



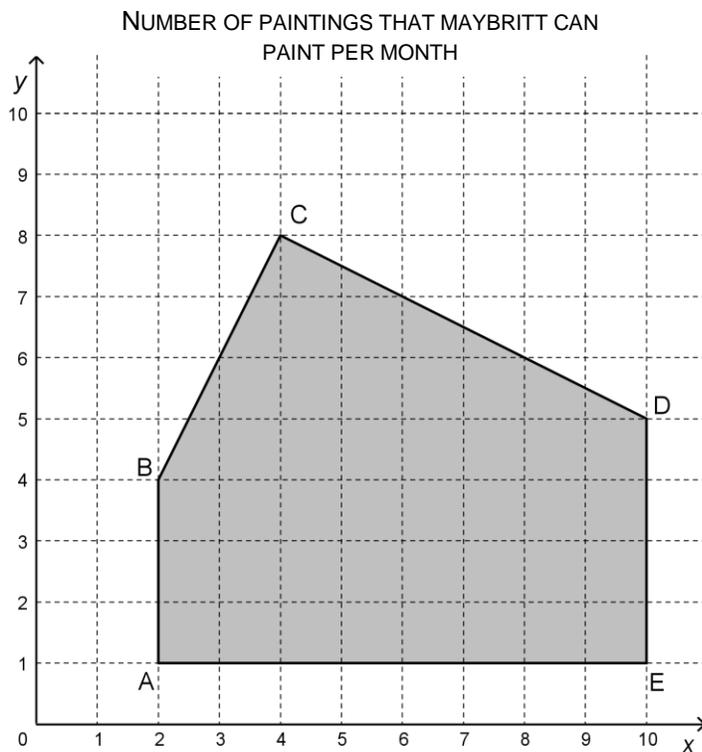
The Painter

Information for students

Maybritt is trying to make it as a full-time artist. She paints small and large paintings.

It takes her an average of 6 hours to complete a small painting and an average of 12 hours to complete a large painting. Because she still needs to work 60 hours a month part time, she can spend only a maximum of 120 hours a month on her art.

Polygon of constraints ABCDE below represents the possible combinations of small paintings and large paintings that Maybritt can paint in a month.



where x : number of small paintings per month
 y : number of large paintings per month

INEQUALITIES
 $6x + 12y \leq 120$
 $y \leq 2x$
 $x \geq 2$
 $x \leq 10$
 $y \geq 1$

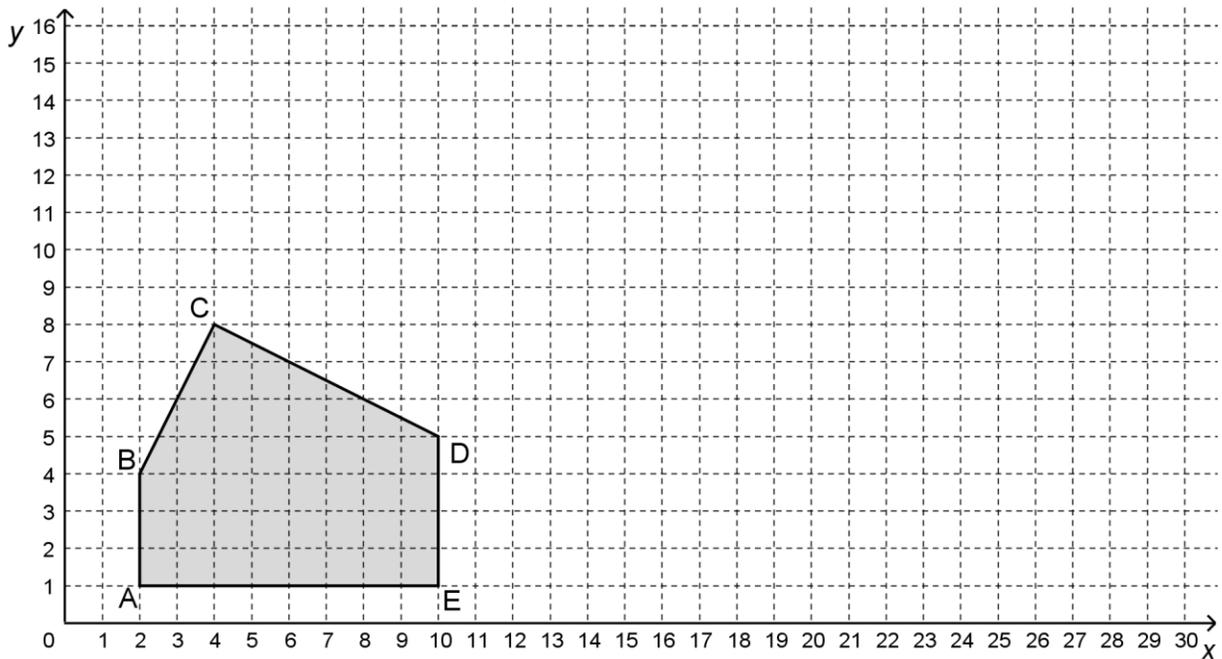
Coordinates of the vertices of the polygon of constraints
A (2, 1)
B (2, 4)
C (4, 8)
D (10, 5)
E (10, 1)

Maybritt earns an average income of \$200 for a small painting and an average income of \$450 for a large painting. She also makes \$30 an hour at her part-time job.

After a few months of earning the maximum possible income from her art, she decides she would like to quit her part-time job. This will allow her to spend an extra 60 hours a month painting.



Will Maybritt's maximum possible monthly income increase or decrease after she quits her part-time job to focus on painting?



Materials required

- Calculator, graph paper, writing and drawing materials

Information for parents

About the activity

Children could:

- explain how this concept relates to businesses

Parents should:

- read the instructions to their child, if necessary
- discuss the task with their child, outlining what steps need to be carried out
- go over the task with their child once it is completed by using the answer key provided in Appendix A



Appendix – The Painter: Solutions

Answer Key

- MAXIMUM MONTHLY INCOME WHILE HAVING A PART-TIME JOB

Function rule: $R = 200x + 450y + 60 \times 30$

VERTEX	INCOME: $200x + 450y + 1800$
A (2, 1)	\$2650
B (2, 4)	\$4000
C (4, 8)	\$6200 ←
D (10, 5)	\$6050
E (10, 1)	\$4250

Maximum

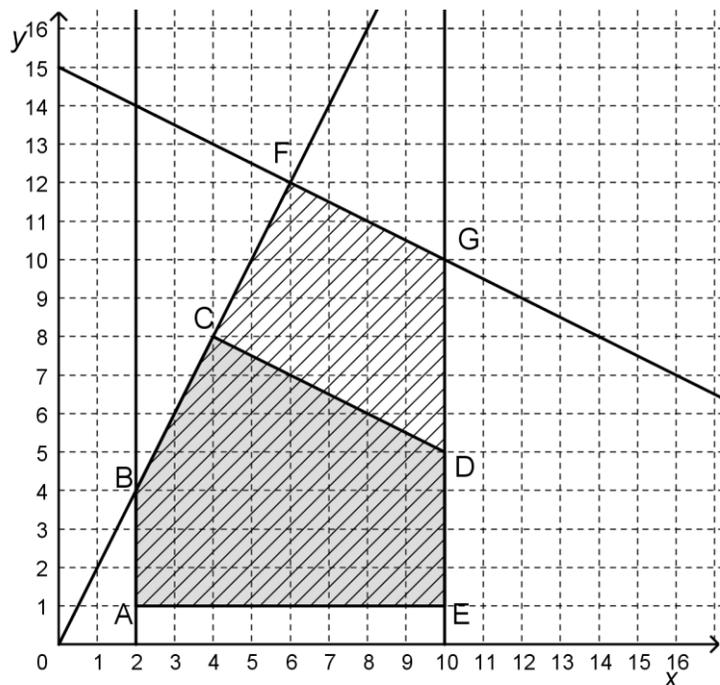
The maximum monthly income while having a part-time job is \$6200.

- NEW POLYGON OF CONSTRAINTS WITH THE NEW CONSTRAINT

The new constraint as a result of working full-time on painting is associated with the inequality

$$6x + 12y \leq 180.$$

Polygon ABFGE on the right represents the possible combinations of small and large paintings with the new constraint.



➤ MAXIMUM INCOME

VERTEX	INCOME: $200x + 450y$
A (2, 1)	\$850
B (2, 4)	\$2200
F (5, 12)	\$6600
G (10, 10)	\$6500
E (10, 1)	\$2450

The new maximum possible income is now \$6600. This is greater than \$6200 by \$400.

- CONCLUSION

Maybriitt's maximum possible monthly income will increase by \$400.