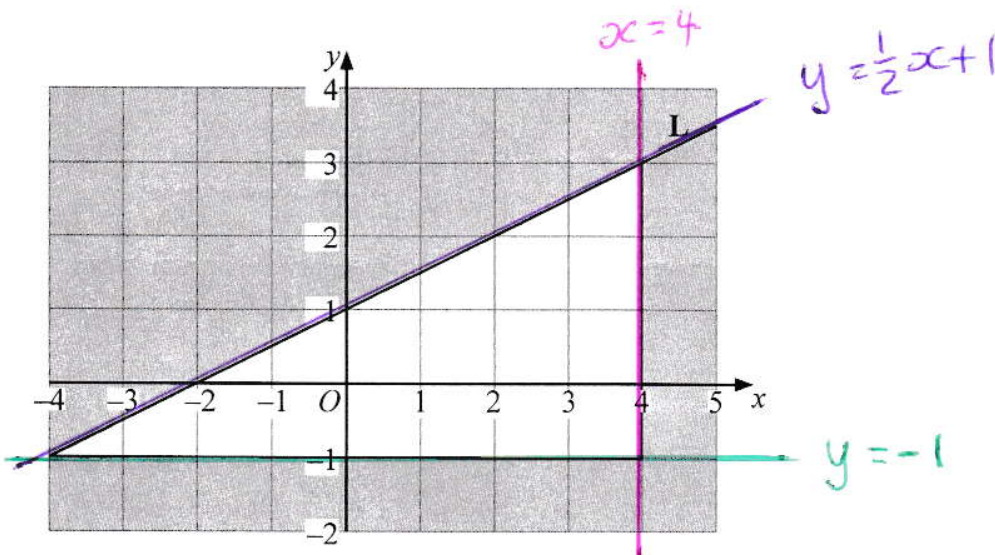
$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{3 - 1}{4 - 0} \quad (M1)$$

$$\frac{1}{2} \quad (A1)$$

(ii) Find the equation of the line L.

$$y = \frac{1}{2}x + 1 \quad (A1) \quad (A1) \quad \text{[OR ALTERNATE FORM]}$$

(b)



Write down the three inequalities that define the unshaded region.

$$x \leq 4 \quad (A1) \quad y \geq -1 \quad (A1) \quad y \leq \frac{1}{2}x + 1 \quad (A1)$$

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The methods used in these solutions, where relevant, are methods which have been successfully used with students. The method shown for a particular question is not always the only method and there is no claim that the method that is used is necessarily the most efficient or ‘best’ method. From time to time, a solution to a question might be updated to show a different method if it is judged that it is a good idea to do so.

Sometimes a method used in these solutions might be unfamiliar to You. If You are able to use a different method to obtain the correct answer then You should consider to keep using your existing method and not change to the method that is used here. However, the choice of method is always up to You and it is often useful if You know more than one method to solve a particular type of problem.

Within these solutions there is an indication of where marks **might** be awarded for each question. B marks, M marks and A marks have been used in a similar, but **not identical**, way that an exam board uses these marks within their mark schemes. This slight difference in the use of these marking symbols has been done for simplicity and convenience. Sometimes B marks, M marks and A marks have been interchanged, when compared to an examiners’ mark scheme and sometimes the marks have been awarded for different aspects of a solution when compared to an examiners’ mark scheme.

B1 - This is an unconditional accuracy mark (the specific number, word or phrase must be seen. This type of mark cannot be given as a result of ‘follow through’).

M1 - This is a method mark. Method marks have been shown in places where they might be awarded for the method that is shown. If You use a different method to get a correct answer, then the same number of method marks would be awarded but it is not practical to show all possible methods, and the way in which marks might be awarded for their use, within these particular solutions. When appropriate, You should seek clarity and download the relevant examiner mark scheme from the exam board’s web site.

A1 - These are accuracy marks. Accuracy marks are typically awarded after method marks. If the correct answer is obtained, then You should normally (but not always) expect to be awarded all of the method marks (provided that You have shown a method) and all of the accuracy marks.

Note that some questions contain the words ‘show that’, ‘show your working out’, or similar. These questions require working out to be shown. Failure to show sufficient working out is likely to result in no marks being awarded, even if the final answer is correct.

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