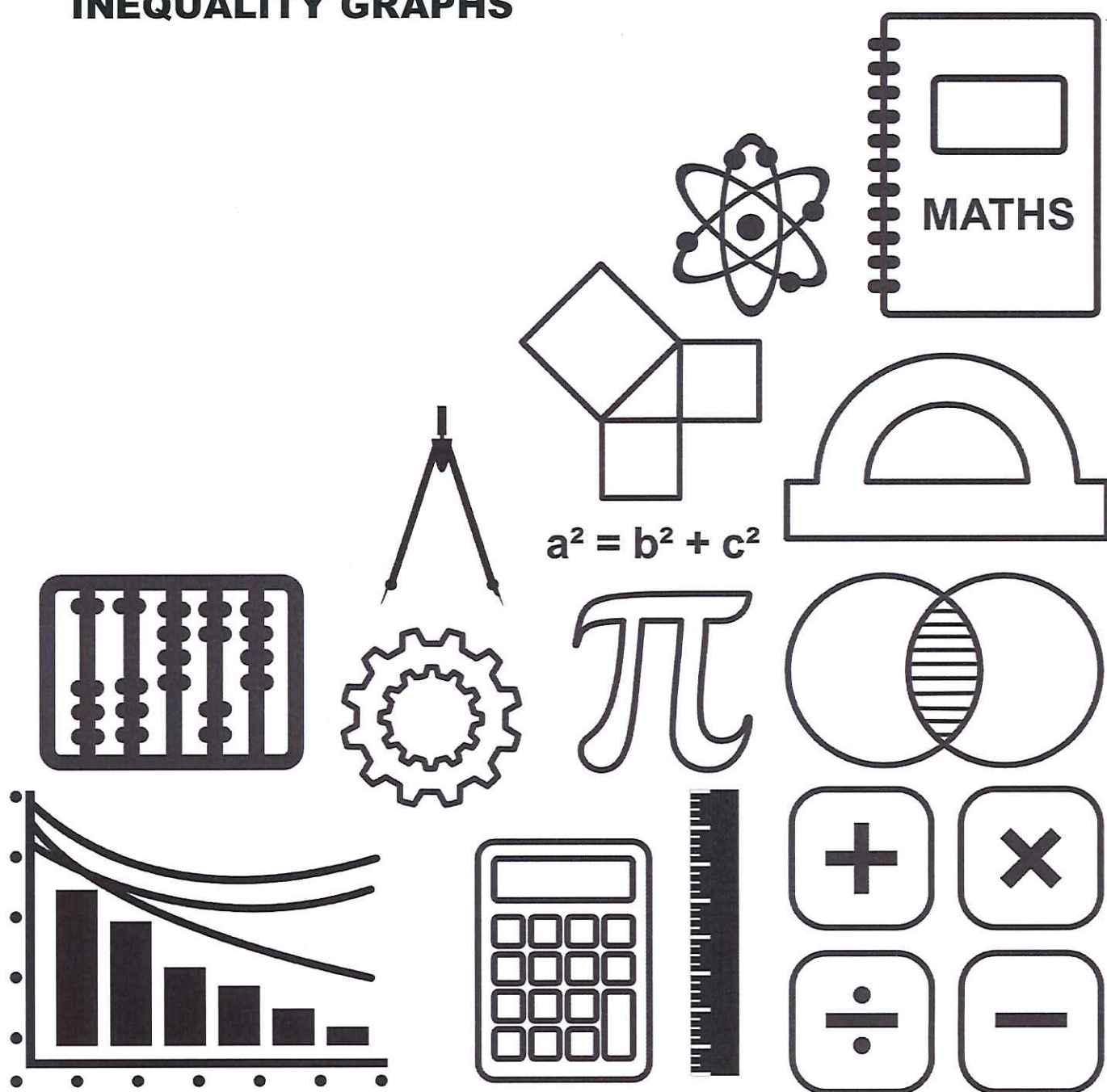


GCSE TOPIC BOOKLET INEQUALITY GRAPHS

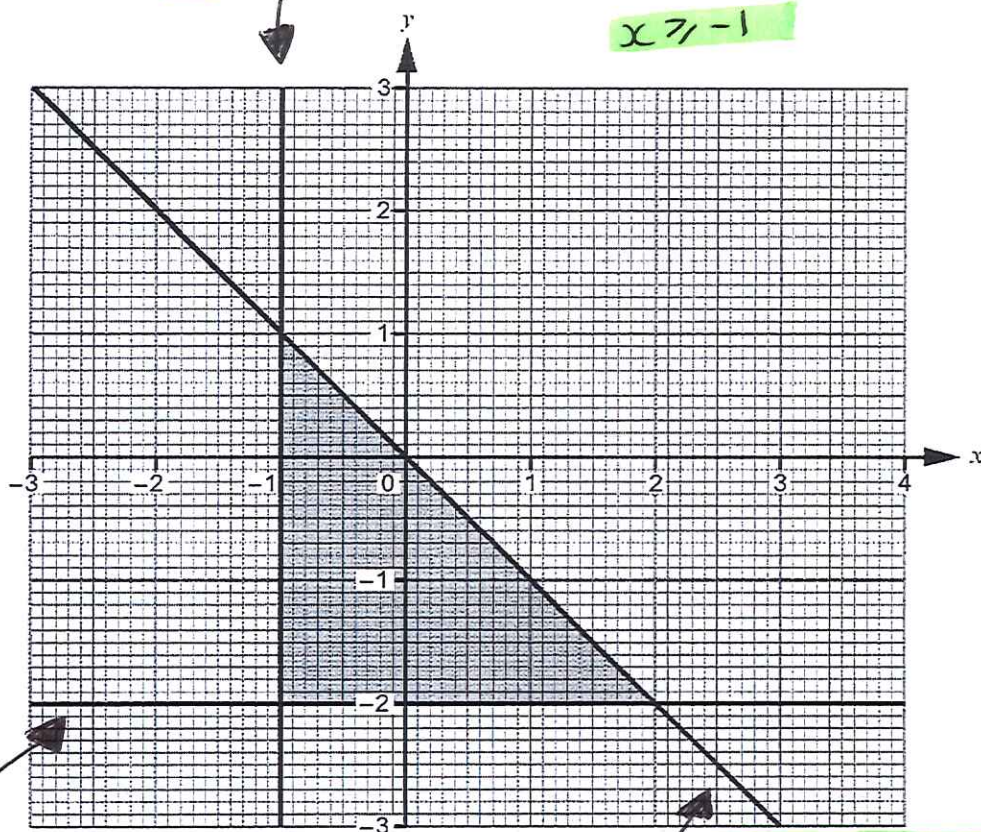
SOLUTIONS



1.

This is the line $x = -1$, so we need

$$x \geq -1$$



This is the line $y = -2$ and they have already done $y \geq -2$ for us.

Complete the following table to give the set of inequalities that describes the shaded region above.

This is the line $y = -x$ so we need $y \leq -x$ [3]

$y \geq -2$
$x \geq -1$
$y \leq -x$

2.

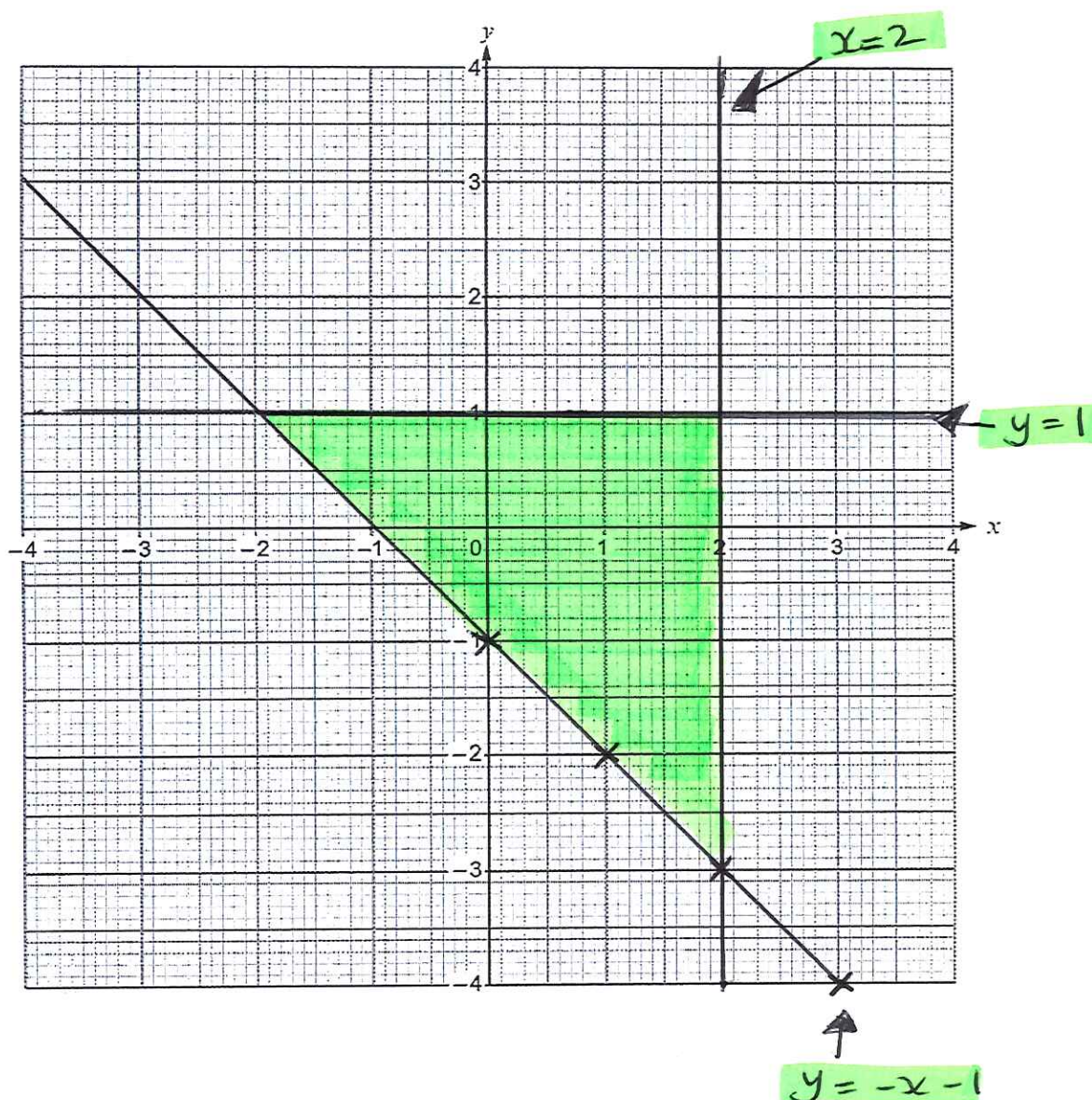
Using the axes below, find the region which satisfies the following inequalities.

$$\begin{aligned} x &\leq 2 \rightarrow \text{plot } x=2 \\ y &\leq 1 \rightarrow \text{plot } y=1 \\ y &\geq -x-1 \rightarrow \text{plot } y=-x-1 \end{aligned}$$

Make sure that you clearly indicate the region that represents your answer.

[3]

x	0	1	2	3
$y = -x - 1$	-1	-2	-3	-4



3.

A garden centre sells two types of spades.



Rounded-end spades cost £40 each and pointed-end spades cost £65 each.

The garden centre manager says that last weekend fewer than 45 spades were sold and more than £1560 was taken from sales of spades.

Let R represent the number of rounded-end spades sold and let P represent the number of pointed-end spades sold.

- (a) Write down two inequalities, in terms of R and P that satisfy the information given by the garden centre manager.

$$R + P < 45$$

$$40R + 65P > 1560$$

[2]

- (b) Use the graph paper opposite to find a region that is satisfied by your inequalities. You must clearly indicate your region.

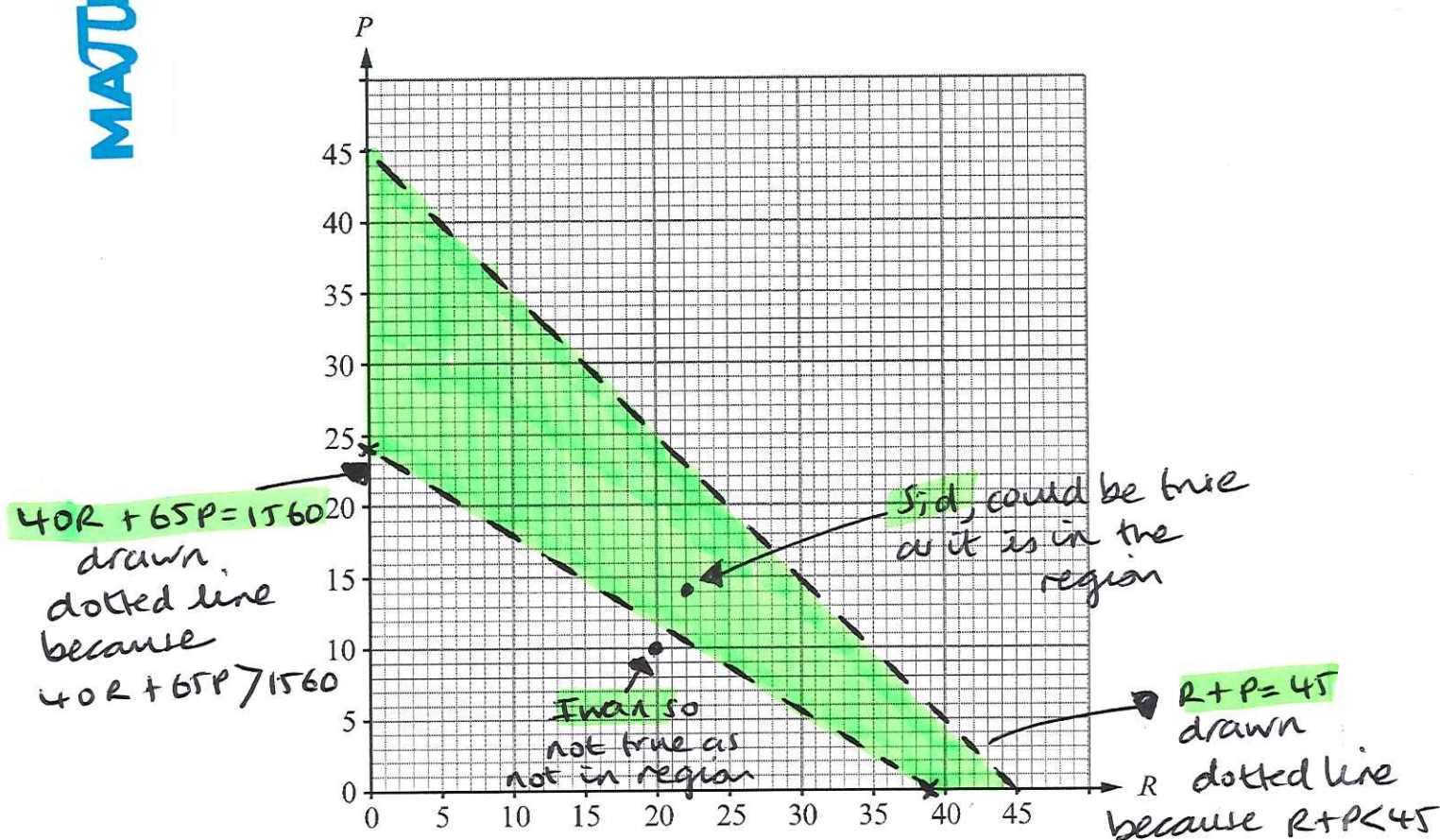
$$\text{Plot } R + P = 45$$

$$\text{Plot } 40R + 65P = 1560 \quad (\div 5)$$

$$8R + 13P = 312$$

[3]

R	39	0	19.5
P	0	24	12



(c) Here are some statements made by sales assistants about the sales of spades last weekend.

Statement made by Iwan.

"20 rounded-end spades and 10 pointed-end spades were sold"

Statement made by Sid.

"22 rounded-end spades and 14 pointed-end spades were sold"

Use your graph to complete the following table to indicate whether each statement could be true or not.

You must show on your graph how you justify your decisions.

Name	Statement	Could be true? Yes or No
Iwan	20 rounded-end spades and 10 pointed-end spades were sold	NO
Sid	22 rounded-end spaces and 14 pointed-end spades were sold	YES

4.

On the squared paper below, draw the region which satisfies all of the following inequalities.

$$x \leq 7 \rightarrow \text{plot } x = 7$$

$$x + y \geq 6 \rightarrow \text{plot } x + y = 6 \quad (y = 6 - x)$$

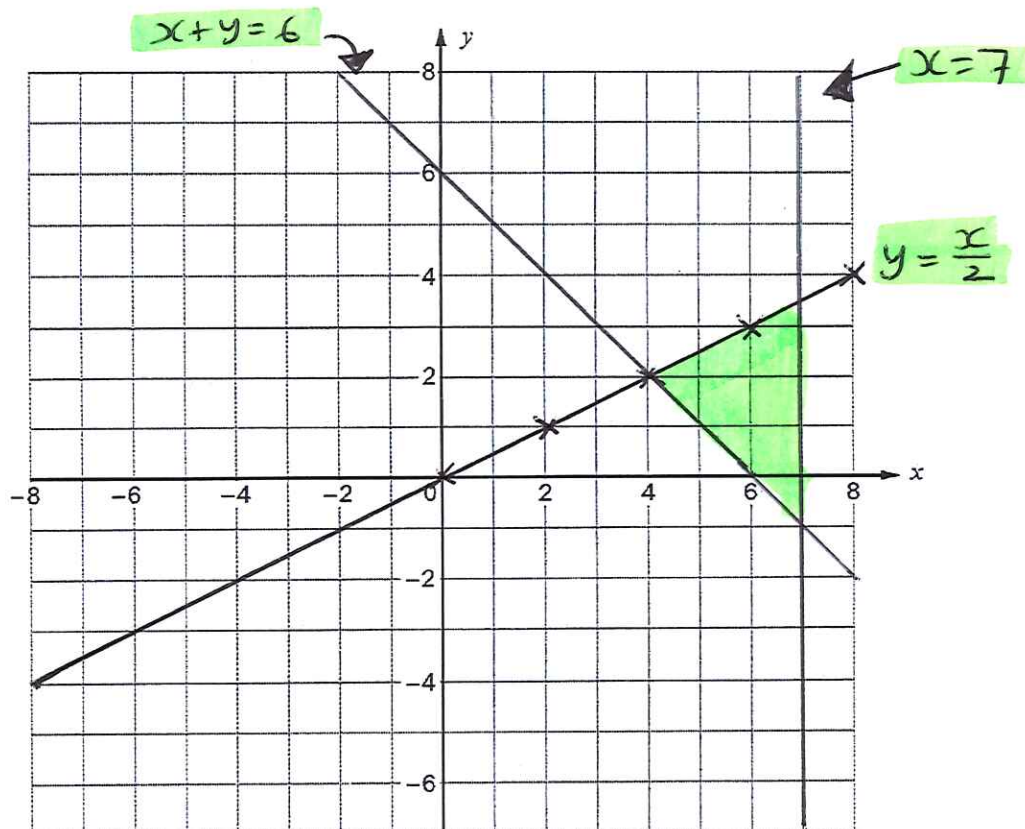
$$y \leq \frac{x}{2} \rightarrow \text{plot } y = \frac{x}{2}$$

Make sure that you clearly indicate the region that represents your answer.

[3]

x	0	2	4	6	8
$y = x/2$	0	1	2	3	4

x	0	1	2	3	4	5	6
$y = 6 - x$	6	5	4	3	2	1	0



5.

Using the axes below, find the region defined by the following inequalities.

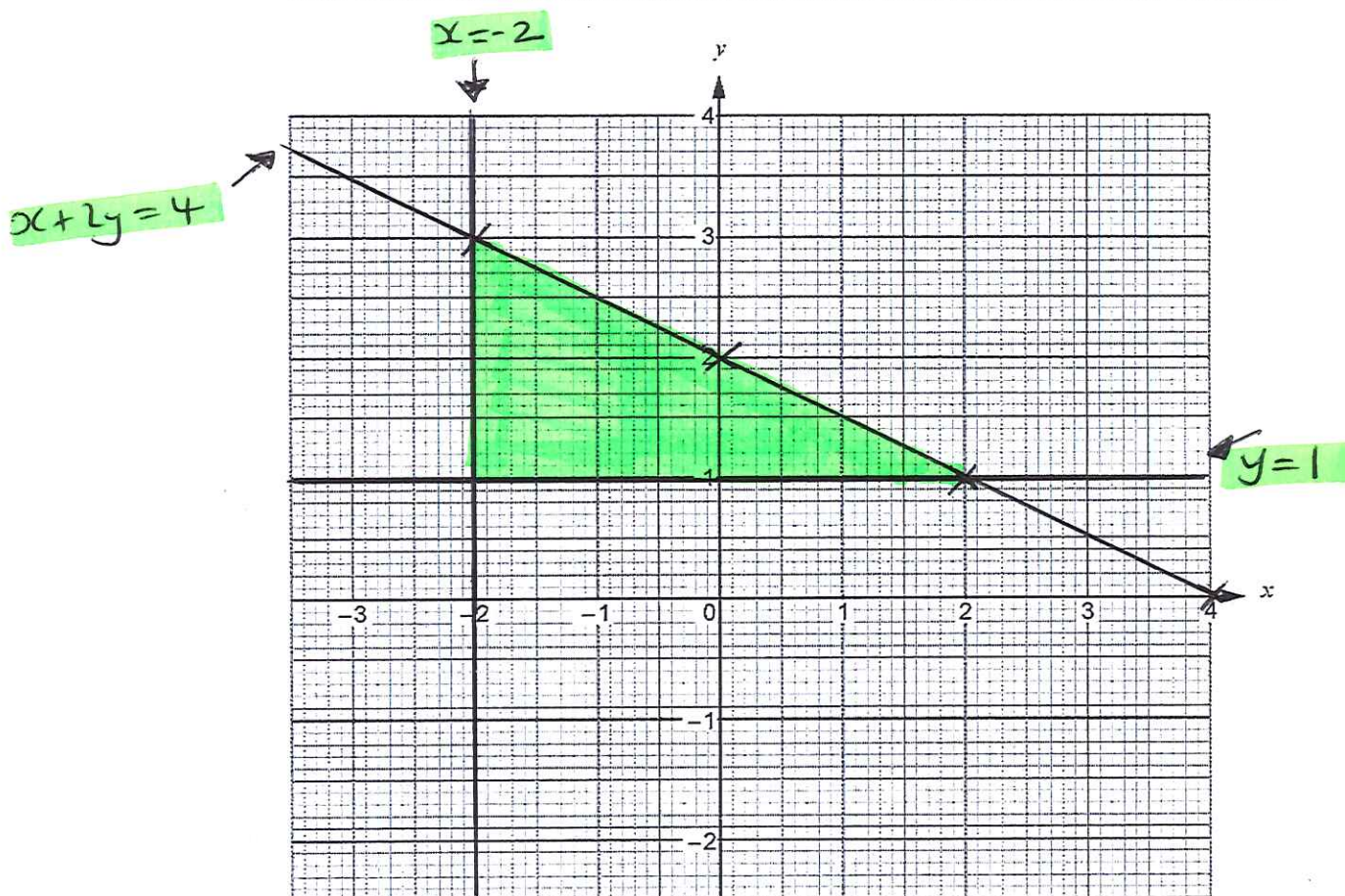
[4]

$$\begin{array}{lcl} x \geq -2 & \rightarrow & \text{plot } x = -2 \\ y \geq 1 & \rightarrow & \text{plot } y = 1 \\ x + 2y \leq 4 & \rightarrow & \text{plot } x + 2y = 4 \end{array}$$

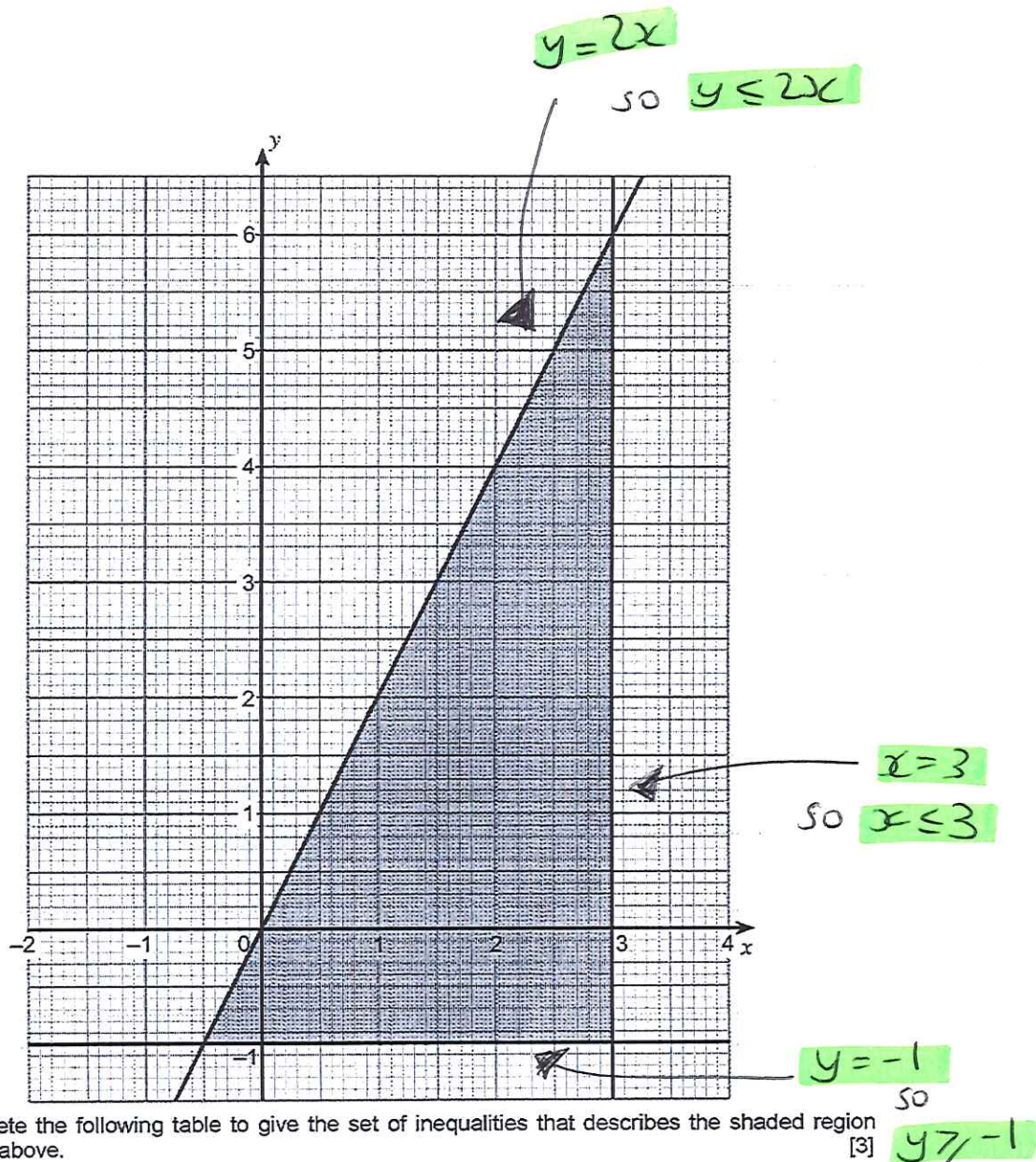
$$y = \frac{4-x}{2}$$

Make sure that you clearly indicate the region that represents your answer.

x	0	2	4	-2
$y = \frac{4-x}{2}$	2	1	0	3

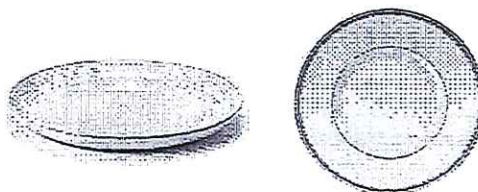


6.



7.

A restaurant needs some new pieces of crockery.
The crockery the restaurant needs are dishes and plates.



The dishes and plates are available to buy in packs.
There are 3 dishes or 2 plates in each pack.
The restaurant cannot afford to buy more than 25 packs altogether.
The restaurant wants to buy at least 60 new pieces of crockery.

The information given can be represented by the inequalities,

$$\begin{aligned} d + p &\leq 25 & \rightarrow \text{plot } d + p = 25 \\ 3d + 2p &\geq 60 & \rightarrow \text{plot } 3d + 2p = 60 \end{aligned}$$

where,

- d represents the number of packs of new dishes bought, and
- p represents the number of packs of new plates bought.

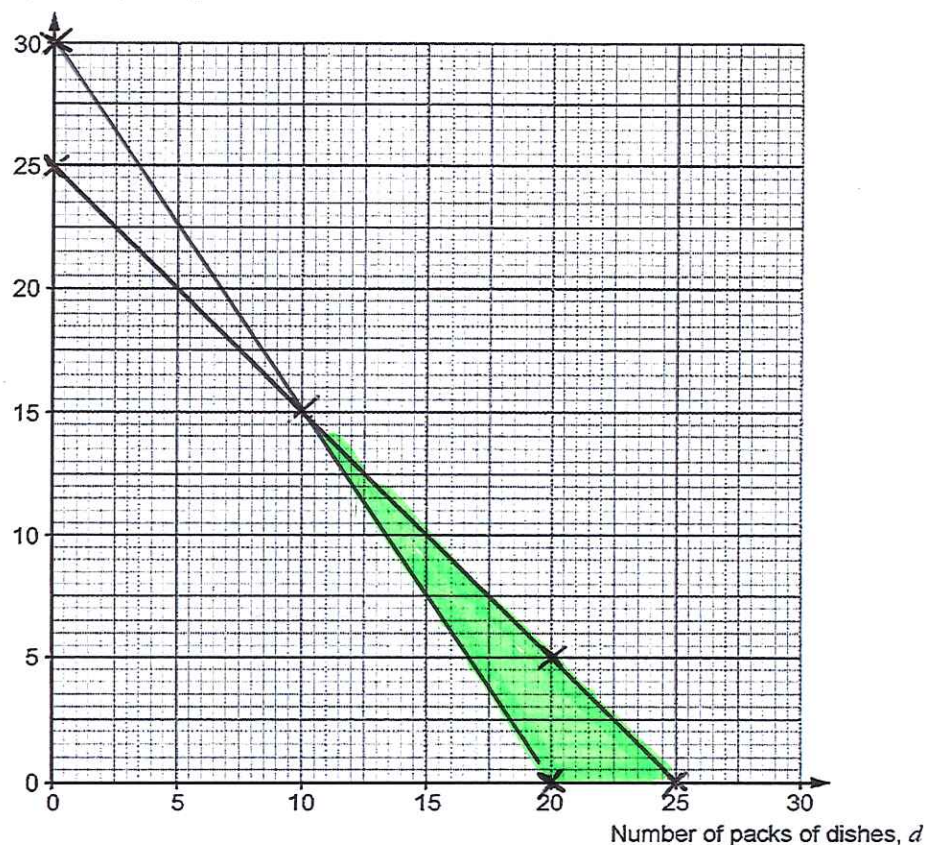
$$\begin{aligned} 2p &= 60 - 3d \\ p &= 30 - \frac{3d}{2} \end{aligned}$$

(a) Use the graph paper opposite to find the region that is satisfied by the inequalities. [3]

$d + p = 25 \rightarrow$	d	0	10	20	25
	p	25	15	5	0

$p = 30 - \frac{3d}{2} \rightarrow$	d	0	10	20	
	p	30	15	0	

Number of packs of plates, p



- (b) The restaurant decides to order some dishes and some plates.
Complete the order form below by selecting a suitable number of packs of dishes and packs of plates for the restaurant to buy. [1]

Crockery	Number of packs to buy
Dishes	20
Plates	4

eg

any option in green area

you must only choose
whole numbers.

8.

A cutting machine has two settings, x and y .
For safety in operating the cutting machine, the settings x and y must be selected so that all the inequalities below are satisfied.

$$\begin{array}{lll} x+y < 8 & \text{plot} & x+y=8 \\ 5x+y > 10 & \text{plot} & y=-5x+10 \\ 2y-x > 4 & \text{plot} & y=\frac{1}{2}x+2 \end{array}$$

- (a) Use the graph paper below to identify the region that shows the safe settings of x and y for the cutting machine.

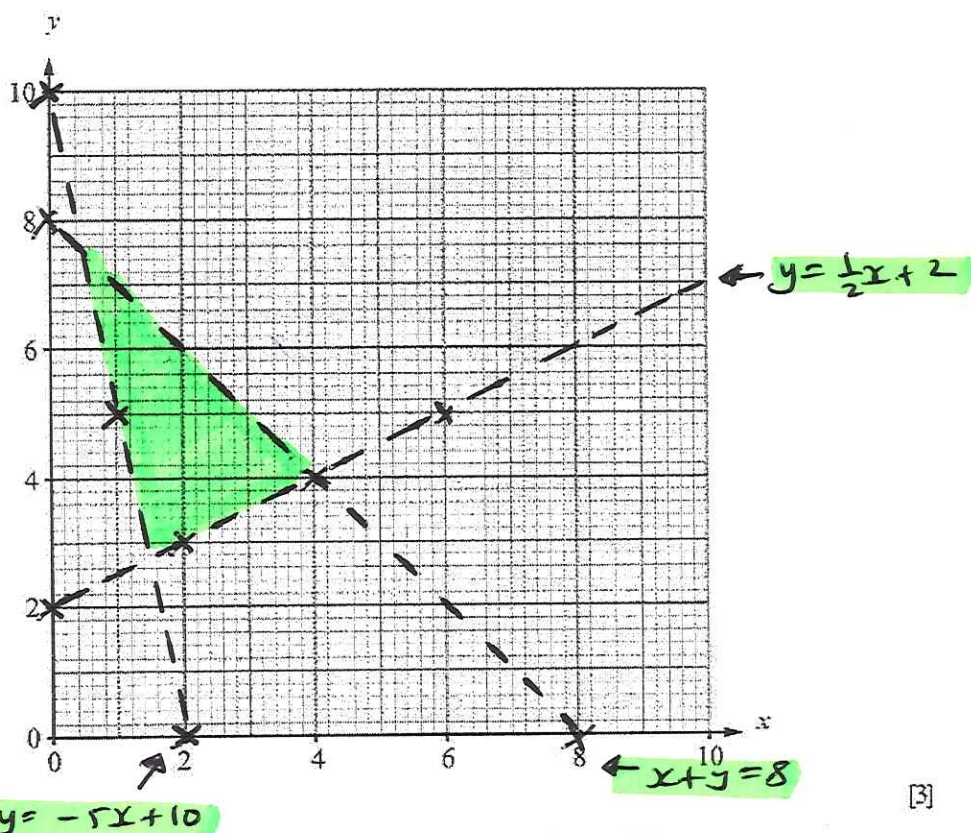
If $y = -5x + 10$

x	0	2	1
y	10	0	5

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

x	0	2	4	6
y	2	3	4	5

DOTTED LINES!



- (b) Write down a set of possible safe settings for the cutting machine.

$x = \underline{3}$ and $y = \underline{4}$

or, $x = 2, y = 5$
 $x = 1, y = 6$
 $x = 2, y = 4$

Note you are not allowed to pick values on the lines. All of the lines are dotted because the points on the lines are not included in the region. I have given all of the whole number possible safe settings, but you could choose decimals too.

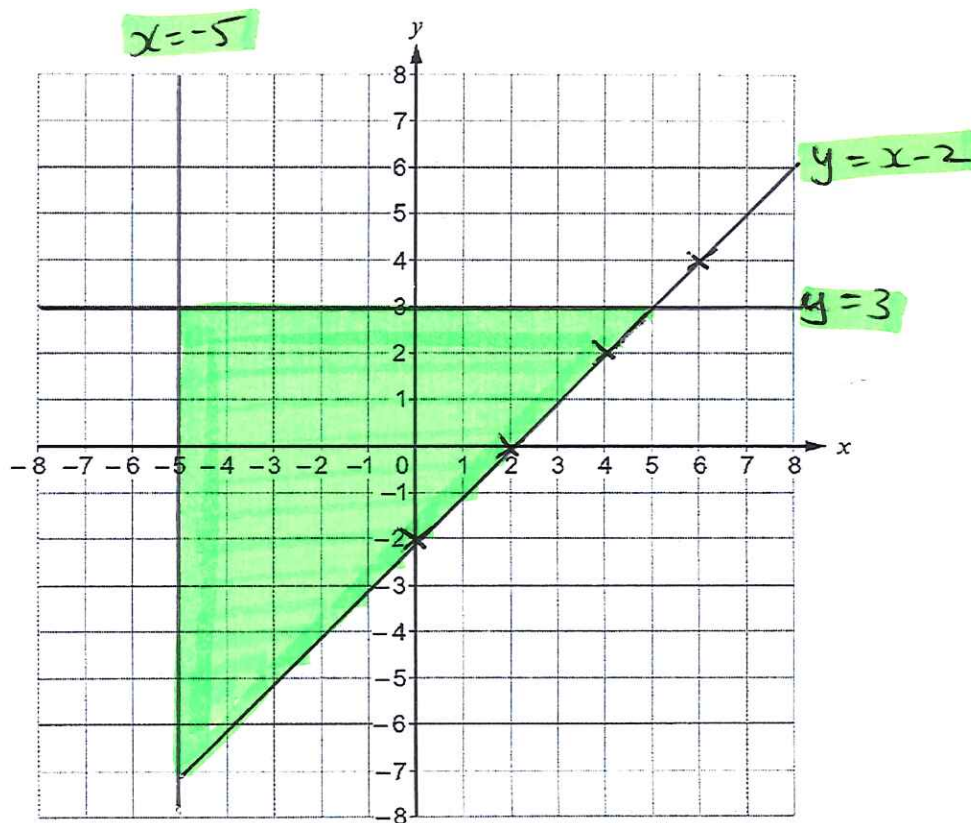
9.

On the grid below, draw the region which satisfies all of the following inequalities.

$$\begin{aligned} x &\geq -5 \rightarrow \text{plot } x = -5 \\ y &\leq 3 \rightarrow \text{plot } y = 3 \\ y - x + 2 &\geq 0 \rightarrow \text{plot } y = x - 2 \end{aligned}$$

You must clearly indicate the region that represents your answer.

[4]



If $y = x - 2$

x	0	2	4	6
y	-2	0	2	4

10.

Thelma owns a Guest House.
She wants to buy a number of rugs and cushions.



Each rug costs £30 and each cushion costs £4.

Thelma has decided on some conditions.

- She wants to buy at least 5 rugs.
- The number of cushions she buys must be less than twice the number of rugs she buys.
- She has a budget of £300.

Let r represent the number of rugs and let c represent the number of cushions.

(a) Write down three inequalities that satisfy Thelma's conditions.

[4]

$$\begin{aligned} r &\geq 5 \\ c &< 2r \\ 30r + 4c &\leq 300 \end{aligned}$$

(b) Use the graph paper opposite to find the region that is satisfied by all three inequalities.

[4]

must plot

$$r = 5$$

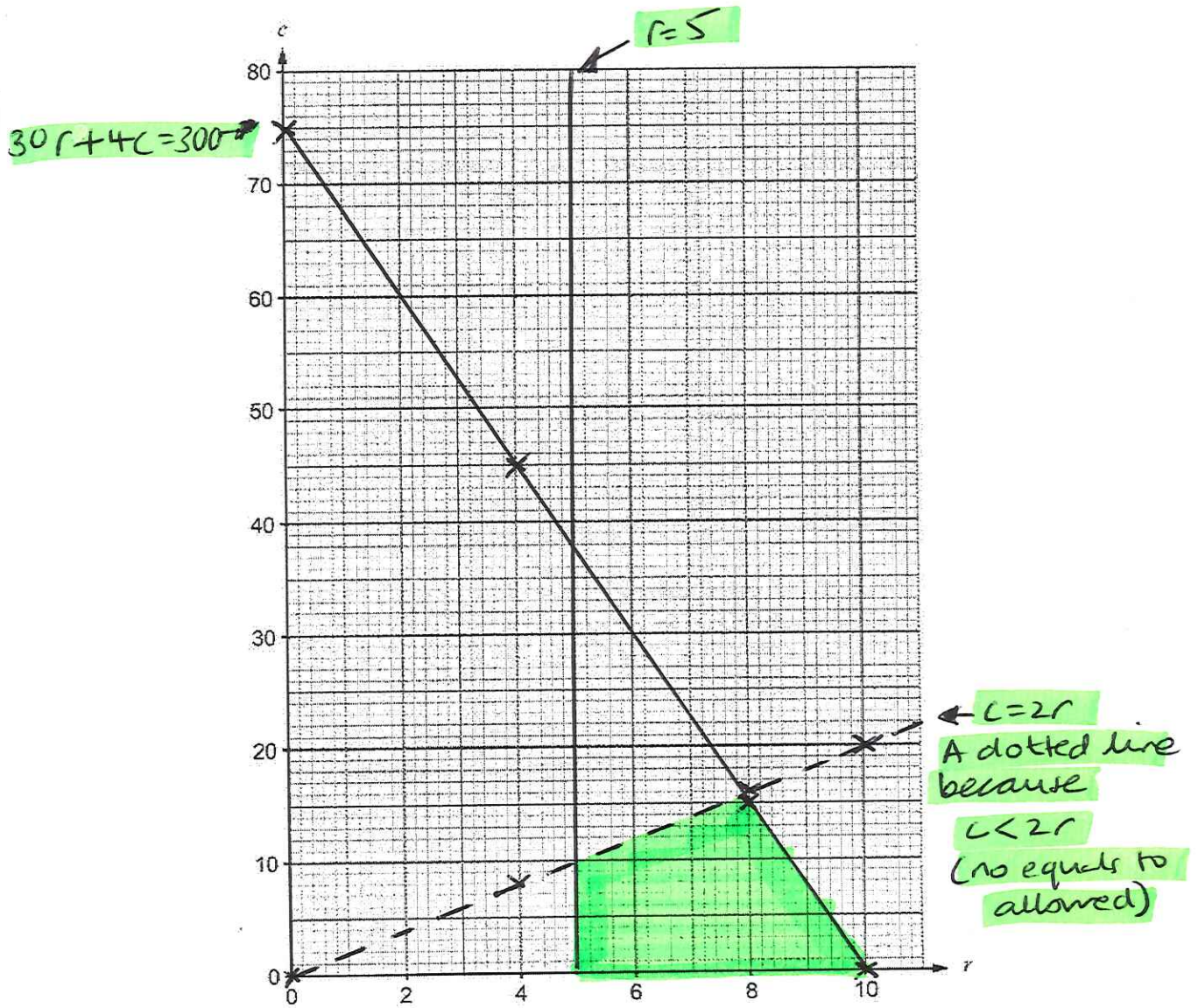
$$c = 2r$$

$$30r + 4c = 300$$

r	0	4	8	10
c	0	8	16	20

r	10	0	8	4
c	0	75	15	45

(I've just looked at the equation and chosen nice ones to evaluate)



- (c) Thelma buys the maximum possible number of cushions, keeping to her conditions. Find the number of rugs and cushions she buys and the total cost. [2]

$$8 \text{ rugs} = 8 \times 30 = 240$$

$$15 \text{ cushions} = 15 \times 4 = 60$$

$$\text{Number of rugs} = \underline{8}$$

$$\text{Number of cushions} = \underline{15}$$

$$\text{Total cost} = \text{£} \underline{300}$$