Graphical Inequalities
Difficulty: Hard

Question Paper 1

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Graphical Inequalities
Paper	Paper 4
Difficulty	Hard
Booklet	Question Paper 1

Time allowed: **70 minutes**

Score: **/61**

Percentage: **/100**

Grade Boundaries:

CIE IGCSE Maths (0580)

A*	A	B	C	D
>83%	67%	51%	41%	31%

CIE IGCSE Maths (0980)

9	8	7	6	5	4
>95%	87%	80%	69%	58%	46%

Pablo plants x lemon trees and y orange trees.

(a) (i) He plants at least 4 lemon trees.

Write down an inequality in x to show this information. [1]

(ii) Pablo plants at least 9 orange trees.

Write down an inequality in y to show this information. [1]

(iii) The greatest possible number of trees he can plant is 20.

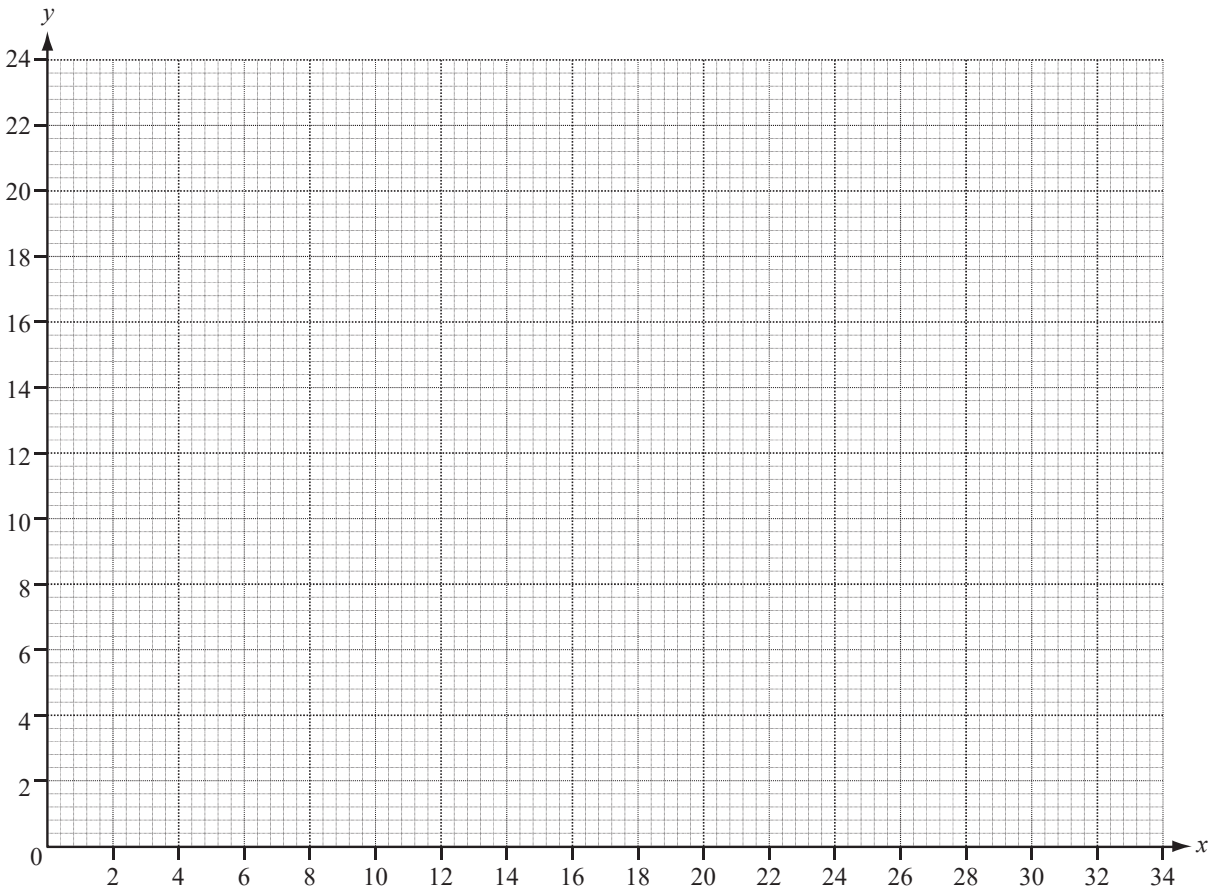
Write down an inequality in x and y to show this information. [1]

(b) Lemon trees cost \$5 each and orange trees cost \$10 each.

The maximum Pablo can spend is \$170.

Write down an inequality in x and y and show that it simplifies to $x + 2y \leqslant 34$. [1]

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



[7]

(ii) Calculate the smallest cost when Pablo buys a total of 20 trees. [2]

Mr Chang hires x large coaches and y small coaches to take 300 students on a school trip.
Large coaches can carry 50 students and small coaches 30 students.
There is a maximum of 5 large coaches.

(a) Explain clearly how the following two inequalities satisfy these conditions.

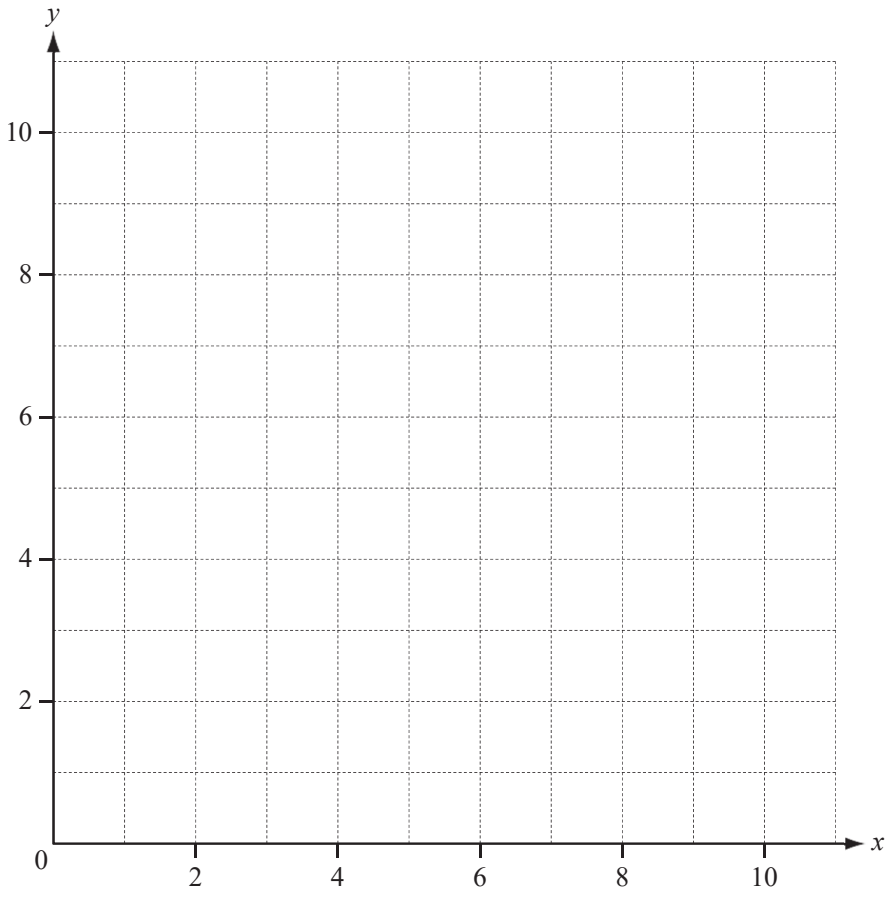
(i) $x \leqslant 5$ [1]

(ii) $5x + 3y \geqslant 30$ [2]

Mr Chang also knows that $x + y \leqslant 10$.

(b) On the grid, show the information above by drawing three straight lines and shading the unwanted regions.

[5]



(c) A large coach costs $450 to hire and a small coach costs $350.

(i) Find the number of large coaches and the number of small coaches that would give the minimum hire cost for this school trip.

[2]

(ii) Calculate this minimum cost. [1]

Hassan stores books in large boxes and small boxes.
Each large box holds 20 books and each small box holds 10 books.
He has x large boxes and y small boxes.

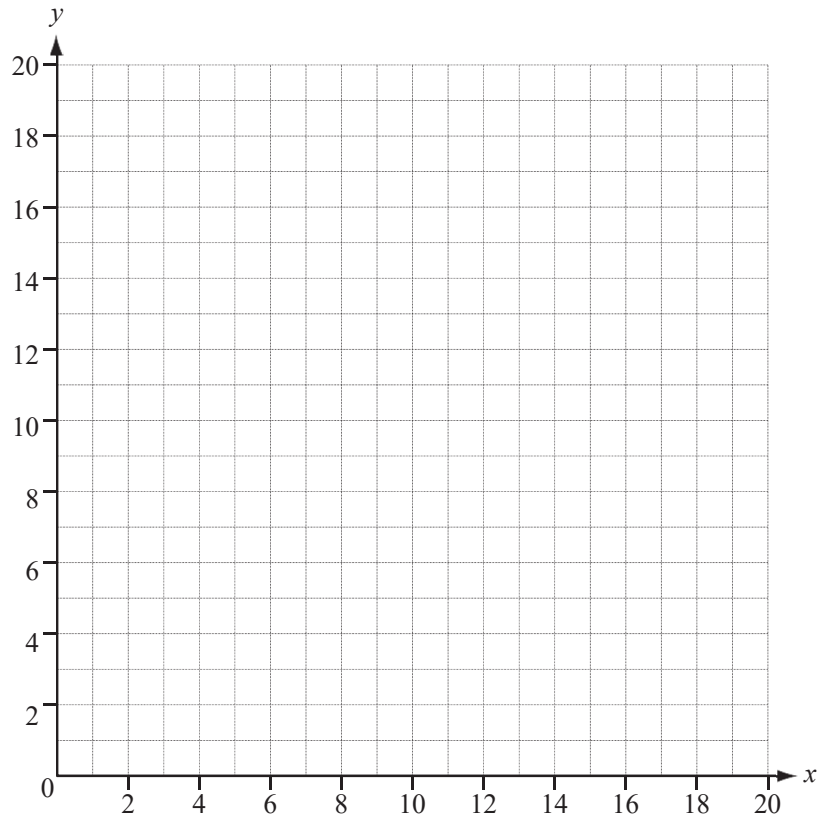
(a) Hassan must store at least 200 books.

Show that $2x + y \geq 20$. [1]

(b) Hassan must not use more than 15 boxes.
He must use at least 3 small boxes.
The number of small boxes must be less than or equal to the number of large boxes.

Write down three inequalities to show this information. [3]

(c) On the grid, show the information in part (a) and part (b) by drawing four straight lines and shading the unwanted regions. [6]



(d) A large box costs $5 and a small box costs $2.

(i) Find the least possible total cost of the boxes. [1]

(ii) Find the number of large boxes and the number of small boxes which give this least possible cost. [2]

A company has a vehicle parking area of $1200\ \text{m}^2$ with space for x cars and y trucks.

Each car requires $20\ \text{m}^2$ of space and each truck requires $100\ \text{m}^2$ of space.

(a) Show that $x + 5y \leqslant 60$. [1]

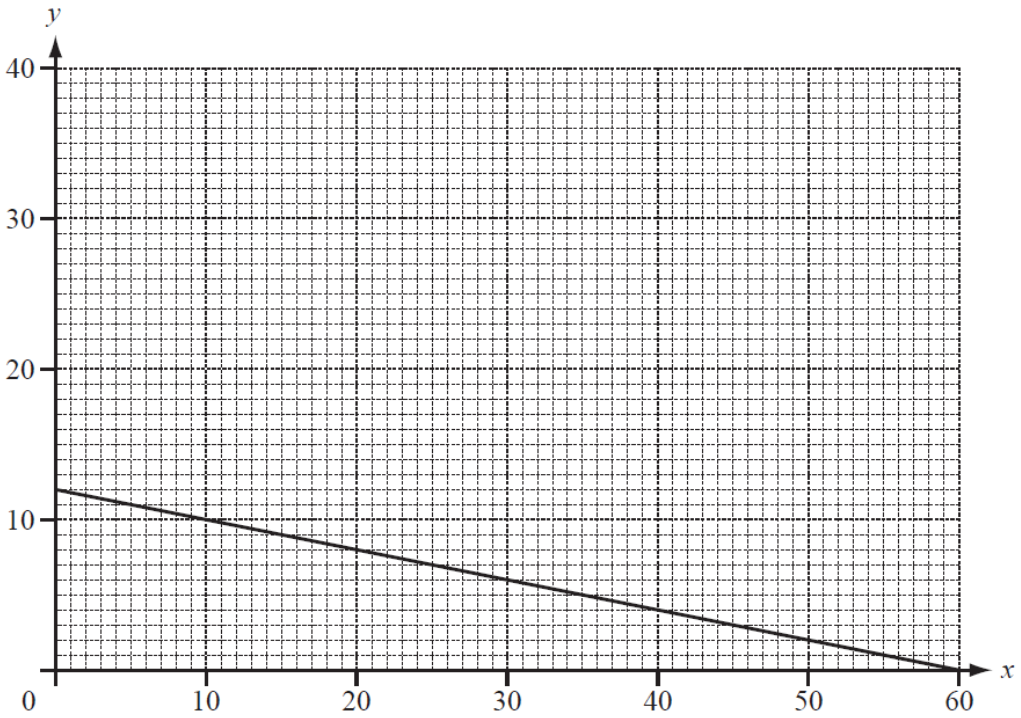
(b) There must also be space for

(i) at least 40 vehicles, [1]

(ii) at least 2 trucks. [1]

Write down two more inequalities to show this information.

(c) One line has been drawn for you.
On the grid, show the three inequalities by drawing the other two lines and shading the **unwanted** regions.



[4]

(d) Use your graph to find the largest possible number of trucks. [1]

(e) The company charges \$5 for parking each car and \$10 for parking each truck.
Find the number of cars and the number of trucks which give the company the greatest possible income.

Calculate this income. [3]

Answer the whole of this question on a sheet of graph paper.

Tiago does some work during the school holidays.
In one week he spends x hours cleaning cars and y hours repairing cycles.
The time he spends repairing cycles is at least equal to the time he spends cleaning cars.
This can be written as $y \geqslant x$.

He spends no more than 12 hours working.
He spends at least 4 hours cleaning cars.

(a) Write down two more inequalities in x and/or y to show this information. [3]

(b) Draw x and y axes from 0 to 12, using a scale of 1 cm to represent 1 unit on each axis. [1]

(c) Draw three lines to show the three inequalities. Shade the **unwanted** regions. [5]

(d) Tiago receives \$3 each hour for cleaning cars and \$1.50 each hour for repairing cycles.

(i) What is the least amount he could receive? [2]

(ii) What is the largest amount he could receive? [2]