

Bell Work:

$$2x + 3y = 5$$

1. Solve and show all work.

$$7x - 6y = 34$$

2. What are the 2 points used to graph the line of the equation below?

$$15x + 20y = 180$$

3. What is the domain in set notation of the absolute value parent function?

4. Solve. $\frac{3.6}{a + 4} = \frac{19.8}{24.2}$

Linear Programming:

A way of finding the maximum or minimum value for a company to run it more efficiently.

It uses systems of inequalities.

Wheels Inc. makes tricycles and bicycles. Experience shows that they must produce at least 30 tricycles and 40 bicycles per month. The factory can produce a maximum of 60 tricycles or 120 bicycles per month. Because of the labor union, they can make at most 160 units combined. If the profit on a tricycle is \$40 and the profit on a bicycle is \$75, how many of each cycle should the company make to maximize the profit?

1. *Identify the variables.*

x : Tricycles

y : Bicycles

2. *Set up some equalities.*

$$x \geq 30 \quad x \leq 60$$

$$y \geq 40 \quad y \leq 120$$

$$x + y \leq 160$$

The company must produce between 30 and 60 tricycles.

The company must produce between 40 and 120 bicycles.

The company can produce a maximum of 160 tricycles and bicycles.

x : Tricycles

y : Bicycles

3. Graph the inequalities.

$$x \geq 30 \quad x \leq 60$$

$$y \geq 40 \quad y \leq 120$$

$$x + y \leq 160$$

4. Find the vertices.

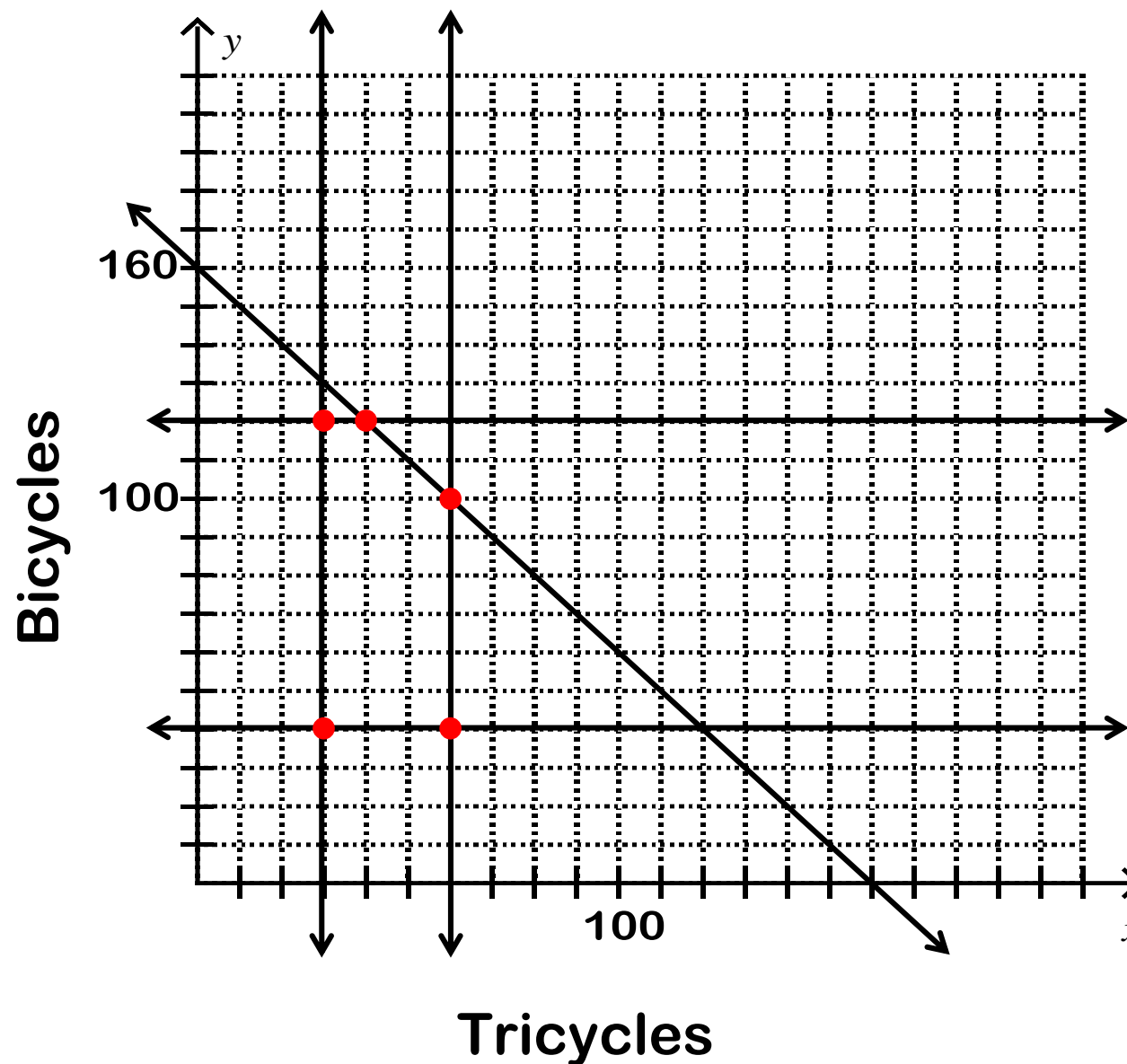
(30, 40)

(30, 120)

(40, 120)

(60, 100)

(60, 40)



x : Tricycles

y : Bicycles

$$x \geq 30 \quad x \leq 60$$

$$y \geq 40 \quad y \leq 120$$

$$x + y \leq 160$$

$$(30, 40)$$

$$(30, 120)$$

$$(40, 120)$$

$$(60, 100)$$

$$(60, 40)$$

If the profit on a tricycle is \$40 and the profit on a bicycle is \$75, how many of each cycle should the company make to maximize the profit?

$$P = 40x + 75y \quad 5. \text{ Set up a profit equation.}$$

6. Use each vertex to find the best profit.

$$P = 40(30) + 75(40) = 4,200$$

$$P = 40(30) + 75(120) = 10,200$$

$$P = 40(40) + 75(120) = 10,600$$

$$P = 40(60) + 75(100) = 9,900$$

$$P = 40(60) + 75(40) = 5,400$$

7. *Answer the question in a complete sentence.*

The company should make 40 tricycles and 120 bicycles to maximize their profit.

(30, 40)

(30, 120)

(40, 120)

(60, 100)

(60, 40)

If the profit on a tricycle is \$40 and the profit on a bicycle is \$75, how many of each cycle should the company make to maximize the profit?

$$P = 40x + 75y \quad 5. \text{ Set up a profit equation.}$$

6. *Use each vertex to find the best profit.*

$$P = 40(30) + 75(40) = 4,200$$

$$P = 40(30) + 75(120) = 10,200$$

$$P = 40(40) + 75(120) = 10,600$$

$$P = 40(60) + 75(100) = 9,900$$

$$P = 40(60) + 75(40) = 5,400$$

In a jeans manufacturing company, it takes 10 minutes to cut the material and 20 minutes to sew the material together to make a pair of men's jeans. It takes 20 minutes to cut the material and 10 minutes to sew the material together to make a pair of women's jeans. Each day, the company has 700 minutes of cutting and 800 minutes of sewing. The profit for a pair of men's jeans is \$10, while the profit for a women's jeans is \$12. How many of each should the company make to maximize the profit and what is the profit?

x : Men's jeans

$$\text{Cutting: } 10x + 20y \leq 700$$

y : Women's jeans

$$\text{Sewing: } 20x + 10y \leq 800$$

x : Men's jeans

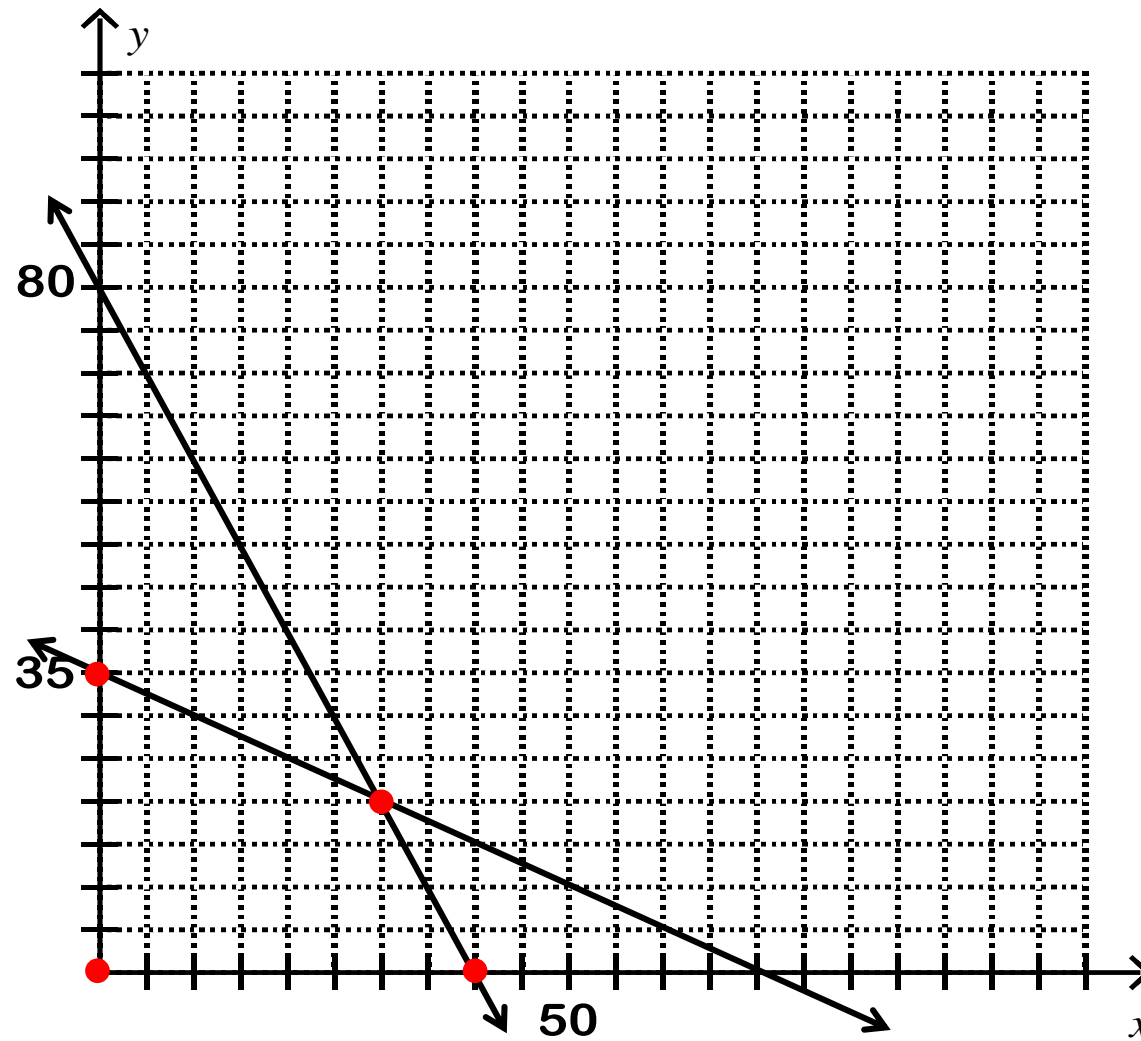
y : Women's jeans

$$10x + 20y \leq 700$$

$$20x + 10y \leq 800$$

$(0, 0)$ $(40, 0)$

$(0, 35)$ $(30, 20)$



x : Men's jeans

y : Women's jeans

$$10x + 20y \leq 700$$

$$20x + 10y \leq 800$$

$(0, 0)$ $(40, 0)$

$(0, 35)$ $(30, 20)$

The company should manufacture 30 pairs of men's jeans and 20 pairs of women's jeans to maximize its profit of \$540.

The profit for a pair of men's jeans is \$10, while the profit for a women's jeans is \$12. How many of each should the company make to maximize the profit and what is the profit?

$$P = 10x + 12y$$

$$P = 10(0) + 12(0) = 0$$

$$P = 10(0) + 12(35) = 420$$

$$P = 10(30) + 12(20) = 540$$

$$P = 10(40) + 12(0) = 400$$

Steps:

- 1. Identify the variables.**
- 2. Set up some inequalities.**
- 3. Graph the inequalities.**
- 4. Find the vertices of the feasible region.**
- 5. Set up the function.**
- 6. Substitute the vertices into the function to find the maximum or minimum amount.**
- 7. Answer the question in a complete sentence.**

Assignment:

Linear Programming Word Problems Worksheet