**EXPLORE** Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Algebra II Period: \_\_\_\_\_\_\_

Linear Programming

Today is the last day of your vacation in Mexico. You have enough space in your carry-on bag for no more than 20 gifts for your family and friends. Mini sombreros cost $3 and maracas cost $6. You have a budget of $90 cash.

Write a system of inequalities that represent the situation. Graph and shade the grid appropriately.



List 3 combinations of mini sombreros and maracas you could buy.

**EXPLAIN** Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Algebra II Period: \_\_\_\_\_\_\_

Linear Programming

**Shipping it Out**

The Supreme Shipping Company can load its trucks with both rectangular and cylindrical containers. A rectangular container has a volume of 100 cubic ft and weighs 200 lb. A cylindrical container has a volume of 200 cubic feet and weighs 100 lb. Let x denote the number of rectangular crates carried by a truck, and let y denote the number of cylindrical containers.

1. What constraint must be satisfied if each truck has room for at most 4200 cubic ft of containers?

2. What constraint must be satisfied if each truck can carry a maximum of 4800 lbs?

3. What additional constraints must be satisfied because the problem involves real objects?

4. Graph the feasibility set on the grid and label

 its vertices. Call the vertex on the x-axis A,

 the vertex on the y-axis B, and the vertex on

 neither axis C.

5. Suppose that Supreme Shipping charges $50 to ship a rectangular and $60 to ship a cylindrical container and wishes to maximize its income.

 a. What is the objective function?

 b. What is the value of the objective function at vertex A? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 c. At vertex B? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 d. At vertex C? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 e. What combination of containers should Supreme Shipping use to maximize its income?

**ELABORATE** Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Algebra II Period: \_\_\_\_\_\_\_

Linear Programming

**Problem Solving: Linear Programming**

1. Each quart of the regular skin lotion that Harold makes contains 2 cups of oil and 1 cup of cocoa butter. Each quart of his extra rich lotion contains 1 cup of oil and 2 cups of cocoa butter. Harold makes $10 profit on each quart of the regular lotion and an $8 profit on each quart of the extra rich lotion. If he has 12 cups of oil and 9 cups of cocoa butter on hand, how many quarts of each type of lotion should he make to maximize his profits?

![[image]]()

Define Variables:

Objective Function:

Constraints:

Vertices:

Substitute into the objective function:

Solution in words:

2. A loaf of Irish soda bread requires 4 cups of flour and 1 cup of sugar. A loaf of zucchini bread uses 2 cups of flour and 1 cup sugar. Mari Alice has 16 cups of flour and 7 cups of sugar on hand. She makes $2 profit per loaf of Irish soda bread and $3 per loaf of zucchini bread. To maximize profits, how many loaves of each type should she make?

![[image]]()

Define Variables:

Objective Function:

Constraints:

Vertices:

Substitute into the objective function:

Solution in words: