

Check Your Understanding Optimization Test Review

The table below identifies some key concepts from this unit. Complete each question, check your answers, and get help as needed.

Key Concepts	Basic Questions	Intermediate Questions	Advanced Questions
Words to Inequalities	1a, 1b	1c	1d, 1e
Finding unclear vertices	2a	2b, 2c	2d
Optimization		3	
Complications - decimals		4	
Complications – dotted lines and tie		5	
Complications – additional information		6	

After you answer each question, place a symbol (shown below) next to the question number in the table above.

Symbol	Meaning
✓	Correct, solved alone
S	Correct, except for a “silly” mistake
H	Correct, solved with help
X	Incorrect
N/A	Did not attempt

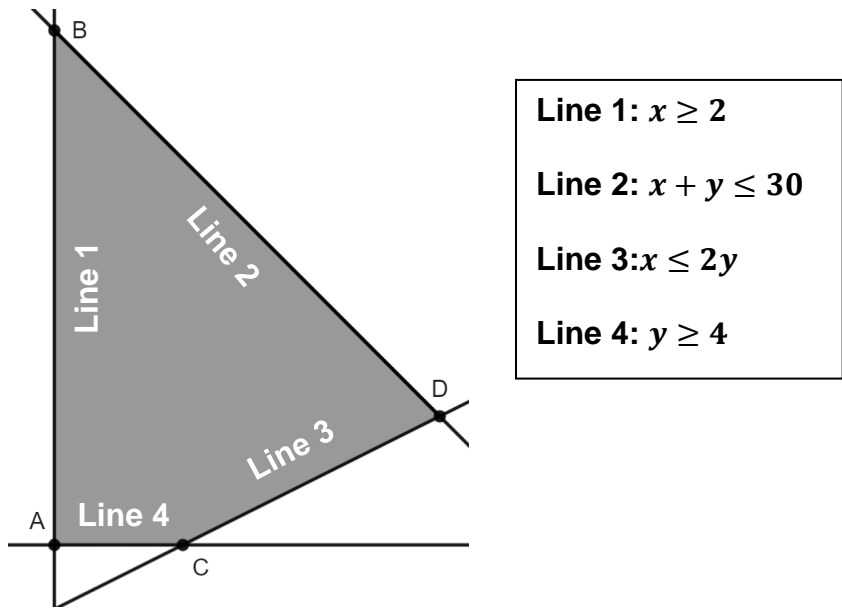
As you are reviewing for the test, please do the following (in this order):

1. Any questions you solved with help, make sure the help is written on your memory aid
2. Please ask for help (Dr. James or another student) for any questions you got incorrect
3. Review your notes and ask for help for any questions you did not attempt

1) Jeremiah has made (and is going to sell) two types of cookies: chocolate chip cookies and sugar cookies.

- a. He sells at least 10 chocolate chip cookies
- b. He sells at most 25 sugar cookies
- c. He sells no fewer than 80 cookies total
- d. He sells no more than half as many sugar cookies as chocolate chip cookies
- e. He sells a minimum of twice as many chocolate chip cookies as sugar cookies

2) The polygon of constraints (and inequalities) shown below are associated with an optimization situation.



a. Vertex A

b. Vertex B

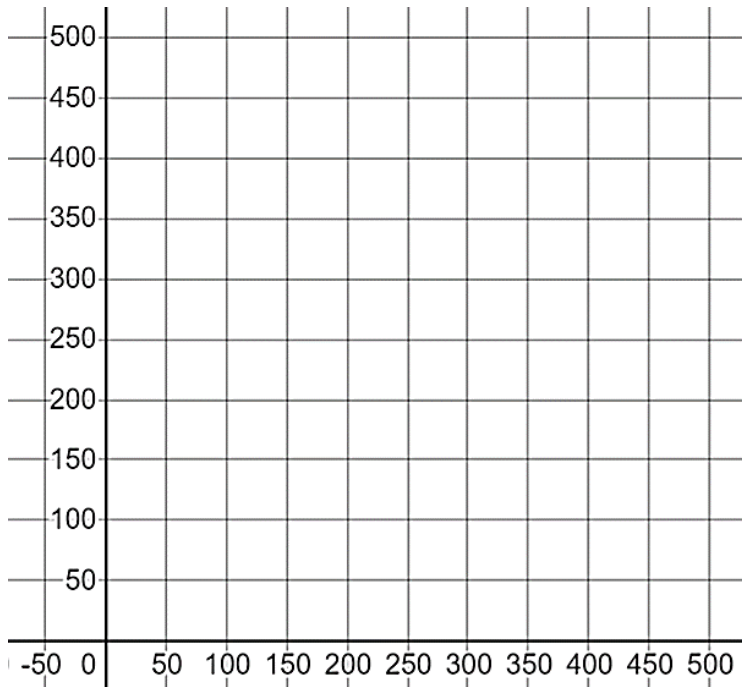
c. Vertex C

d. Vertex D

3) To fundraise for a school activity, the students sold two kinds of snacks: bags of chips and drinks.

- No fewer than 150 bags of chips will be sold.
- A maximum of 450 snacks will be sold.
- They will sell at most 200 drinks.
- They will sell no more than twice as many bags of chips as drinks

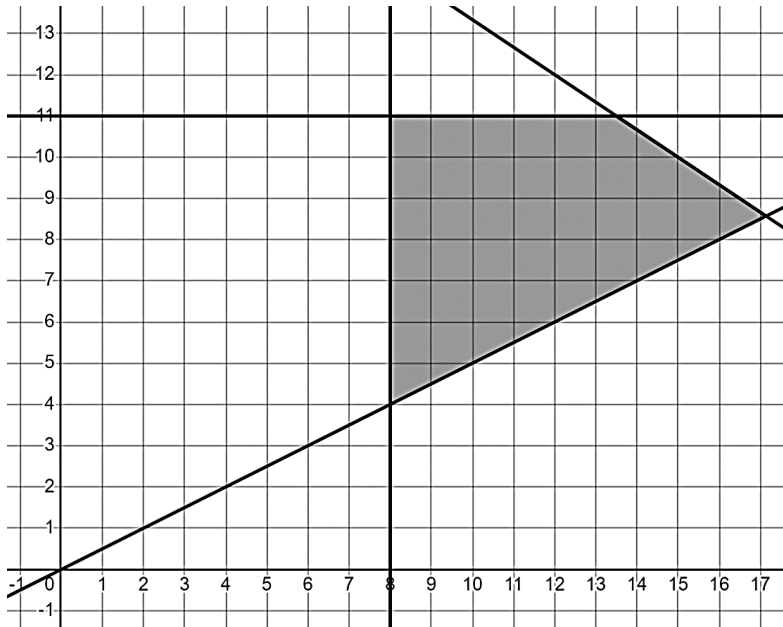
The students earned a profit of \$1.50 for each bag of chips and \$2.00 for each drink.



What was the maximum profit for the fundraiser?

4) The polygon of constraints for an optimization scenario is given below.

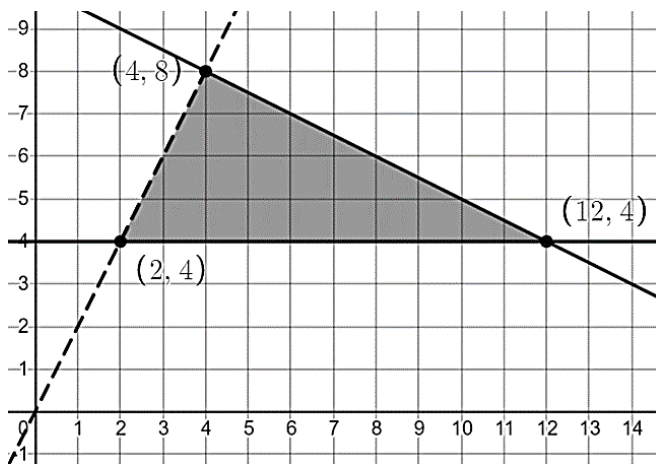
The optimizing function is: $Profit = 3.5x + 2y$



What is the maximum possible profit?

5) The polygon of constraints for an optimization scenario is given below.

The optimizing function is: $Profit = 4x + 8y$



How many points optimize this scenario?

6) Each year, Philemon students hold a bake sale selling cookies and cupcakes.

The profit for each cookie is \$1.50 and the profit for each cupcake is \$1.75.

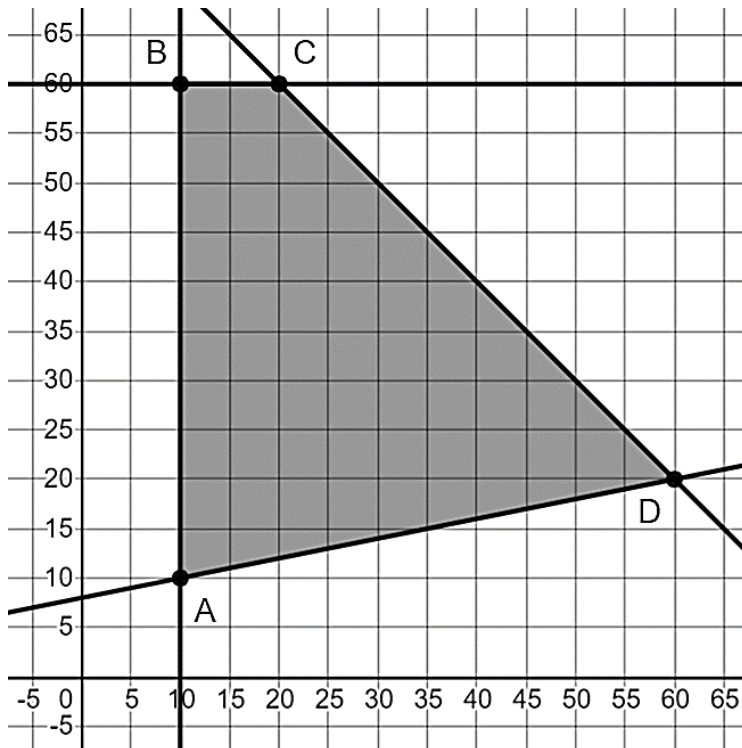
Let: x be the number of cookies sold
 y be the number of cupcakes sold

The polygon of constraints below represents the combination of cookies and cupcakes sold in a typical year.

This year, students must individually wrap each baked item, which increases the amount of time necessary to make each treat, decreasing the number of treats they are able to sell. This decrease is represented by the inequality below:

$$x + y \leq 50$$

By how much will the students' expected maximum profit decrease as a result of this new constraint?



Answer Key

1) If x is the number of chocolate chip cookies and y is the number of sugar cookies, then:

- a. $x \geq 10$
- b. $y \leq 25$
- c. $x + y \geq 80$
- d. $y \leq \frac{1}{2}x$
- e. $x \geq 2y$

If x is the number of sugar cookies and y is the number of chocolate chip cookies, switch x and y in all the inequalities above.

2) Find the vertices:

- a. A (2, 4)
- b. B (2, 28)
- c. C (8, 4)
- d. D (20, 10)

3) The maximum profit is \$775

4) The maximum profit is \$74

5) 4 points maximize the scenario

6) The student's expected maximum profit will decrease by \$50