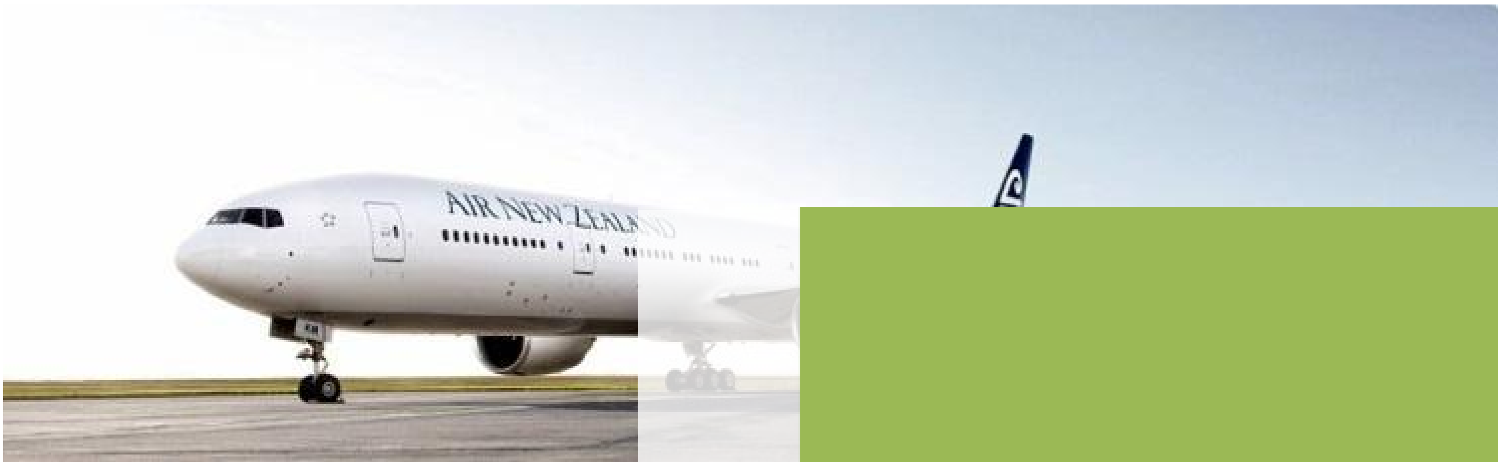


Linear Programm

Writing Inequations

Probably the hardest part of this standard, is to be able to write algebraic inequations from given word sentences. The following exercises will practice this skill.

eg A number x is less than 7

$x < 7$

eg A maximum budget of $2 000

$b \leq 2000$

eg John has at least 100 Star Wars toys

$t \geq 100$

Exercise 1

1) A number x is greater than 5.

$x > 5$

2) A number n is greater than or equal to 5.

$n \geq 5$

3) A number w is less than or equal to 100.

$w \leq 100$

4) A number y is a positive integer.

$y \geq 0$

5) A number p is a negative integer.

$p \leq 0$

6) Tom has at least $1,000 in the bank.

$m \geq 1000$

7) Two numbers have a sum that is at least 10.

$x + y \geq 10$

8) Two numbers have a sum no more than 4.

$x + y \leq 4$

9) Three times a number and 2 times a different number have a sum less than 10.

$3x + 2y < 10$

10) Twice a number g is no more than 30.

$2g \leq 30$

11) Bread costs 10c per slice and a sausage costs 40c. They plan to buy make and sell x sausages. A fundraising team has a maximum budget of $200 to spend on bread and sausages.

$0.10x + 0.40x \leq 200$ **or** $0.50x \leq 200$

12) The Mathematics Department has a maximum budget of $2,000 to spend on new textbooks. A Year 9 textbook costs $50 and a Year 10 textbook costs $60. Mr Amrein plans to buy x Year 9 textbooks and y Year 10 textbooks.

$50x + 60y \leq 2000$

Practice Test #1

A farmer has 6 hectares (ha) of land to grow potatoes and onions.

The cost to grow a hectare of potatoes is $5,000.

The cost to grow a hectare of onions is $3,000.

Altogether the farmer has a maximum budget of $20,000.

Problem: If the farmer receives a profit of $8,000 for growing a hectare of potatoes and a profit of $5,000 for growing a hectare of onions, how many hectares of potatoes and onions should the farmer grow to receive the maximum profit and what is the maximum profit…?

Solution:

Step 1

Identify the variables x and y:

x = number of hectares of potatoes

y = number hectares of onions

Step 2

Identify the constraints and write them as inequations:

Constraint #1 (hint: 6 hectares)

- $x + y \leq 6$

Constraint #2 (hint: cost and budget)

- $5000x + 3000y \leq 20000$

Constraint #3 (hint: a "hidden" constraint, ie not mentioned in the problem)

- $x \geq 0$

(because we can't have negative hectares)

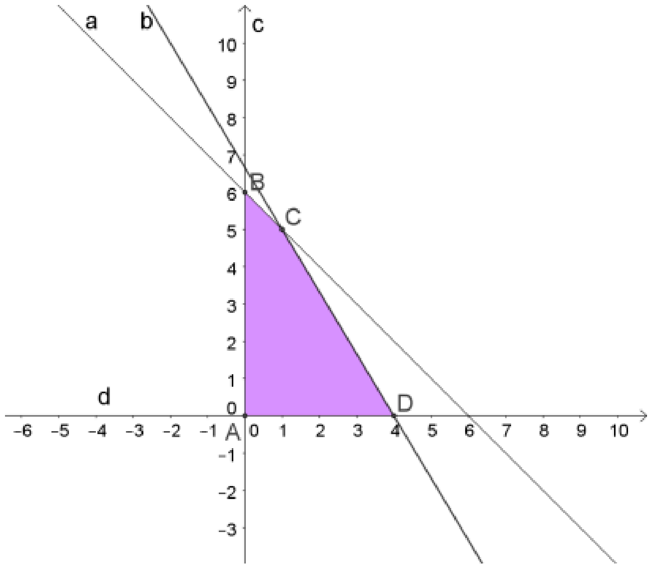
Constraint #4 (another "hidden" constraint)

- $y \geq 0$

Step 3

Graph the constraints and identify the feasible region.

We will use a programme called GeoGebra to graph the constraints (remember, to change the $\leq$ or $\geq$ signs into an $=$ sign when using GeoGebra).



Step 4

Find all appropriate solutions:

Here are some possible solutions:

Point (solution)	Potatoes (ha)	Onions (ha)
(0, 0)	0	0
(1, 2)	1	2
(0, 6)	0	6
(2, 2)	2	2

Rather than identify EVERY single possible solution in (or on) the feasible region), the **good news** is that the problems we look at have their maximum/minimum solutions on the VERTICES (corners) of the feasible region or polygon. In other words, we only need to explore the vertex solutions to decide the maximum or minimum solution.

Identify the 4 vertex solutions.

If there are four constraints, there will be a 4-sided polygon and there will be 4 solutions.

Point (Solution)	**Potatoes (ha)**	**Onions (ha)**
(0, 0)	0	0
(4, 0)	4	0
(0, 6)	0	6
(1, 5)	1	5

Step 5

Determine the maximum or minimum value to solve the problem.

Now we take each possible vertex solution and explore the PROFIT for each solution.

Profit Equation = $8000x + 5000y$

eg Looking at a solution of (1, 5):

1 ha potatoes and 5 ha of onions.

Profit = \$8000 × 1 + \$5000 × 5

= \$33,000

Find the profits for all other the vertex solutions:

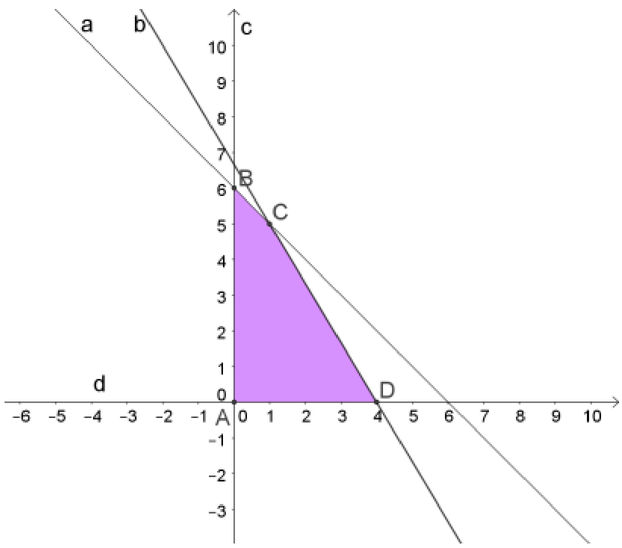
Solution	**Profit**
(0, 0)	8000 × 0 + 5000 × 0 = \$0
(0, 6)	8000 × 0 + 5000 × 6 = \$30,000
(1, 5)	8000 × 1 + 5000 × 5 = \$33,000
(4, 0)	8000 × 4 + 5000 × 0 = \$32,000

Step 6

Write a conclusion:

The maximum profit gained would be \$33,000 and this is from growing 1 hectare of potatoes and 5 hectares of onions.

Before we get into another practice test, let's make sure you understand a little better what you have done by answering a few questions.



Question 1

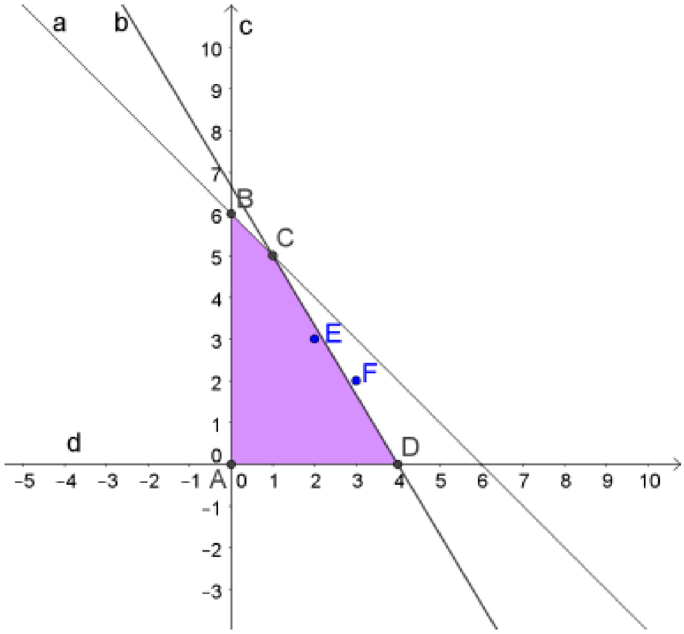
Explain why we cannot have a solution of (-1, 2)?

Question 2

Explain why the point (6, 0), 6 hectares of potatoes and 0 hectares of onions, is not in the feasible region?

Question 3

Explain whether point E (2, 3) or F (3, 2) is a suitable solution. Why?



Practice Test #2

A company wishes to import teddy bears to sell. A container of Small teddy bears costs $1,500 to buy and ship into New Zealand. A container of Large teddy bears costs $4,000 to buy and ship into New Zealand. The company has a maximum of $600,000 to purchase these containers.

The company is allowed a maximum of 200 containers on the ship.

The profit for each container of Small teddy bears is $2,000 and the profit for each container of Large teddy bears is $5,000.

Task

Determine the amount of containers of each type of teddy bear, the company should import into New Zealand to maximise its profit. What is the maximum profit?

Identify the variables:

x = number of containers of small teddy bears

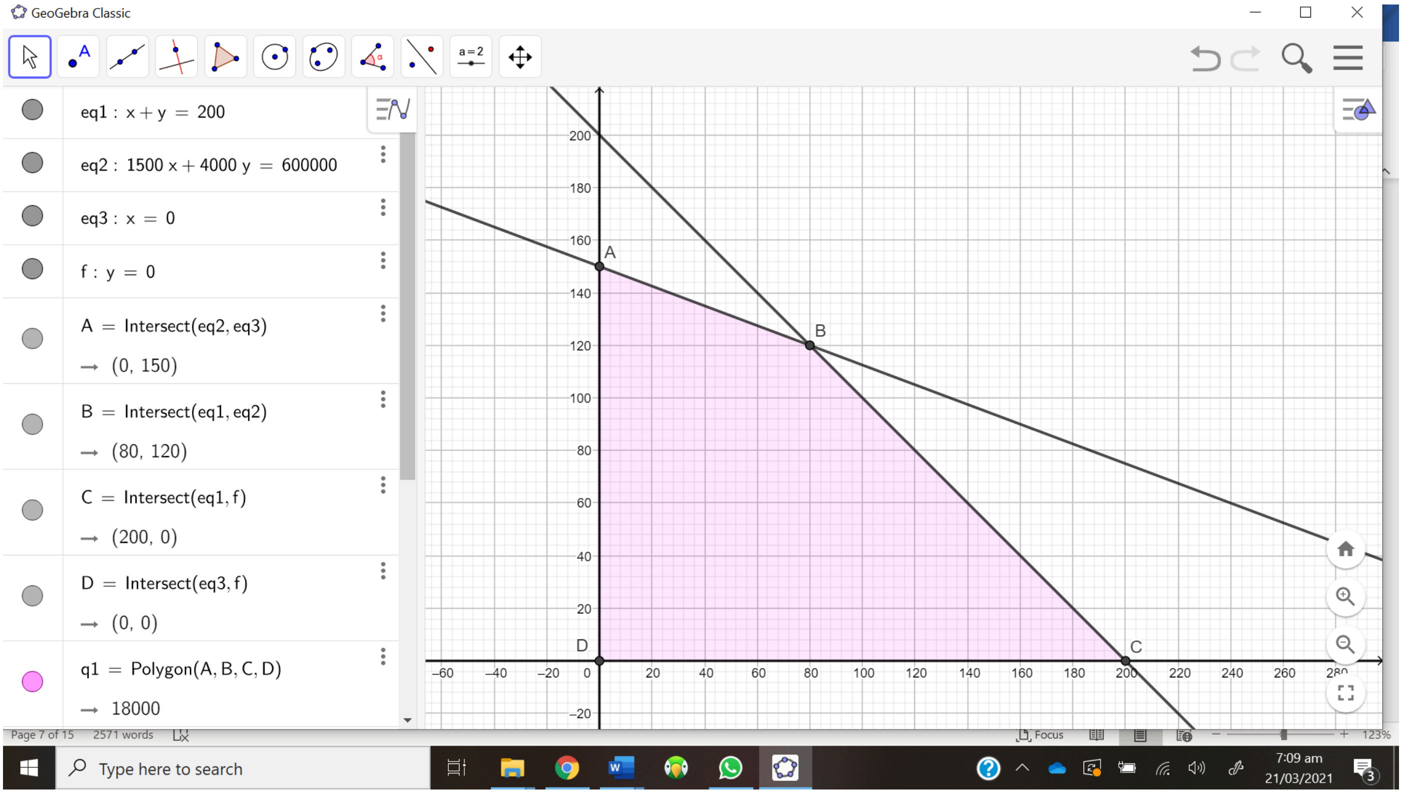
y = number of containers of larger teddy bears

Objective Function: **Profit Equation =** $2000x + 5000y$

Constraints:

- $x + y \leq 200$
- $1500x + 4000y \leq 600000$
- $x \geq 0$
- $y \geq 0$

Feasible Region: (insert graph here)



__Appropriate Solutions:__

Point (solution)	Containers of Small Teddy Bears	Containers of Large Teddy Bears
(0, 0)	**0**	**0**
(0, 150)	**0**	**150**
(80, 120)	**80**	**120**
(200, 0)	**200**	**0**

Vertex	Profit
(0, 0)	**2000 × 0 + 5000 × 0 = $0**
(0, 150)	**2000 × 0 + 5000 × 150 = $750,000**
(80, 120)	**2000 × 80 + 5000 × 120 = $760,000**
(200, 0)	**2000 × 200 + 5000 × 0 = $400,000**

__Conclusion:__

The maximum profit obtained is $760,000. This can be obtained by ordering in 80 containers of small teddy bears and 120 containers of large teddy bears.

Practice Test #3

A soft drink company produces soft drinks with GLASS and PLASTIC bottles. The factory can produce no more than 80 pallets of bottles per week. It costs $800 to produce a pallet of GLASS bottles and $600 to produce a pallet of PLASTIC bottles. The company has signed a contract that states they must produce at least 24 pallets of GLASS bottles and at least 16 pallets of PLASTIC bottles. The company has a budget of $60,000 per week to produce soft drinks.

GLASS bottles make a profit of $250 per pallet. PLASTIC bottles make a profit of $200 per pallet

Task

Determine the amount of glass and plastic bottles the company needs to produce to maximise its weekly profit. What is the maximum profit?

Identify the variables:

x = number of pallets of glass bottles

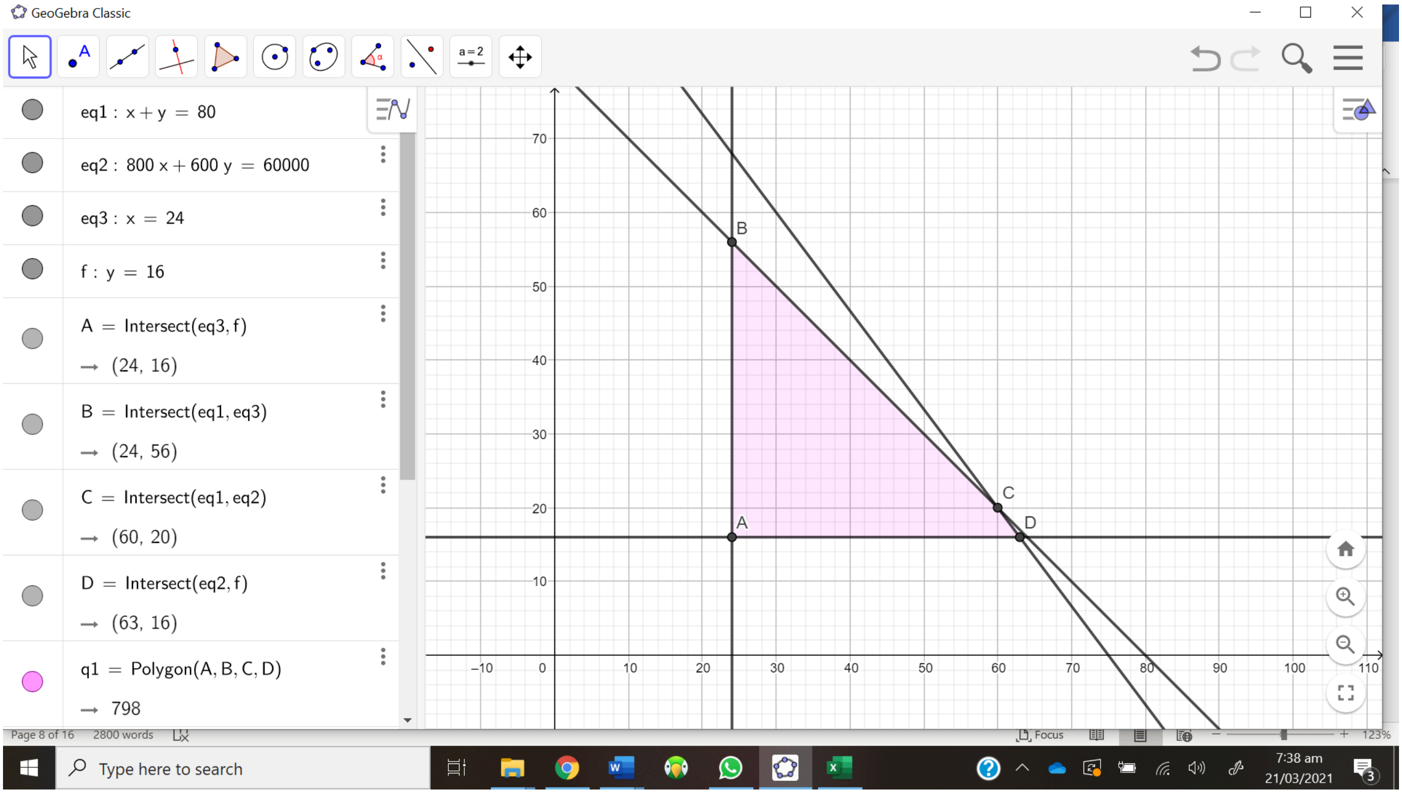
y = number of pallets of plastic bottles

Objective Function: **Profit Equation =** $250x + 200y$

Constraints:

- $x + y \leq 80$
- $800x + 600y \leq 60000$
- $x \geq 24$
- $y \geq 16$

__Feasible Region:__ (insert graph here)



__Appropriate Solutions:__

Point (solution)	Pallets of glass bottles	Pallets of plastic bottles
(24, 16)	**24**	**16**
(24, 56)	**24**	**56**
(60, 20)	**60**	**20**
(63, 16)	**63**	**16**

Vertex	Profit
(24, 16)	**250 × 24 + 200 × 16 = $9,200**
(24, 56)	**250 × 24 + 200 × 56 = $17,200**
(60, 20)	**250 × 60 + 200 × 20 = $19,000**
(63, 16)	**250 × 63 + 200 × 16 = $18,950**

__Conclusion:__

The maximum profit obtain is $19,000. This can be obtained by producing 60 pallets of glass bottles and 20 pallets of plastic bottles.

Practice Test #4

A camp site for caravans and tents has an area of 18,000m^2. Each caravan site requires 200m^2. Each tent site requires 100m^2.

The council stipulates the following conditions:

- The total number of caravans or tents must not exceed 160.
- The number of caravans must not exceed 70.

The camp site intends to charge $80 per night for a caravan and $50 per night for a tent.

TASK

Determine what combination of caravans and tents will yield the maximum revenue available to the camp site. What is the maximum revenue?

Identify the variables:

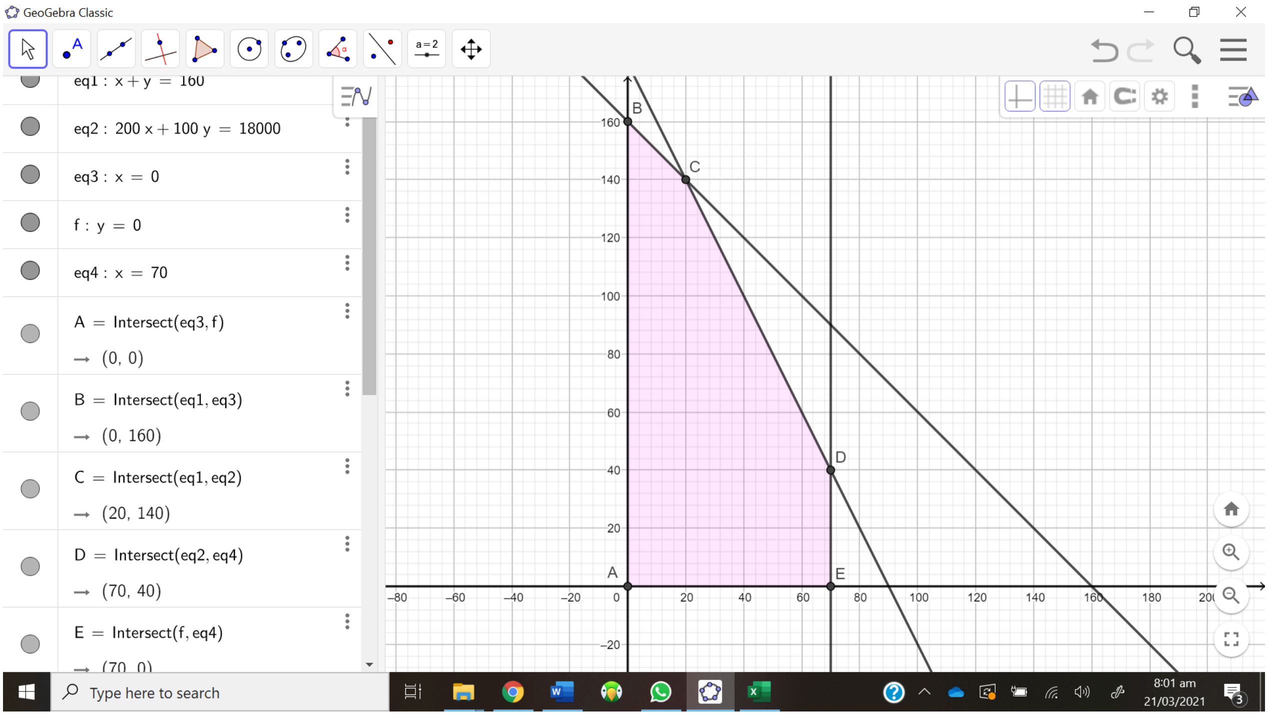
x = number of sites for caravans

y = number of sites for tents

Constraints:

- $x + y \leq 160$
- $200x + 100y \leq 18000$
- $x \geq 0$
- $y \geq 0$
- $x \leq 70$

Feasible Region: (insert graph here)



Appropriate Solutions:

Point (solution)	Number of Caravans Sites	Number of Tent Sites
(0, 0)	0	0
(0, 160)	0	160
(20, 140)	20	140
(70, 40)	70	40
(70, 0)	70	0

Vertex Solutions: **Revenue Equation =** $80x + 50y$

Vertex	Profit
(0, 0)	80 × 0 + 50 × 0 = $0
(0, 160)	80 × 0 + 50 × 160 = $8,000
(20, 140)	80 × 20 + 50 × 140 = $8,600
(70, 40)	80 × 70 + 50 × 40 = $7,600
(70, 0)	80 × 70 + 50 × 0 = $5,600

Conclusion:

The maximum revenue the campsite can obtain is $8,600 per night. This can be obtained by having 20 caravan sites and 140 tent sites.

Practice Test #5

A company makes souvenir kiwi and sheep toys to sell to tourists.

Here are their production statistics:

	Number Made	Time to make (minutes)	Weight of plastic per toy (g)	Profit per toy ($)
Kiwi	X	45	21	15
Sheep	Y	30	42	12

The company has a maximum of 60 hours to make the toys. The company has a maximum of 3360g of plastic to make these items. They already have orders for 10 kiwi and 24 sheep toys.

Determine the maximum profit on these toys describing how many kiwi and sheep toys need to be made for this profit.

Identify the variables:

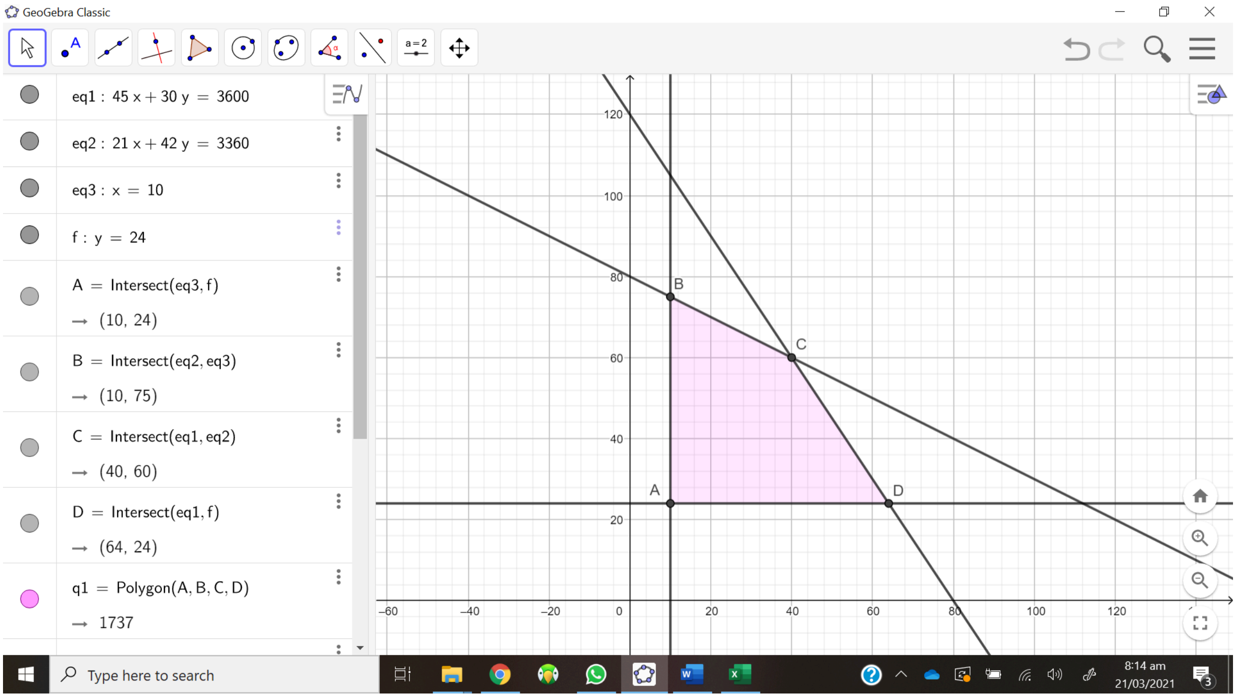
x = number of kiwi toys

y = number of sheep toys

Constraints:

- $45x + 30y \leq 3600$
- $21x + 42y \leq 3360$
- $x \geq 10$
- $y \geq 24$

Feasible Region: (insert graph here)



Appropriate Solutions:

Point (solution)	Number of Kiwi Toys	Number of Sheep Toys
(10, 24)	**10**	**24**
(10, 75)	**10**	**75**
(40, 60)	**40**	**60**
(64, 24)	**64**	**24**

Vertex Solutions: **Profit Equation =** $15x + 12y$

Vertex	Profit
(10, 24)	**15 × 10 + 12 × 24 = $438**
(10, 75)	**15 × 10 + 12 × 75 = $1,050**
(40, 60)	**15 × 40 + 12 × 60 = $1,320**
(64, 24)	**15 × 64 + 12 × 24 = $1,248**

Conclusion:

The maximum profit the souvenir shop can make is $1,320. This can be obtained by making 40 kiwi toys and 60 sheep toys.

Practice Test #6

A businessman starts up a computer business. He can purchase laptops for $250 and desktops for $650. He has a maximum budget of $75,000. The total monthly demand will not exceed 200 computers.

He sells the laptops to customers for $450 and desktops for $800.

Determine the maximum profit that can be made by selling laptops and desktops and describe how many of each computer he needs to sell to get this profit.

Identify the variables:

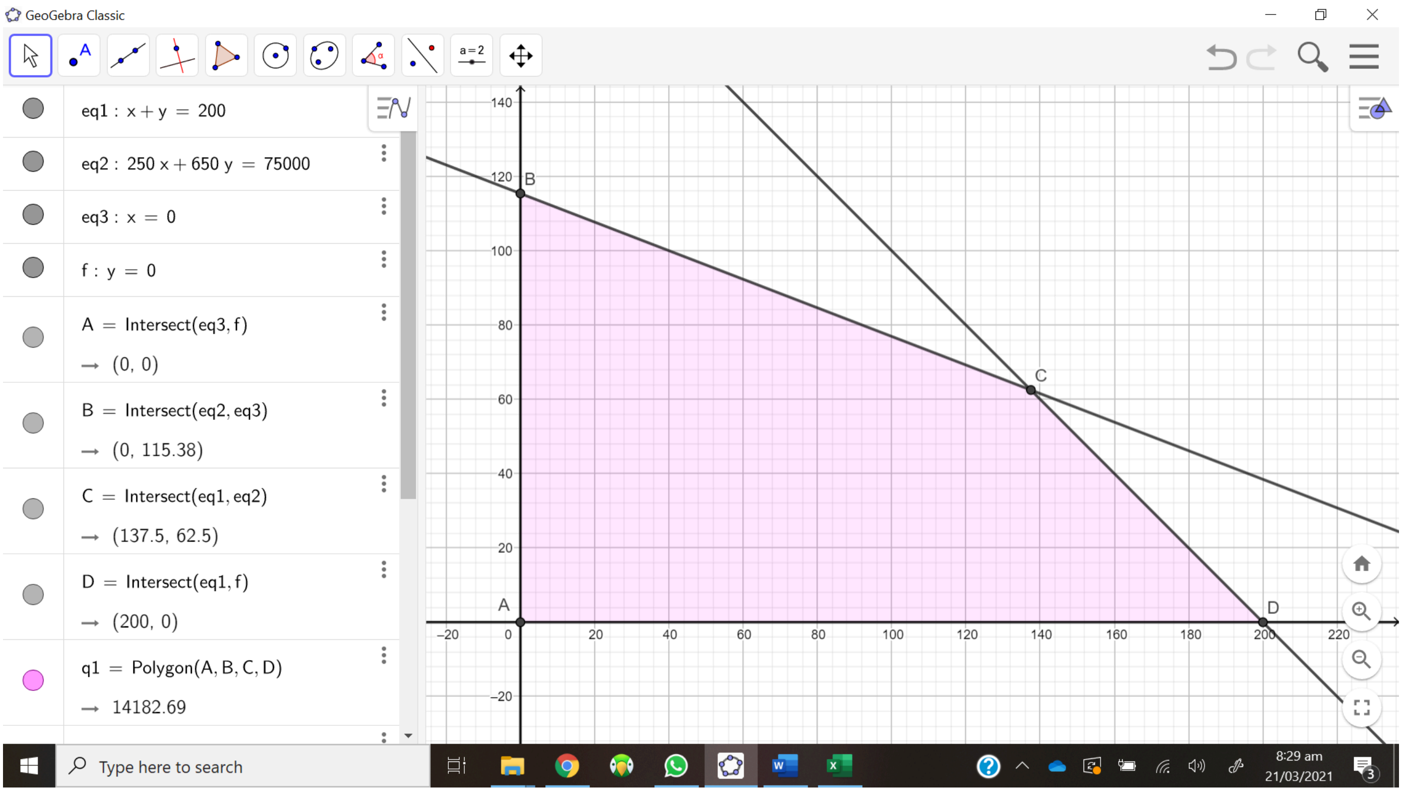
x = number of laptops

y = number of desktops

Constraints:

- $x + y \leq 200$
- $250x + 650y \leq 75000$
- $x \geq 0$
- $y \geq 0$

Feasible Region: (insert graph here)



Appropriate Solutions:

Point (solution)	Number of Laptops	Number of Desktops
(0, 0)	**0**	**0**
(0, 115.38)	**0**	**115**
(137.5, 62.5)	**137**	**62**
(200, 0)	**200**	**0**

Vertex Solutions: **Profit Equation =** $200x + 150y$

Profit (laptops) = 450 – 250 = $200 *Profit (desktops) = 800 – 650 = $150*

Vertex	Profit
(0, 0)	**200 × 0 + 150 × 0 = $0**
(0, 115)	**200 × 0 + 150 × 115 = $17,250**
(137, 62)	**200 × 137 + 150 × 62 = $36,700**
(200, 0)	**200 × 200 + 150 × 0 = $40,000**

Conclusion:

The maximum profit he can make is $40,000 by selling 200 laptops and no desktops.

Practice Test #7

A company manufactures and sells two models of lamps; the Lightning Lamp (Lamp #1) and the Quickfire Lamp (Lamp #2).

The manual work needed to make the lamps is 20 minutes for Lamp #1 and 30 minutes for Lamp #2. There is 100 hours of manual work available each week in total.

The machine work needed to make the lamps is 20 minutes for Lamp #1 and 10 minutes for Lamp #2. There is 80 hours of machine work available each week in total.

Knowing that the profit for Lightning Lamp will be $15 and the profit for Quickfire Lamp will be $10, determine the quantities of each lamp that should be manufactured each week to obtain the maximum profit. What is this maximum profit?

Identify the variables:

x = number of Lamp #1 (Lightning Lamp)

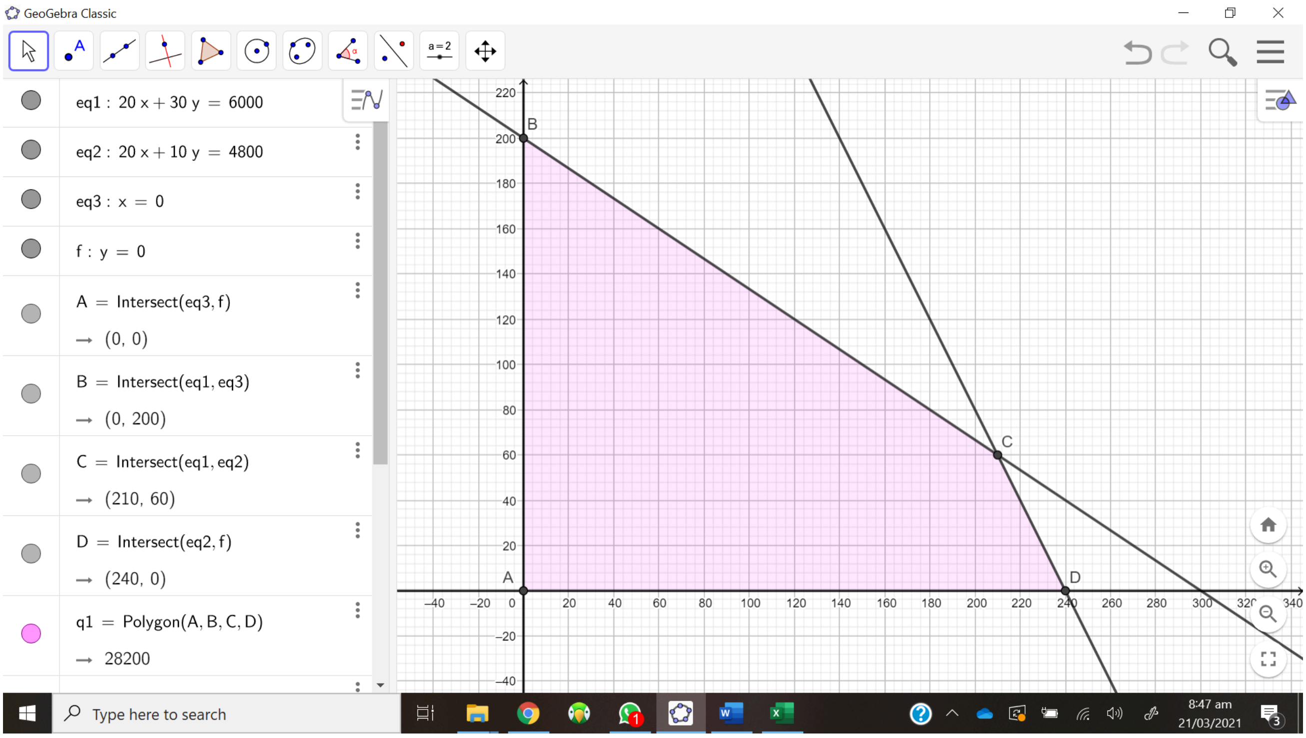
y = number of Lamp #2 (Quickfire Lamp)

Constraints:

- $20x + 30y \leq 6000$
- $20x + 10y \leq 4800$
- $x \geq 0$

- $y \geq 0$

Feasible Region: (insert graph here)



Appropriate Solutions:

Point (solution)	Number of Lamp #1	Number of Lamp #2
(0, 0)	**0**	**0**
(0, 200)	**0**	**200**
(210, 60)	**210**	**60**
(240, 0)	**240**	**0**

Vertex Solutions: **Profit Equation =** $15x + 10y$

Vertex	Profit
(0, 0)	**15 × 0 + 10 × 0 = $0**
(0, 200)	**15 × 0 + 10 × 200 = $2,000**
(210, 60)	**15 × 210 + 10 × 60 = $3,750**
(240, 0)	**15 × 240 + 10 × 0 = $3,600**

Conclusion:

The maximum profit the company can make is $3,750. This is by manufacturing 210 Lamp #1 (Lightning Lamps) and 60 Lamp #2 (Quickfire Lamps).

Practice Test #8

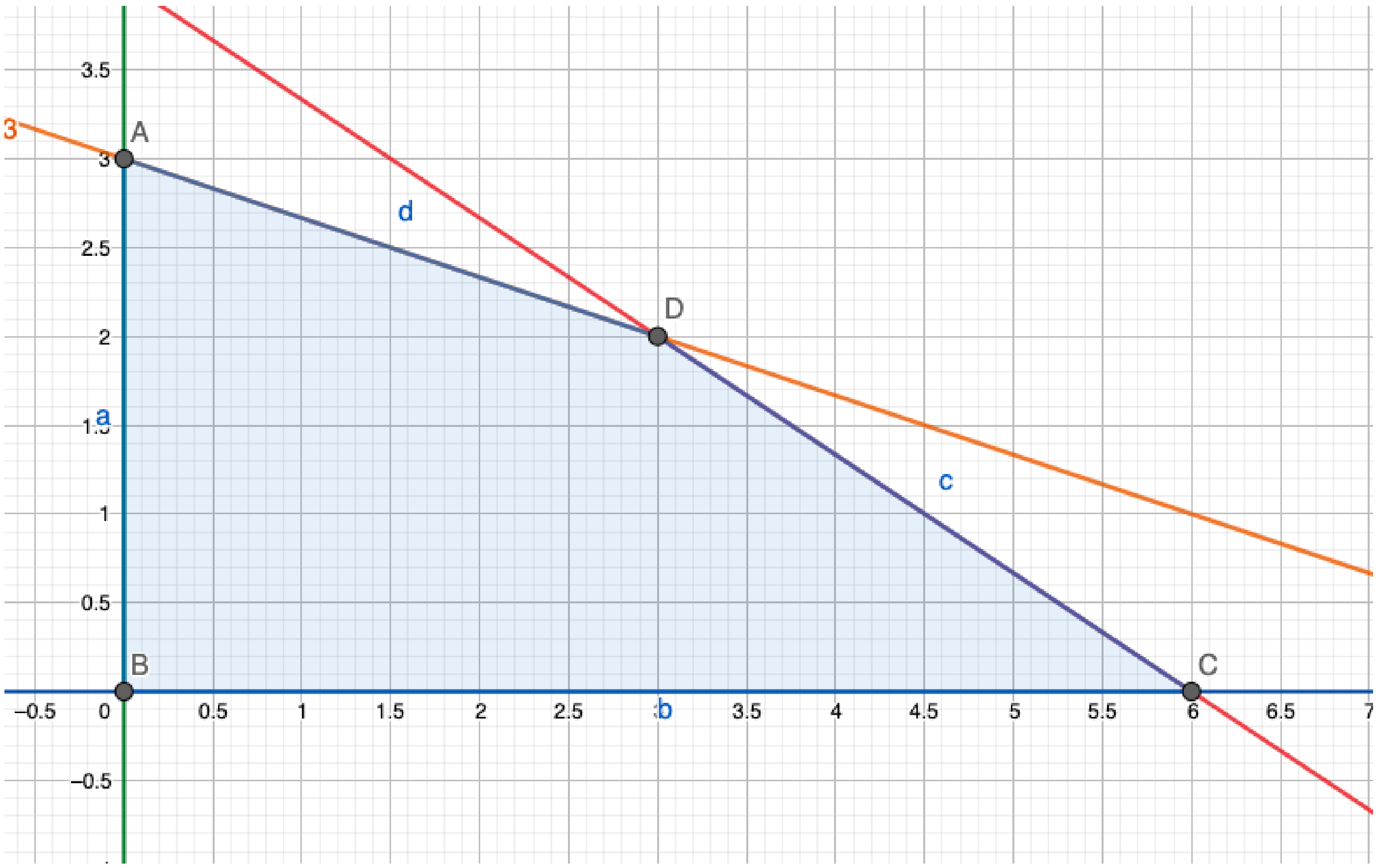
Bob the Builder builds tool sheds. He uses 10 sheets of dry wall and 15 studs for a small shed and 15 sheets of dry wall and 45 studs for a large shed. He has 60 sheets of dry wall available and 135 studs available. If Bob makes $390 profit on a small shed and $520 on a large shed, how many of each type of building should Bob build to maximize his profit and what is his maximum profit?

x = Number of small sheds
y = Number of large sheds

Constraints:

- x=>0
- y=>0
- 10x+15y =<60
- 15x + 45y =<135

Feasible Region



Appropriate Solutions:

Point (Solution)	Number of small sheds $390	Number of large sheds $520
(0,3)	0	3
(0,0)	0	0
(6,0)	6	0

(3,2)	3	2

Vertex Solutions:

Solution	Profit
(0,3)	(0x390) + (3x520) = 1,560
(0,0)	(0x390) + (0x520) = 0
(6,0)	(6x390) + (0x520) = 2,340
(3,2)	(3x390) + (2x520) = 2,210

Conclusion:

The maximum profit that can be obtained is $2,340. This can be obtained by making 6 small sheds and 0 large sheds.

Practice Test #9

Marni has a small business, making sun-shelters and tents for young children.

	Production time	Amount of material used (m^2)	Profit
sun-shelter	30	2	$9
tent	40	5	$12

The table summarises each item.

Marni has small children, so each week she only has 30 hours available to work on these items. Each week she orders in $190m^2$ of material to make these items.

Currently she has a steady order of at least 10 sun-shelters per week and at least 15 tents per week.

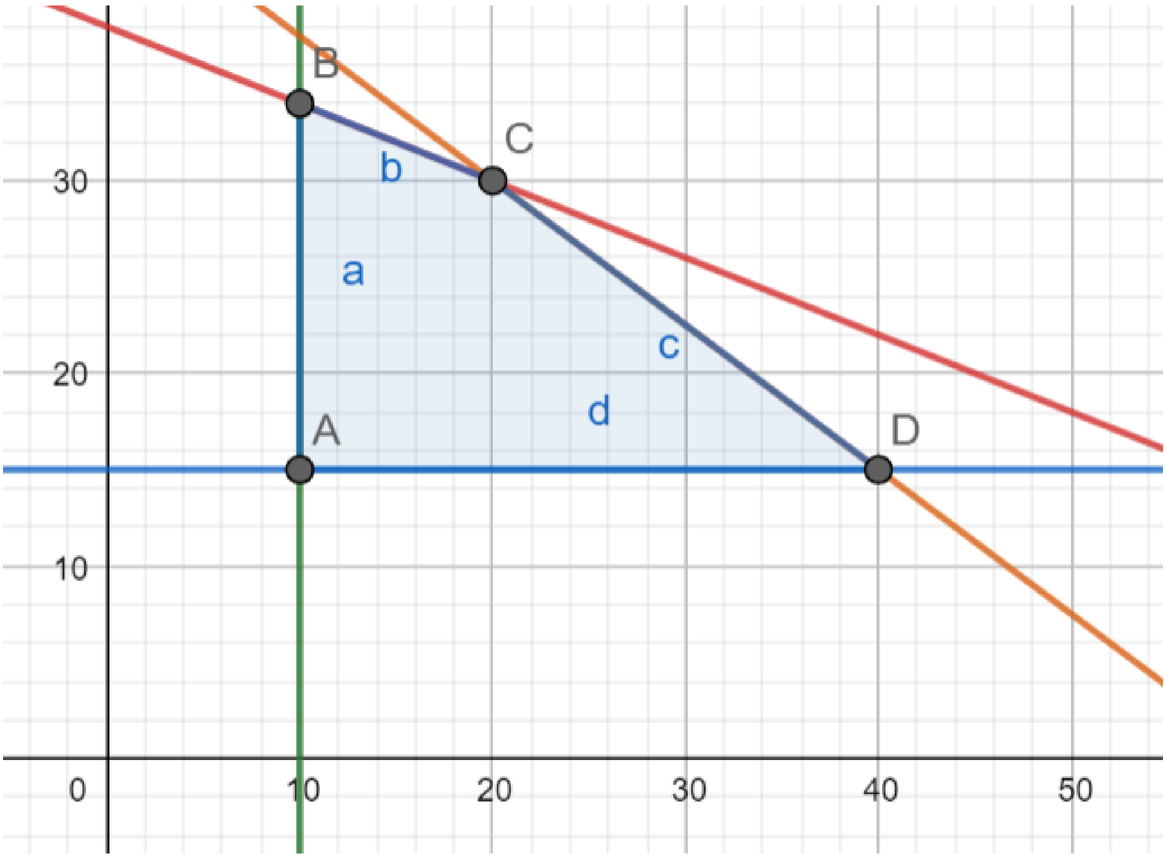
Calculate how many sun-shelters and how many tents to maximise her profit each week and determine this maximum profit.

x = the number of sun-shelters
y = the number of tents

Constraints:

- $x \geq 10$
- $y \geq 15$
- $2x + 5y \leq 190$
- $30x + 40y \leq 1800$

Feasible Region



Appropriate Solutions:

Point (Solution)	Sun shelters	Tents
(10,15)	10	15
(10,34)	10	34
(20,30)	20	30
(40,15)	40	15

Vertex Solutions:

Solution	Profit
(10,15)	(10x9) + (15x12) = 270
(10,34)	(10x9) + (34x12) = 498
(20,30)	(20x9) + (30x12) = 540
(40,15)	(40x9) + (15x12) = 540

Conclusion:

The maximum profit that can be obtained is $540. This can be obtained by making either 20 sun shelters and 30 tents or 40 sun shelters and 15 tents. The second option would use 155m2 of material which is less than the first option which would use 190m2.

Practice Test #10

Mr Amrein is writing a Year 9 Mathematics test. The test requires the following conditions:

- It had to have a maximum of 10 Algebra questions
- It had to have a maximum of 8 Measurement questions
- The total number of questions in the test had to be at least 15.

Mr Amrein wanted to **minimise** his marking time. It takes 3 minutes to mark an algebra question and 2 minutes to mark a Measurement question.

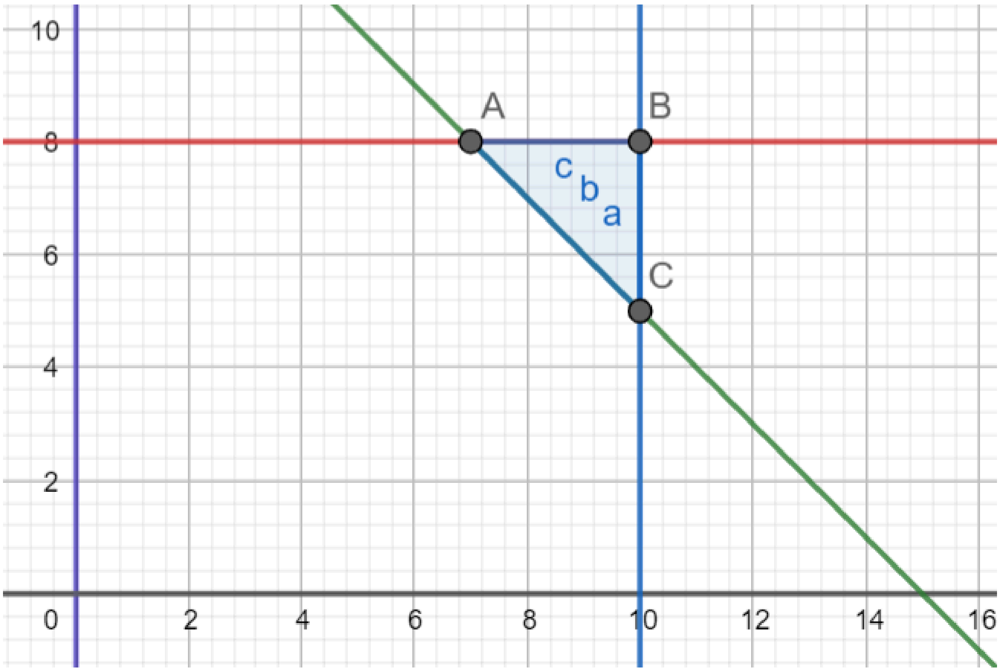
How many of each question should Mr Amrein put in the test to **minimise** the marking time and how long would it take to mark the test?

x = the number of Algebra questions
y = the number of Measurement questions

Constraints:

- $x \le 10$
- $y \le 8$
- $x + y \ge 15$
- $x \ge 0$
- $y \ge 0$

Feasible Region



Appropriate Solutions:

Point (Solution)	Algebra Questions	Measurement Questions
(7,8)	7	8
(10,8)	10	8
(10,5)	10	5

Vertex Solutions:

Solution	Time
(7,8)	**7x3+8x2=37mins**
(10,8)	**10x3+8x2=46mins**
(10,5)	**10x3+5x2=40mins**

Conclusion:

The minimum time to mark a test will be 37 minutes from 7 Algebra questions and 8 Measurement questions.

Practice Test #11

A helicopter company transports passengers out to an island resort. The company has 5 large helicopters which require 3 crew members to operate and 7 small helicopters which require 2 crew members to operate.

The helicopter company has 18 qualified crew members.

Each helicopter can only make one trip per day and on any one day the company must transport at least 30 passengers.

Large helicopters carry 10 passengers and make a profit of $500 per round trip.

Small helicopters carry 6 passengers and make a profit of $400 per round trip.

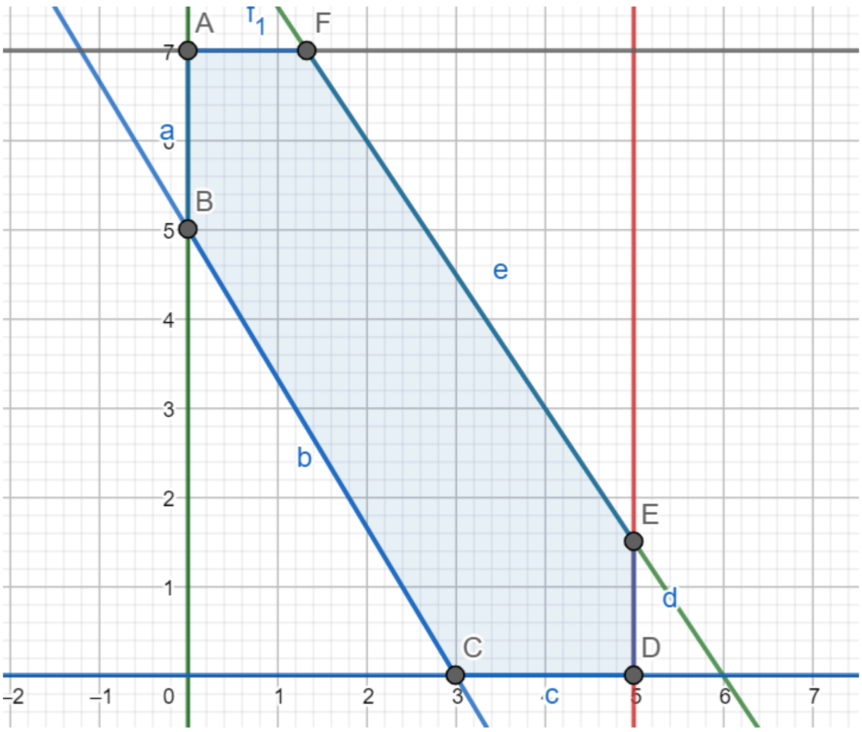
How many helicopters of each type should the company use to maximise its profit and what is this profit?

x = Number of large Helicopters
y = Number of small Helicopters

Constraints:

- x=>0
- y=>0
- x<=5
- y<=7
- 3x+2y =<18
- 10x + 6y >=30

Feasible Region



Appropriate Solutions:

Point (Solution)	# Large Heli	# Small Heli
(0,5)	0	5
(0,7)	0	7
(3,0)	3	0
(5,0)	5	0

(5,1.5)	5	1.5
(1.33,7)	1.33	7

Vertex Solutions:

Solution	Profit
(0,5)	(0x500) + (5x400) = 2,000
(0,7)	(0x500) + (7x400) = 2,800
(3,0)	(3x500) + (0x400) = 1,500
(5,0)	(5x500) + (0x400) = 2,500
(5,1.5)	(5x500) + (1x400) = 2,900 (1.5 rounded down to 1)
(1.33,7)	(1x500) + (7x400) = 3,300 (1.33 rounded down to 1)

Conclusion:

The maximum profit that can be obtained is $3,300. This can be obtained by using 1 Large Helicopter and 7 Small Helicopters.

Practice Test #12

The local SPCA takes in unwanted dogs and cats, but only has room for 16 animals. It only has a maximum of 14 cat kennels.

It costs $10 per day to keep a dog and $5 per day to keep a cat. The SPCA has $100 per day to spend on these animals.

The SPCA makes a profit on the cats of $250 and $220 on the dogs.

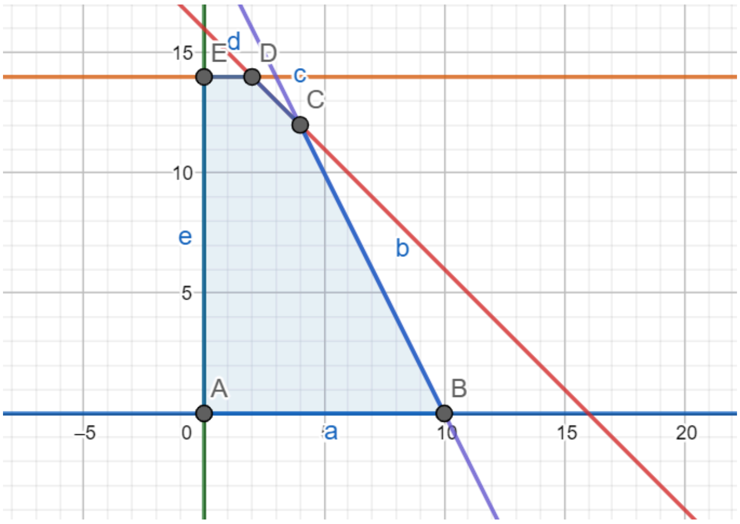
How many of each type of animal does it need to take in to maximise the profit? What is the maximum profit?

x = Number of dogs
y = Number of cats

Constraints:

- x=>0
- y=>0
- x+y<=16
- y<=14
- 10x+5y =<100

Feasible Region



Appropriate Solutions:

Point (Solution)	Dogs	Cats
(0,0)	0	0
(10,0)	10	0
(0,14)	0	16
(2,14)	2	14
(4,12)	4	12

Vertex Solutions:

Solution	Profit
(0,0)	(0x220) + (0x250) = 0
(10,0)	(10x220) + (0x250) = $2200

(0,14)	**(0x220) + (14x250) = $3500**
(2,14)	**(2x220) + (14x250) = $3940**
(4,12)	**(4x220) + (12x250) = $3880**

Conclusion:

The maximum profit that can be obtained is $3940. This can be obtained by housing 2 dogs and 14 cats.

Practice Test #13

Murder Burger sells two types of burgers for lunch: the MOA burger and the WEKA burger.

It takes 3 minutes to make a MOA burger and 2 minutes to make a WEKA burger.

The total time available to make the burgers is 4 hours.

The cost of ingredients for each type of burger is $2.

The shop has only $200 available for ingredients for all the burgers.

The shop must provide at least 10 of each type of burger, but no more than 60 MOA burgers and 80 WEKA burgers.

The profit on each MOA burger is $2.20 and each WEKA burger is $1.

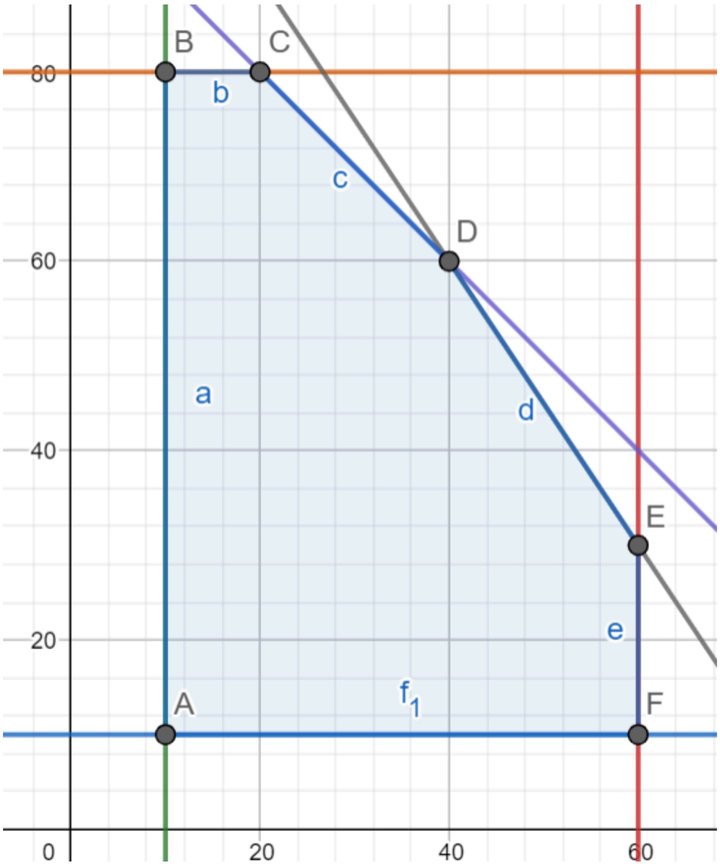
Determine the number of MOA and WEKA burgers that need to be made during lunch to maximise the profit and calculate this maximum profit.

x = Number of MOA Burgers
y = Number of WEKA Burgers

Constraints:

- x ≥ 10
- y ≥ 10
- x ≤ 60
- y ≤ 80
- 3x + 2y ≤ 240
- 2x + 2y ≤ 200

Feasible Region



Appropriate Solutions:

Point (Solution)	MOA Burgers	WEKA Burgers
(10,10)	10	10
(10,80)	10	80
(20,80)	20	80
(40,60)	40	60
(60,30)	60	30

(60,10)	**60**	**10**

Vertex Solutions:

Solution	Profit
(10,10)	**(10x2.2) + (10x1) = $32**
(10,80)	**(10x2.2) + (80x1) = $92.20**
(20,80)	**(20x2.2) + (80x1) = $124**
(40,60)	**(40x2.2) + (60x1) = $148**
(60,30)	**(60x2.2) + (30x1) = $162**
(60,10)	**(60x2.2) + (10x1) = $142**

Conclusion:

The maximum profit that can be obtained is $162. This can be obtained by making 60 MOA Burgers and 30 WEKA Burgers.

Practice Test #15

Back to Practice Test #3.

A soft drink company produces soft drinks with GLASS and PLASTIC bottles. The factory can produce no more than 80 pallets of bottles per week. It costs $800 to produce a pallet of GLASS bottles and $600 to produce a pallet of PLASTIC bottles. The company has signed a contract that states they must produce at least 24 pallets of GLASS bottles and at least 16 pallets of PLASTIC bottles. The company has a budget of $60,000 per week to produce soft drinks.

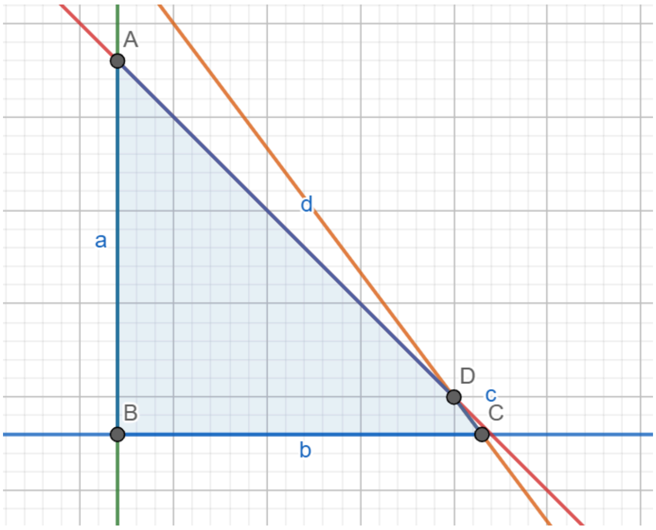
GLASS bottles make a profit of $250 per pallet

PLASTIC bottles make a profit of $200 per pallet

Extension:

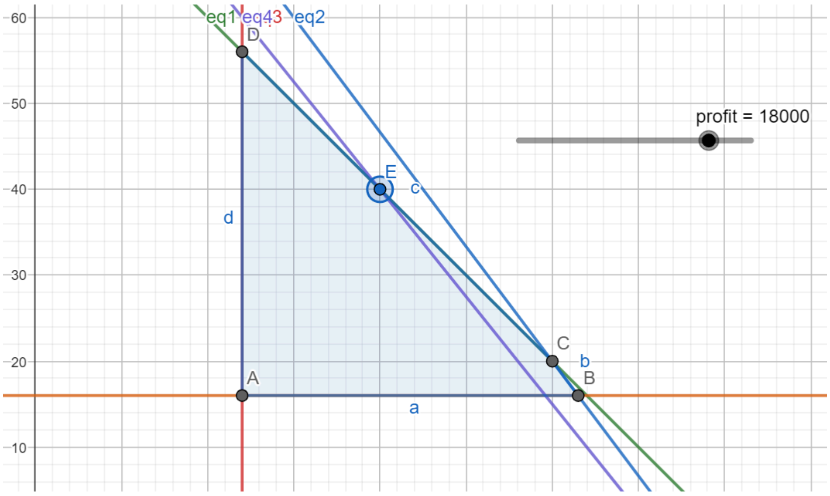
1. Find a possible solution that will give a profit of $18,000
2. The price of plastic has increased and the cost to produce a pallet of PLASTIC bottles increases to $640. Find the maximum profit and determine how many of each type of bottle the company needs to make to reach this maximum profit.
3. The company accountant has made a mistake. The GLASS bottles make a profit of $200 per pallet and the PLASTIC bottles make a profit of $250. Find the maximum profit and determine how many of each type of bottle the company needs to make to reach this maximum profit.

To start: Maximum profit = $19000



Part 1

Profit of $18000 required

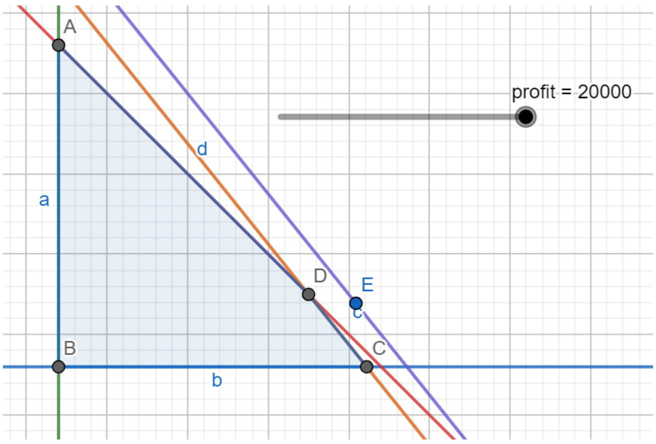


A solution is 40 glass and 40 plastic (40*250+40*200=18000)

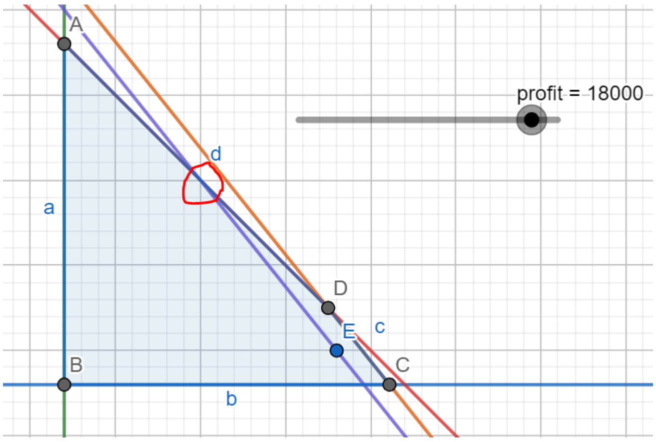
A solution is 56 glass and 20 plastic (56*250+20*200=18000)

Part 2

Y increases from $600 to $640:



Then dragging the slider to a maximum profit of $18000:

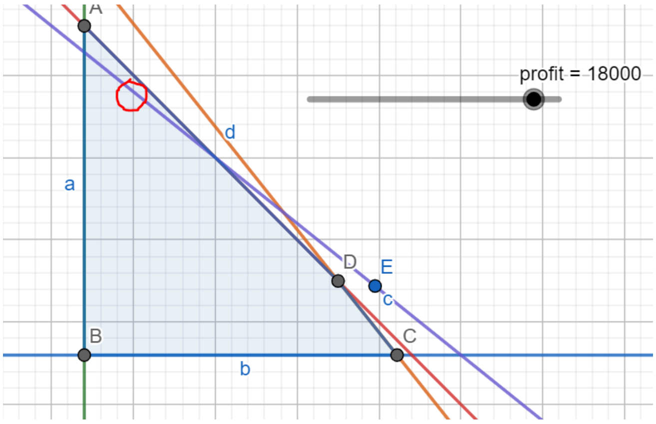


A solution is 40 glass and 40 plastic (40*250+40*200=18000)

Part 3

Change of costs.

X was $250, is now $200. Y was $200, is now $250.



A solution is 30 glass and 48 plastic (30*200+48*250=18000)

Practice Test #16

Back to Practice Test #11.

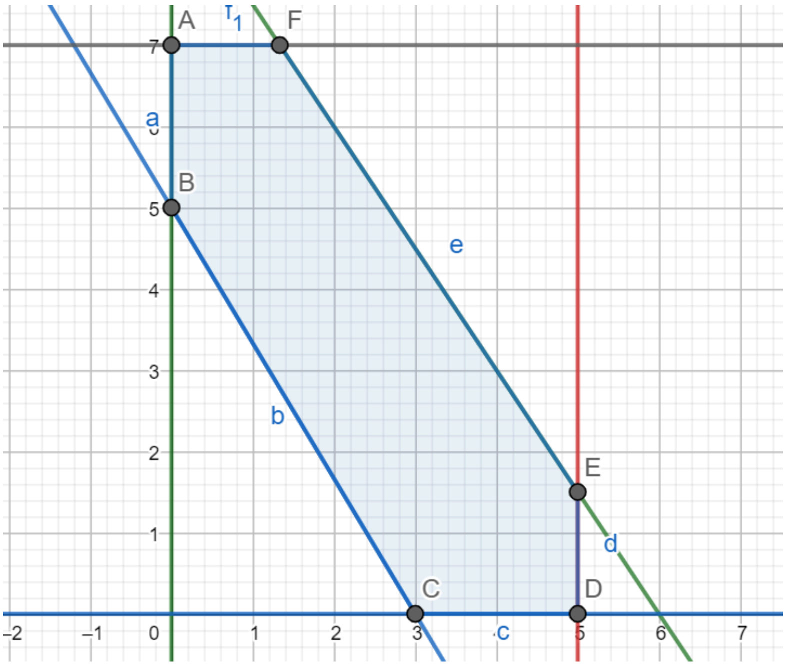
A helicopter company transports passengers out to an island resort. The company has 5 large helicopters which require 3 crew members to operate and 7 small helicopters which require 2 crew members to operate.

The helicopter company has 18 qualified crew members.

Each helicopter can only make one trip per day and on any one day the company must transport at least 30 passengers.

Large helicopters carry 10 passengers and make a profit of $500 per round trip.

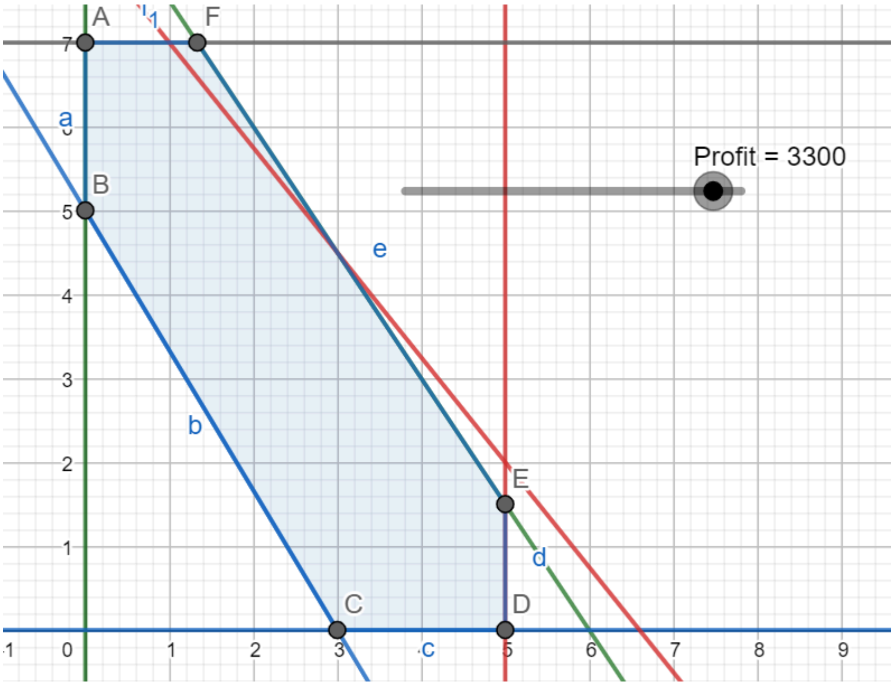
Small helicopters carry 6 passengers and make a profit of $400 per round trip.



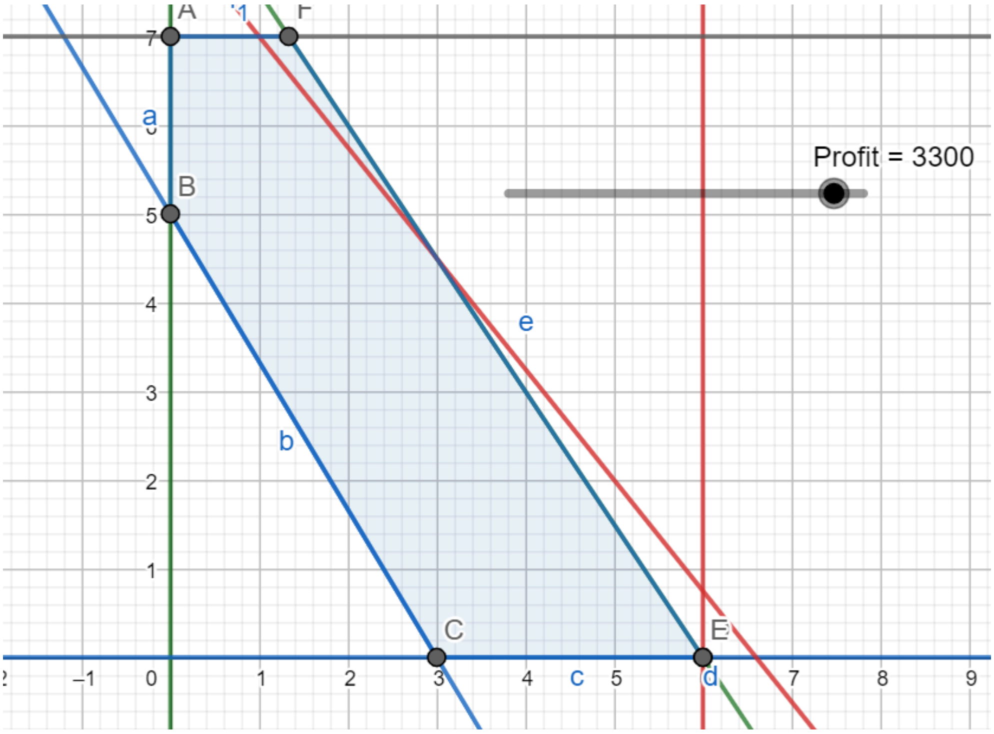
From above - Max profit is $3,300 from 1 Large Helicopter and 7 Small Helicopters.

Extension:

1. The company is thinking of purchasing one more large helicopter. Determine what changes this will have on the maximum profit and advise the company's board whether it is advisable to purchase one more large helicopter.

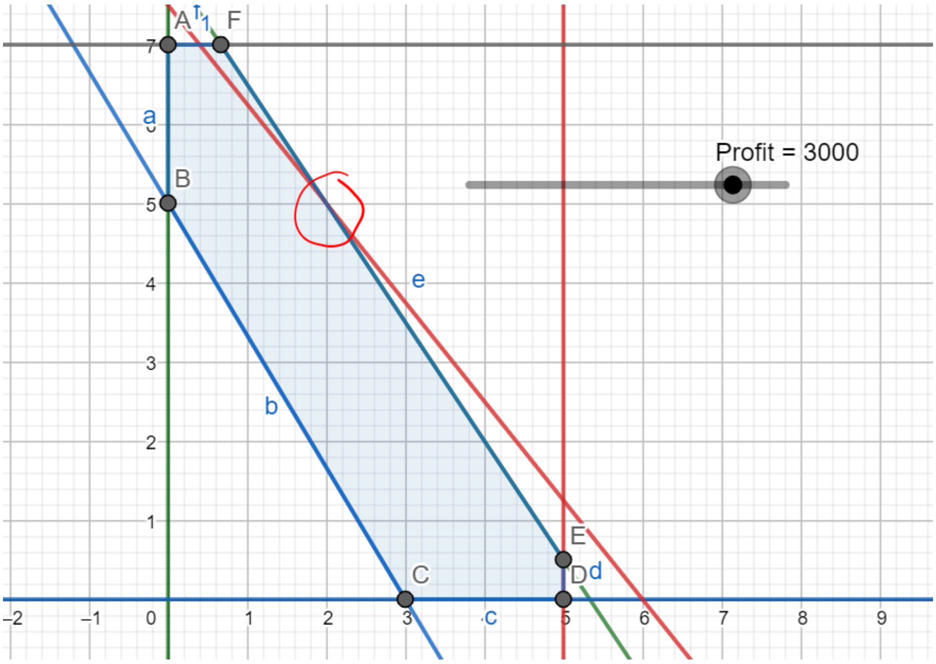


Changing x from 5 to 6 won't have an effect on the profit:



2. They decide NOT to purchase the helicopter. The next day, two staff members call in sick. What effect will this have on the number of helicopter trips made this day?

Changing equation from 3x+2y=18 to 3x+2y=16:



Gives a maximum profit of $3,000 from 2 Large Helicopters and 5 Small Helicopters.

Practice Test #17

Back to Practice Test #12.

The local SPCA takes in unwanted dogs and cats, but only has room for 16 animals. It only has a maximum of 14 cat kennels. It costs $10 per day to keep a dog and $5 per day to keep a cat. The SPCA has $100 per day to spend on these animals. The SPCA makes a profit on the dogs of $250 and $220 on the cats. How many of each type of animal does it need to take in to maximise the profit? What is the maximum profit?

Extension:

1. The SPCA buy another two cat kennels. How does this affect the maximum profit?
2. The SPCA are a non-profit organisation, and need to keep their profit under $2000. What is one solution that will give a profit as close to $2000 as possible.
3. The SPCA build 4 more shelters and can now has room for 20 animals. How does this affect the maximum profit?