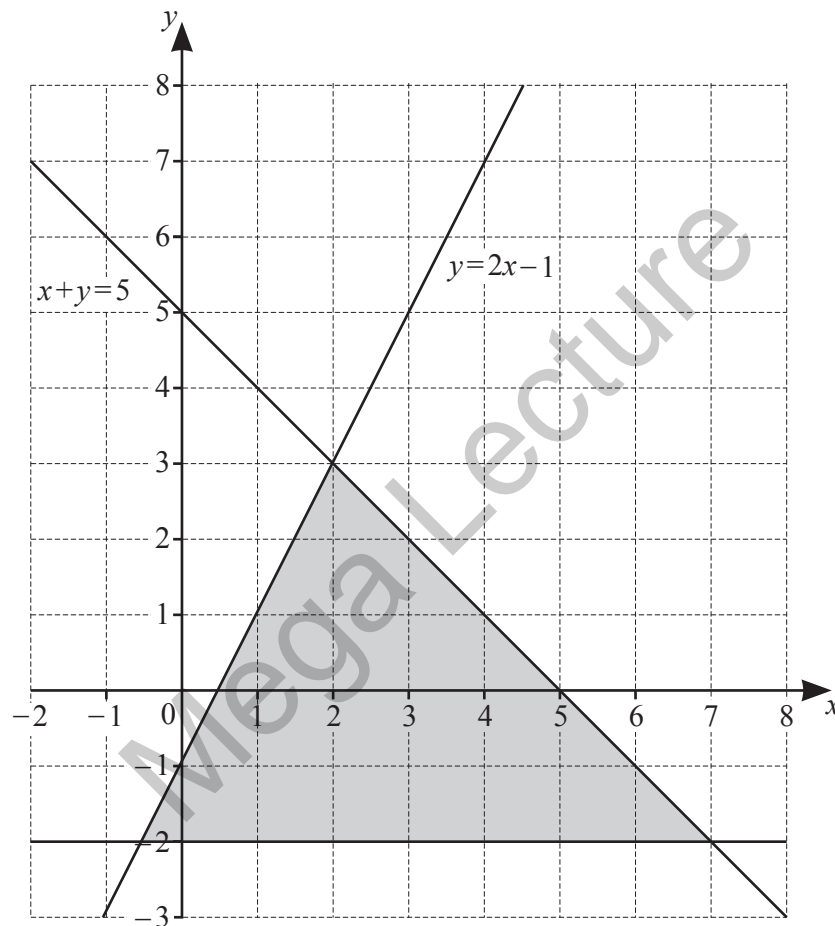


Inequalities Worksheet

1 Three lines and a shaded region are shown on a 1 cm square grid.



(a) Find the three inequalities that define the shaded region.

.....

.....

..... [2]

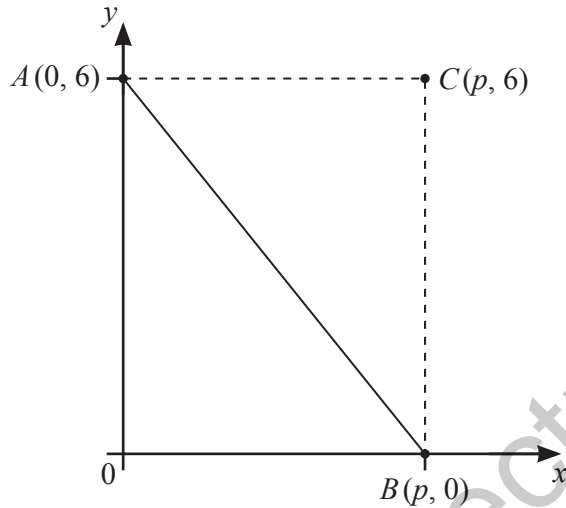
(b) Another region, R , is defined by these three inequalities.

$$x + y \leq 5 \quad y \geq 2x - 1 \quad x \geq 1$$

Find the area of region R .

2

..... cm^2 [1]



NOT TO SCALE

The diagram shows the points $A(0, 6)$, $B(p, 0)$ and $C(p, 6)$.
The equation of the line AB is $3y + 4x = 18$.

(a) Find the value of p .

Mega Lecture

$p =$ [1]

(b) Write down the three inequalities that define the region **inside** triangle ABC .

.....

 [2]

3 Write down an irrational value of n that satisfies this inequality.

a) $4.5 \leq n \leq 5.5$

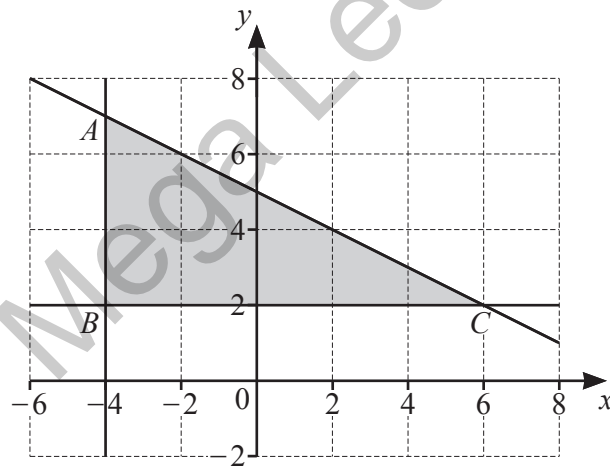
..... [1]

b) Solve the inequality.

$$23 + 2n > 5 - 6n$$

..... [2]

4



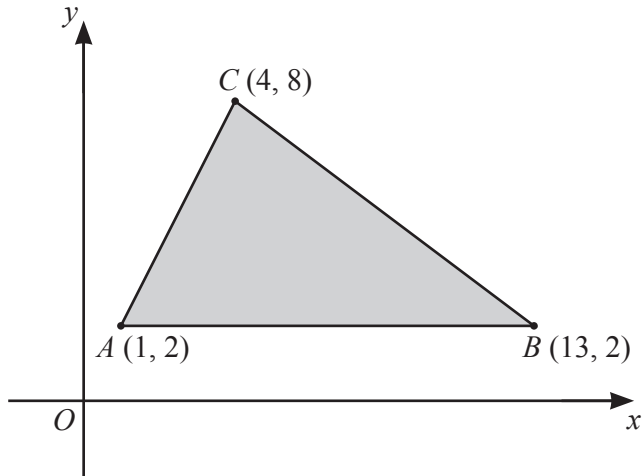
The diagram shows a shaded region ABC .

The equation of the line AC is $y = -\frac{1}{2}x + 5$.

Write down the three inequalities that define the shaded region.

.....
.....
..... [2]

5



NOT TO
SCALE

The diagram shows a triangle formed by joining the points $A(1, 2)$, $B(13, 2)$ and $C(4, 8)$.
The equation of the line BC is $2x + 3y = 32$.

- (a) The region **inside** triangle ABC is defined by three inequalities.
One of these is $2x + 3y < 32$.

Write down the other two inequalities.

.....

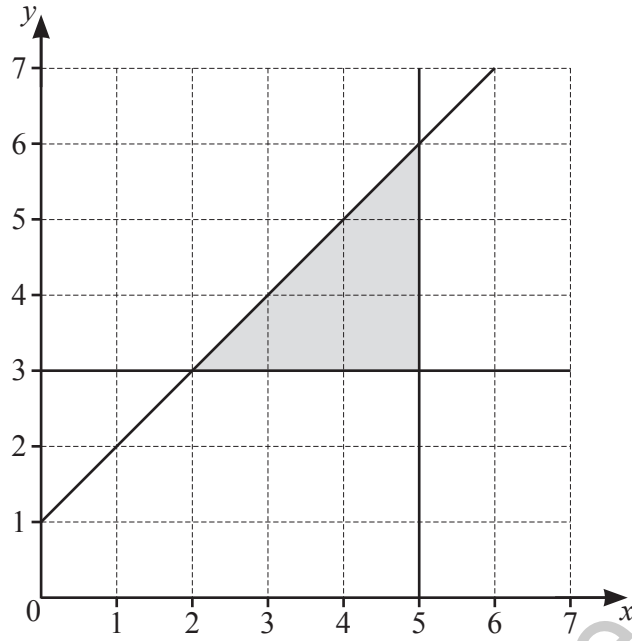
..... [2]

- (b) The point $(k, 7)$, where k is an integer, lies **inside** triangle ABC .

Find the possible values of k .

$k =$ [2]

6



The shaded region is defined by three inequalities.

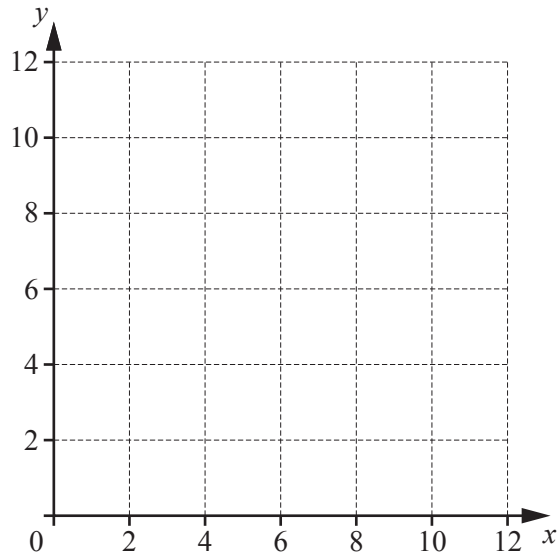
Find these three inequalities.

Mega Lecture

.....

.....

..... [3]



The region R is defined by the inequalities

$$2 \leq x \leq 8$$

$$5 \leq y \leq 10$$

$$x + y \geq 10.$$

On the diagram, shade and label the region R .

[3]

- 8 (a) Write down all the integers that satisfy the inequality $-\frac{3}{2} \leq x < 2$.

Answer [1]

- (b) Complete the following inequality with a fraction.

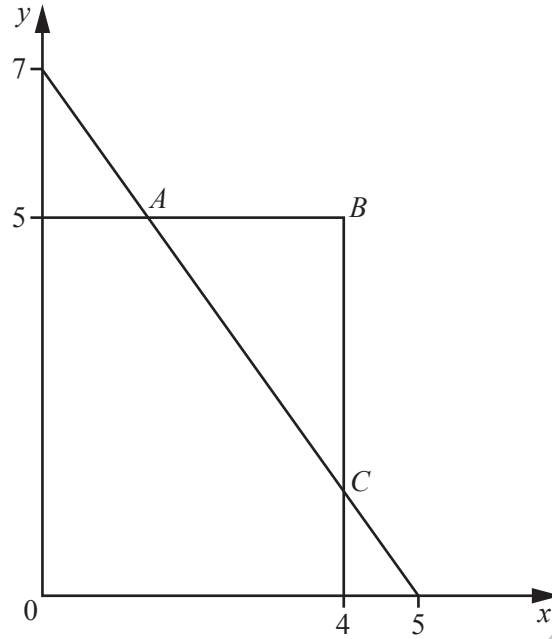
$$\frac{3}{4} > \dots > \frac{1}{2}$$

[1]

- (c) Write down an irrational value of n that satisfies this inequality.

$$2 < n < 3$$

Answer [1]



In the diagram, the equation of the line AC is $7x + 5y = 35$.

- (a) Write down the three inequalities that define the region **inside** triangle ABC .

Answer

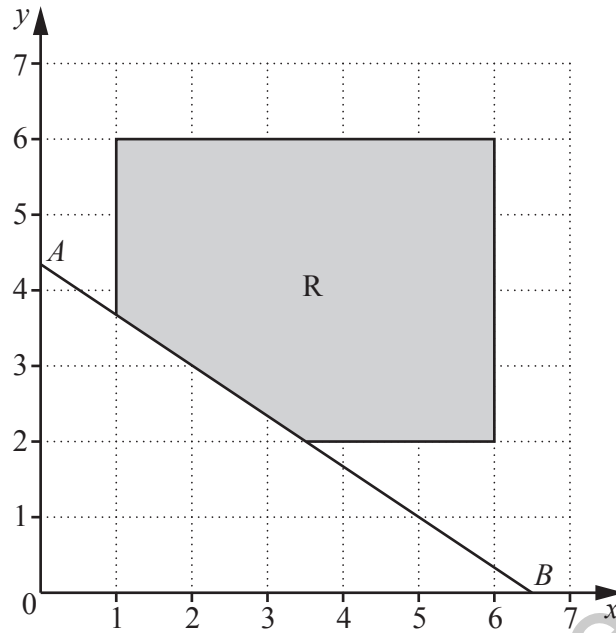
.....

..... [2]

- (b) The line $y = kx$, where k is an integer, passes through triangle ABC .

Find the greatest possible value of k .

Answer $k =$ [2]



In the diagram, the line $3y + 2x = 13$ meets the axes at A and B .

(a) Find the coordinates of A .

Answer (.....,) [1]

(b) The shaded region R is defined by five inequalities.
Two of these are $x \leq 6$ and $y \leq 6$.

Write down the other three inequalities.

Answer

.....

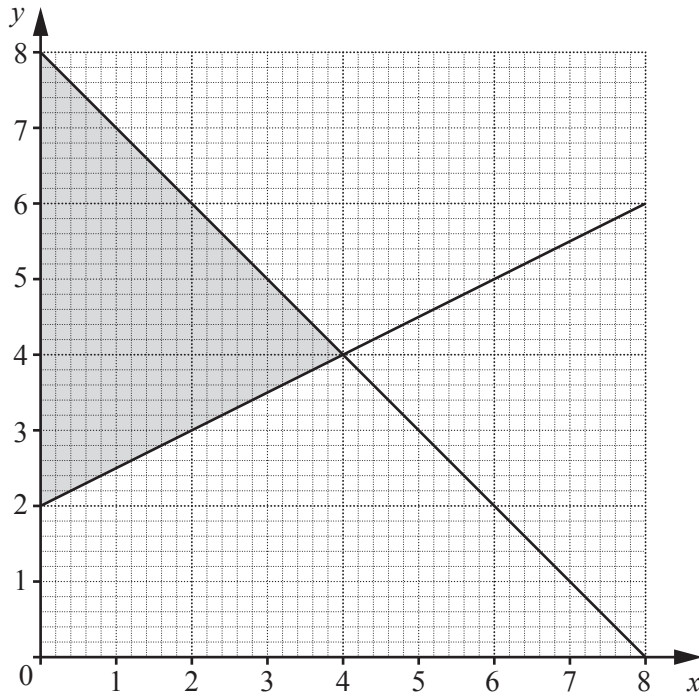
..... [2]

(c) The point P is in the shaded region R .

Given that AP is as large as possible, write down the coordinates of P .

Answer (.....,) [1]

- 11 The diagram shows the lines $x + y = 8$ and $2y = x + 4$.



- (a) The shaded region on the diagram is defined by three inequalities.

Write down these three inequalities.

Answer

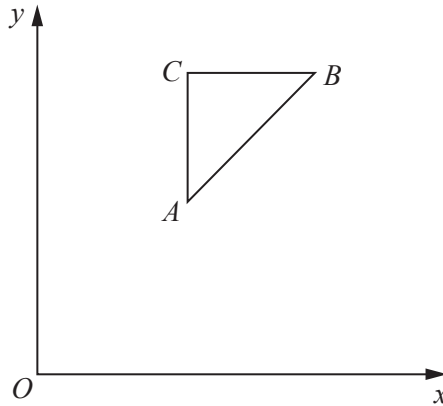
.....

..... [2]

- (b) Another region, R , is defined by the inequalities $x + y \leq 8$, $2y \leq x + 4$ and $y \geq a$, where a is an integer. This region contains 5 points with integer coordinates.

Write down the value of a .

Answer $a = \dots\dots\dots$ [1]



The sides of the triangle ABC are formed by the straight lines with equations

$$x = 3, \quad y = 6, \quad y = x + \frac{1}{2}.$$

- (a) The region **inside** the triangle is defined by three inequalities.

Write down these three inequalities.

Answer

.....

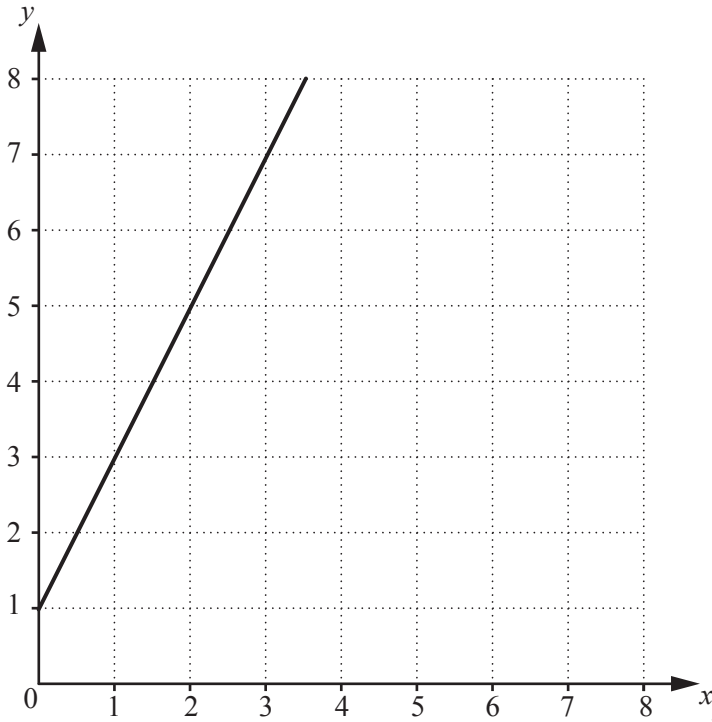
..... [2]

- (b) The point $(4, k)$, where k is an integer, lies inside the triangle.

Find the value of k .

Answer $k =$ [1]

13

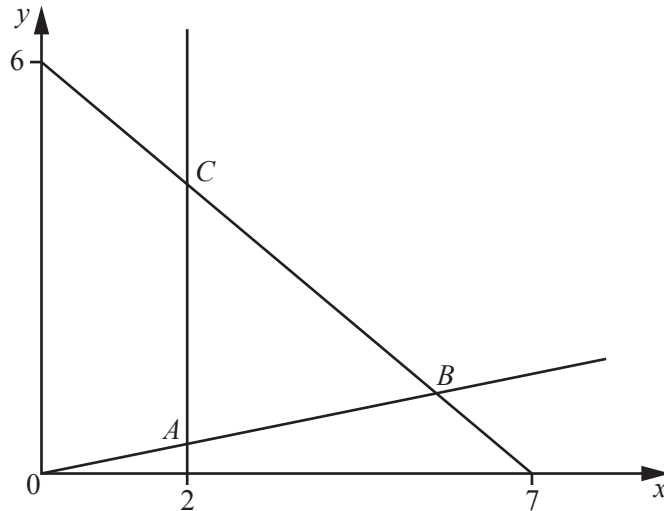


The diagram shows the line $y = 2x + 1$.

The point P has coordinates (a, b) where a and b are both positive integers.
The values of a and b satisfy the inequalities $a < 2$, $b < 7$ and $b > 2a + 1$.

Write down all the possible coordinates of P .

Answer [2]



In the diagram, the equation of the line

- through B and C is $6x + 7y = 42$
- through A and B is $y = \frac{x}{5}$.

(a) The region **inside** triangle ABC is defined by three inequalities.

One of these is $y > \frac{x}{5}$.

Write down the other two inequalities.

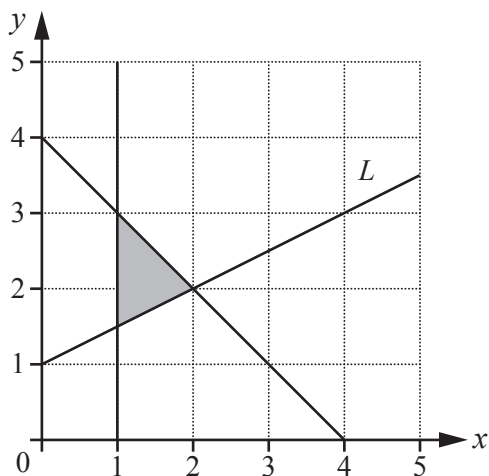
Answer

..... [2]

(b) The line $y = kx$ passes through triangle ABC .

Find all the possible **integer** values of k .

Answer [2]



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

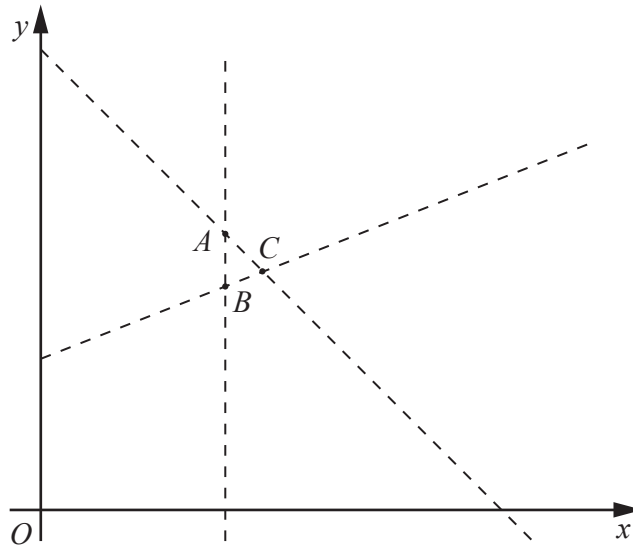
Answer [1]

- (b) The shaded region on the diagram is defined by three inequalities. One of these is $x + y \leq 4$.

Write down the other two inequalities.

Answer

..... [2]



The diagram shows the three lines $x = 8$, $x + y = 21$ and $2y = 12 + x$ which intersect at the points A , B and C .

(a) Find the coordinates of B .

Answer (.....,) [1]

(b) The region **inside** triangle ABC is defined by three inequalities.

One of these is $x + y < 21$.

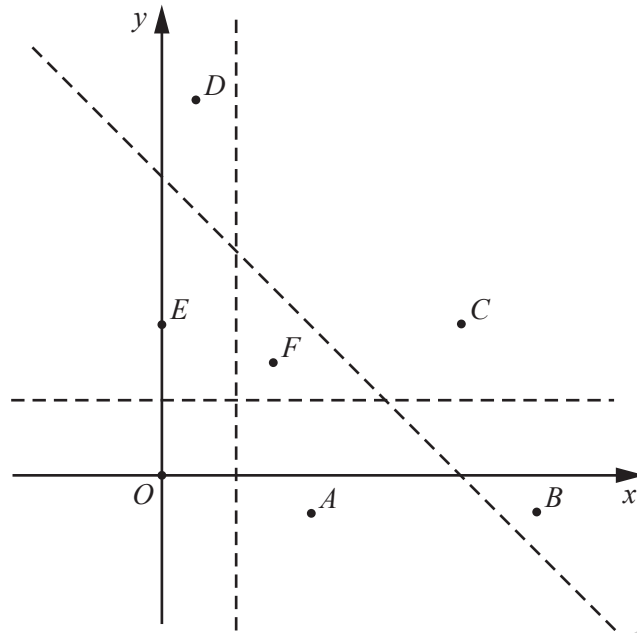
Write down the other two inequalities.

Answer

..... [2]

(c) Find the coordinates of the point, with integer coordinates, that is inside triangle ABC .

Answer (.....,) [1]



The diagram shows the three lines $x = 1$, $y = 1$ and $x + y = 4$ and the seven points O, A, B, C, D, E and F .

- (a) Which of these seven points lie in the region defined by $x + y > 4$?

Answer [1]

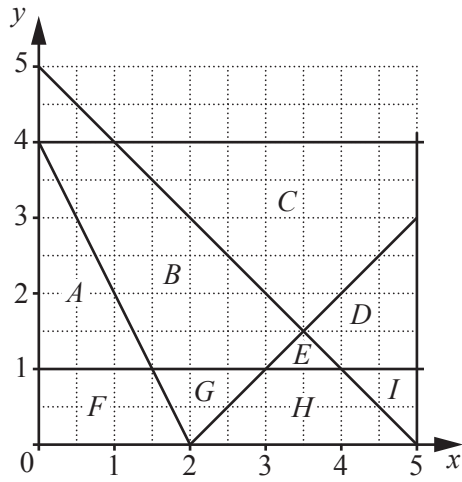
- (b) Which one of these seven points lies in the region defined by $x < 1$, $y > 1$ and $x + y < 4$?

Answer [1]

- (c) Given that O is $(0, 0)$ and C is $(4, 2)$, find the inequality that defines the region below the line that passes through O and C .

Answer [1]

18 The diagram shows the regions *A* to *I*.



Give the letter of the region defined by each set of inequalities.

(a) $x > 0$, $y > 0$, $y < 1$ and $y < 4 - 2x$

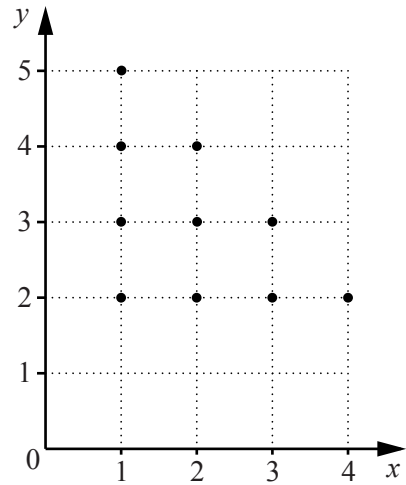
Answer [1]

(b) $y > 1$, $y < x - 2$ and $y < 5 - x$

Answer [1]

Mega Lecture

- 19 The diagram shows 10 points, with coordinates (h, k) , where h and k are integers.



- (a) For these 10 points find
- (i) the maximum value of $k - h$,

Answer [1]

- (ii) the value of k , for the point that lies on the line $y = \frac{1}{2}x$.

Answer $k =$ [1]

- (b) The coordinates of the 10 points satisfy the inequalities

$$h \geq a, \quad k \geq b, \quad h + k \leq c.$$

Write down the values of a, b and c .

Answer $a =$

$b =$

$c =$ [2]