


3. The graduation committee at a school organizes a cookie and muffin sale to raise money for the graduation party. The two coordinators of the committee, Laura and Russ, offer the following propositions to their members.

Laura's proposition

- Price of a cookie: \$2
- Price of muffin: \$3

Polygon of constraints



Russ' proposition

- Price of a cookie: \$2.50
- Price of a muffin: \$2.50

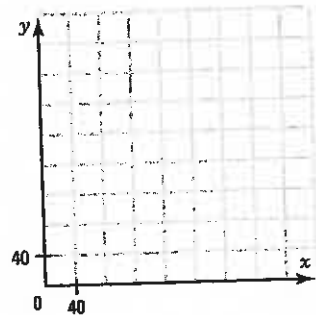
Constraints

The committee must sell

- a maximum of 320 items;
- at least 120 cookies;
- at most 160 muffins;
- at most 4 times as many cookies as muffins.

Let x represent the number of cookies and y the number of muffins.

Which proposition should the committee accept in order to maximize profits?



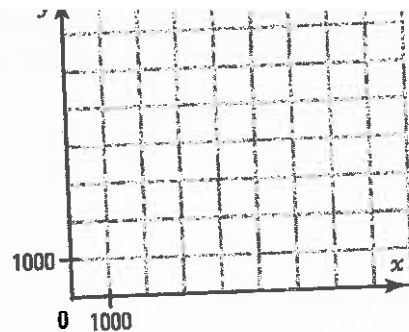
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6. A concert is performed at the Athletes Park to raise funds for the fight against AIDS. Organizers have installed 8000 seats. They estimate that there will be at least 3000 youths under 18 and at most 4000 adults.

They want to organize this concert for at least 4000 spectators.

A youth ticket sells for \$15 and an adult ticket sells for \$25. Expenses associated with the organization of this concert are estimated at \$20 000.

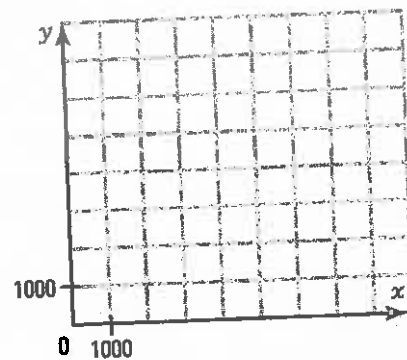
What is the maximal net revenue that the organizers can obtain?



7. During the hockey playoffs, a shop owner decides to sell flags and caps with the Montreal Canadiens logo.

He orders 6000 items and expects to sell at least 3000 flags and at least 1000 caps. Moreover, he expects to sell at least twice as many flags as caps.

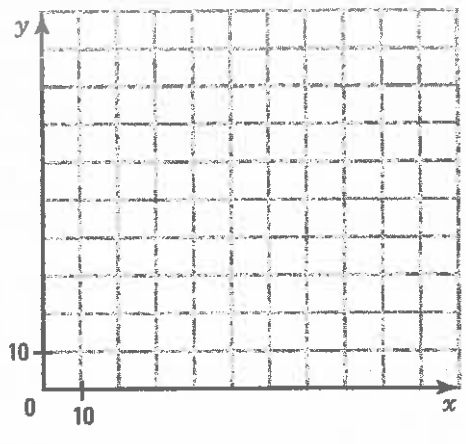
If the net profit on a flag is \$15 and that on a cap is \$12, how many flags and caps must he sell in order to maximize his profit?



CHALLENGE 1

1. During the summer, Adel grows strawberries on his farm in the St-Laurent Lowlands. His wife Denise makes jam that she sells in her general store. She fills 400 ml jars and 500 ml jars.

- Every week she uses a maximum of 30 litres of jam.
- She wants to produce at least 50 jars per week.
- She also wants to produce, weekly, at least 20 jars but at most forty 500 ml jars.
- Moreover, she wants to produce, weekly, at least twenty 400 ml jars.



How many jars of each size must she produce weekly in order to maximize her profit if she sells each 400 ml jar for \$7 and each 500 ml jar for \$9?

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8. The graduation committee at a school organizes a cookie and muffin sale to raise money for the graduation party. The two coordinators of the committee, Laura and Russ, offer the following propositions to their members.

Laura's proposition

- Price of a cookie: \$2
- Price of muffin: \$3

Polygon of constraints

Russ' proposition

- Price of a cookie: \$2.50
- Price of a muffin: \$2.50

Constraints

The committee must sell

- a maximum of 320 items;
- at least 120 cookies;
- at most 160 muffins;
- at most 4 times as many cookies as muffins.

Let x represent the number of cookies and y the number of muffins.

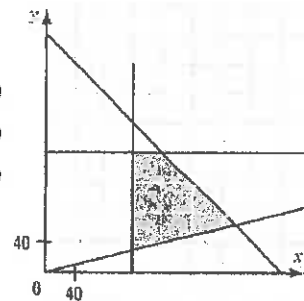
Which proposition should the committee accept in order to maximize profits?

Laura

Vertices	$R = 2x + 3y$
(120, 0)	240
(40, 80)	320
(80, 160)	640
(200, 120)	760
(200, 0)	400

Russ:

$$\begin{aligned} x &\geq 0 \\ y &\geq 0 \\ x + y &\leq 320 \\ x &\geq 120 \\ y &\leq 160 \\ x &\leq 4y \end{aligned}$$



Vertices	$R = 2.50x + 2.50y$
(120, 30)	375
(120, 160)	700
(160, 160)	800
(256, 64)	800

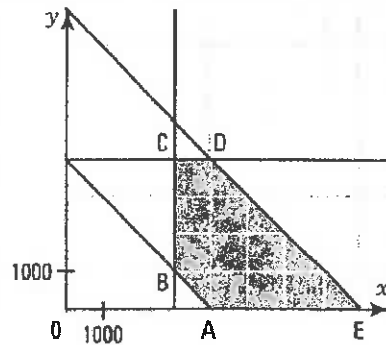
Russ' proposition achieves a better profit.

6. A concert is performed at the Athletes Park to raise funds for the fight against AIDS. Organizers have installed 8000 seats. They estimate that there will be at least 3000 youths under 18 and at most 4000 adults.

They want to organize this concert for at least 4000 spectators.

A youth ticket sells for \$15 and an adult ticket sells for \$25. Expenses associated with the organization of this concert are estimated at \$20 000.

What is the maximal net revenue that the organizers can obtain?



x : number of youths under 18

y : number of adults

$$x \geq 0$$

$$y \geq 0$$

$$x + y \leq 8000$$

$$x \geq 3000$$

$$y \leq 4000$$

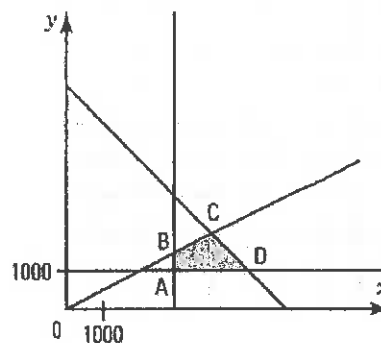
Vertices	$R = 15x + 25y - 20\ 000$
A(4000, 0)	40 000
B(3000, 1000)	50 000
C(3000, 4000)	125 000
D(4000, 4000)	140 000
E(8000, 0)	100 000

The organizers can obtain a maximal net revenue of \$140 000.

7. During the hockey playoffs, a shop owner decides to sell flags and caps with the Montreal Canadiens logo.

He orders 6000 items and expects to sell at least 3000 flags and at least 1000 caps. Moreover, he expects to sell at least twice as many flags as caps.

If the net profit on a flag is \$15 and that on a cap is \$12, how many flags and caps must he sell in order to maximize his profit?



x : number of flags sold

y : number of caps sold

$$x \geq 0$$

$$y \geq 0$$

$$x + y \leq 6000$$

$$x \geq 3000$$

$$y \geq 1000$$

$$x \geq 2y$$

Vertices	$R = 15x + 12y$
A(3000, 1000)	57 000
B(3000, 1500)	63 000
C(4000, 2000)	84 000
D(5000, 1000)	87 000

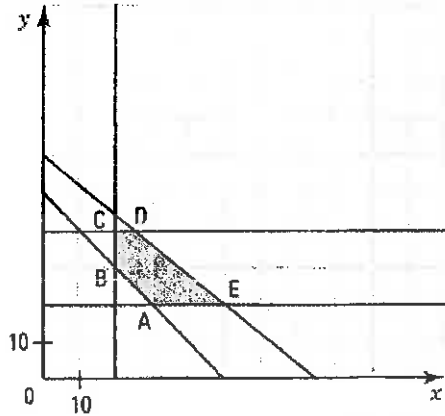
The shop owner must sell 5000 flags and 1000 caps.

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CHALLENGE 2

1. During the summer, Adel grows strawberries on his farm in the St-Laurent Lowlands. His wife Denise makes jam that she sells in her general store. She fills 400 ml jars and 500 ml jars.

- Every week she uses a maximum of 30 litres of jam.
- She wants to produce at least 50 jars per week.
- She also wants to produce, weekly, at least 20 jars but at most forty 500 ml jars.
- Moreover, she wants to produce, weekly, at least twenty 400 ml jars.



How many jars of each size must she produce weekly in order to maximize her profit if she sells each 400 ml jar for \$7 and each 500 ml jar for \$9?

x : number of 400 ml jars

y : number of 500 ml jars

$$x \geq 0$$

$$y \geq 0$$

$$400x + 500y \leq 30\,000$$

$$x + y \geq 50$$

$$20 \leq y \leq 40$$

$$x \geq 20$$

Vertices	$R = 7x + 9y$
A(30, 20)	\$390
B(20, 30)	\$410
C(20, 40)	\$500
D(25, 40)	\$535
E(50, 20)	\$530

She will maximize her profit if she produces, weekly, twenty-five 400 ml jars and forty 500 ml jars.