

A The cost in petrol of a particular journey in a large car is £10, and in a small car is £6. A large car holds 6 people and a small car holds 4 people. There are 35 people to transport, and there are 5 large cars and 10 small cars available. What is the cheapest option?

B A big chair takes 6 hours to produce and a company has the materials to produce 5 of these. They sell for a profit of £10. A small chair takes 4 hours and the materials are available to make 10. They make a profit of £6. A company has 35 hours available. What should they make to get the most profit?

C A tour bus has 50 seats available. Tickets can be sold to adults for £15 and to children for £10. There must be at least 2 adults for every child on the bus. How many tickets should they sell to adults and how many to children?

D A factory has 50 operators and $480m^2$ of floor space. It is trying to decide how many of each of two types of machinery to buy to make the factory as profitable as possible. Machine A requires 2 operators, takes up $5m^2$ of floor space and makes a profit of £6 an hour. Machine B requires 3 operators and $15m^2$ of floor space but makes an hourly profit of £10. What should they get?

E A chef has £50 available for ingredients and 8 hours preparation time. He wants to make 2 different dishes in the quantities that will give the most profit. Dish A has ingredients costing £2, takes 5 minutes to prepare, and sells for a profit of £3. Dish B has ingredients costing £1, takes 15 minutes to prepare, and sells for a profit of £4.

F The cost in petrol of a particular journey in a large car is £4, and in a small car is £3. A large car holds 6 people and a small car holds 4 people. There are 50 people to transport, and there are 5 large cars and 10 small cars available. What is the cheapest option?

G A big chair takes 3 hours to produce and a company has the materials to produce 5 of these. They sell for a profit of £4. A small chair takes 2 hours and the materials are available to make 10. They make a profit of £3. A company has 50 hours available. What should they make to get the most profit?

H A theatre has 50 seats available to a children's show. The price of tickets is £15 for adults and £10 for children. However the performers do not like to perform to an adult audience and so it is a requirement that every adult must bring at least one child to the show. How many tickets should be sold to adults and how many to children?

INSTRUCTIONS: Match each graph with its problem, objective, constraints and solution, and write the correct capital letter, number, lower case letter and roman numeral inside the feasible region.

1 Minimise $Z = 3x + 4y$

i $x = 25, y = 25, Z = 625$

2 Maximise $Z = 10x + 15y$

ii $x = 5, y = 2, Z = 62$

3 Maximise $Z = 6x + 10y$

iii $x = 5, y = 10, Z = 50$

4 Maximise $Z = 3x + 4y$

iv $x = 10, y = 2, Z = 38$

5 Maximise $Z = 15x + 10y$

v $x = 5, y = 1, Z = 56$

6 Minimise $Z = 10x + 6y$

vi $x = 11, y = 28, Z = 145$

7 Maximise $Z = 4x + 3y$

vii $x = 0, y = 50, Z = 750$

8 Maximise $Z = 10x + 6y$

viii $x = 1, y = 16, Z = 166$

a $4x + 6y \geq 50$
 $0 \leq x \leq 10$
 $0 \leq y \leq 5$
 x, y integers

b $2x + 3y \leq 50$
 $x \geq 0$
 $y \geq 0$
 $5x + 15y \leq 480$
 x, y integers

c $x + y \leq 50$
 $x \geq 0$
 $y \geq 0$
 $y \geq 2x$
 x, y integers

d $6x + 4y \geq 35$
 $0 \leq x \leq 5$
 $0 \leq y \leq 10$
 x, y integers

e $3x + 2y \leq 50$
 $0 \leq x \leq 5$
 $0 \leq y \leq 10$
 x, y integers

f $2x + y \leq 50$
 $x \geq 0$
 $y \geq 0$
 $5x + 15y \leq 480$
 x, y integers

g $x + y \leq 50$
 $x \geq 0$
 $y \geq 0$
 $y \geq x$
 x, y integers

h $6x + 4y \leq 35$
 $0 \leq x \leq 5$
 $0 \leq y \leq 10$
 x, y integers

Solutions to Matching Exercise:

First graph sheet 1	A	6	d	ii
Second graph sheet 1	B	8	h	v
Third graph sheet 1	C	2	c	vii
Fourth graph sheet 1	D	3	b	viii
First graph sheet 2	E	4	f	vi
Second graph sheet 2	F	1	a	iv
Third graph sheet 2	G	7	e	iii
Fourth graph sheet 2	H	5	g	i



