Linear programming



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

$$y \ge 0 \qquad x \ge 4 \qquad 2y \le x \qquad 2y + x \le 12$$
[3]

5



 $y \le \frac{1}{2}x + 4$, $y \ge 3$ and $x + y \ge 6$.

On the grid, label with the letter R the region which satisfies these inequalities.

You must shade the **unwanted** regions.

[3]



Find the three inequalities that define the unshaded region, R.

......[5]



Write down the 3 inequalities which define the unshaded region.





9

Find four inequalities that define the region, R, on the grid.

[Turn over



9

Write down the three inequalities that define the unshaded region, R.

......[4]

21

[Turn over

10



The region R satisfies these inequalities.

 $y \le 2x \qquad \qquad 3x + 4y \ge 12 \qquad \qquad x \le 3$

On the grid, draw and label the region R that satisfies these inequalities. Shade the **unwanted** regions.

[5]





(b) Write down the three inequalities that define the shaded region, *R*.

Answer(b)

......[3]

.....

(c)	A gardener buys x bushes and y trees. The cost of a bush is \$30 and the cost of a tree is \$200. The shaded region R shows the only possible numbers of bushes and trees the gardener can buy.				
	(i)	Find the number of bushes and the number of trees when the total cost is \$720.			
		Answer(c)(i) bushes			
		trees [2]			
	(ii)	Find the number of bushes and the number of trees which give the greatest possible total cost. Write down this greatest possible total cost.			
		Answer(c)(ii) bushes			
		trees			
		Greatest possible total cost = \$			

4 Ali buys *x* rose bushes and *y* lavender bushes.

He buys:

- at least 5 rose bushes
- at most 8 lavender bushes
- at most 15 bushes in total
- more lavender bushes than rose bushes.
- (a) (i) Write down four inequalities, in terms of x and/or y, to show this information.



(b) Rose bushes cost \$6 each and lavender bushes cost \$4.50 each.

What is the greatest amount of money Ali could spend?

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The cost of a bag of sweets is less than 24 cents. There are at least 9 sweets in each bag. There are at least 2 lemon sweets in each bag.

(i) One of the inequalities that shows this information is 2x + 3y < 24.

Write down the other two inequalities.

.....

.....[2]

(ii) On the grid, by shading the unwanted regions, show the region which satisfies the three inequalities.



[4]

(iii) Find the lowest cost of a bag of sweets.Write down the value of x and the value of y that give this cost.

- 8 Sima sells *x* biscuits and *y* cakes.
 - (a) (i) She sells at least 100 biscuits.Write down an inequality in *x*.

(ii) She sells at least 120 cakes.

Write down an inequality in *y*.

(iii) She sells a maximum of 300 biscuits and cakes altogether.

Write down an inequality in *x* and *y*.

(iv) Sima makes a profit of 40 cents on each biscuit and 80 cents on each cake. Her total profit is at least \$160.

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Show that $x + 2y \ge 400$.

Answer(a)(iv)

(b) On the grid, draw four lines to show the four inequalities and shade the unwanted regions.



(c) Calculate Sima's maximum profit. Give your answer in dollars.

[6]

3	(a)	Luk	wants to buy x goats and y sheep.	For Examiner's			
		(i)	He wants to buy at least 5 goats.	Use			
			Write down an inequality in <i>x</i> to represent this condition.				
			Answer(a)(i) [1]				
		(ii)	He wants to buy at least 11 sheep.				
			Write down an inequality in <i>y</i> to represent this condition.				
			Answer(a)(ii) [1]				
		(iii)	He wants to buy at least 20 animals.				
			Write down an inequality in x and y to represent this condition.				
			Answer(a)(iii)				
	(b)	Goa The	tts cost \$4 and sheep cost \$8. maximum Luk can spend is \$160.				
		Write down an inequality in x and y and show that it simplifies to $x + 2y \le 40$.					
		Ans	wer(b)				

(c) (i) On the grid below, draw four lines to show the four inequalities and shade the **unwanted** regions.

For Examiner's Use



Pable	o pla	ants x lemon trees and y orange trees.	For
(a)	(i)	He plants at least 4 lemon trees.	Use
		Write down an inequality in x to show this information.	
		Answer(a)(i) [1]]
	(ii)	Pablo plants at least 9 orange trees.	
		Write down an inequality in y to show this information.	
		Answer(a)(ii) [1]
(1	iii)	The greatest possible number of trees he can plant is 20.	
		Write down an inequality in x and y to show this information.	
		Answer(a)(iii) [1]
(b)	Len	non trees cost \$5 each and orange trees cost \$10 each.	
	The	maximum Pablo can spend is \$170.	
	Wri	te down an inequality in x and y and show that it simplifies to $x + 2y \le 34$.	
	Ans	wer (b)	
		[1]

(c) (i) On the grid opposite, draw four lines to show the four inequalities and shade the **unwanted** region.

