7.9 Making a Mosaic

Solving Systems of Linear Inequalities

Objectives

In this lesson, you will:

- Write a system of linear inequalities.
- Graph a system of linear inequalities.
- Identify solutions of a system of linear inequalities.

Key Terms

- system of linear equations
- linear inequality
- system of linear inequalities

SCENARIO A local arts group is donating a mural that will be placed at the entrance to your school. The mural will be 6 feet tall and 12 feet wide. The group has calculated that they will need approximately 110 bags of tiles to complete the project. The mural will be made of glass and metallic tiles. Each bag of glass tiles costs $10 and each bag of metallic tiles costs $18. Another group has donated $1500 for the purchase of the tiles.

Problem 1 Getting the Tiles

A. Write an equation that relates the numbers of bags of glass and metallic tiles that can be bought for $1500. Use x to represent the number of bags of glass tiles and use y to represent the number of bags of metallic tiles that can be bought for the mural.

B. Write an equation that relates the numbers of bags of glass and metallic tiles to the total number of bags of tiles needed for the project.

C. What does the solution of the linear system formed by the equations in part (A) and part (B) represent?

D. Solve the linear system. Show all your work and use a complete sentence in your answer.

E. What does the solution mean in the problem situation? Use a complete sentence in your answer.

Investigate Problem 1

1. Suppose that the group wants to buy 75 bags of glass tiles and 35 bags of metallic tiles. Is this enough tile?

   Can the group afford this assortment of tile? Show all your work and use a complete sentence to explain your reasoning.

2. Suppose that the group wants to buy 90 bags of glass tiles and 25 bags of metallic tile. Is this enough tile?

   Can the group afford this assortment of tile? Show all your work and use a complete sentence to explain your reasoning.

3. Suppose that the group wants to buy 80 bags of glass tiles and 38 bags of metallic tiles. Is this enough tile?

   Can the group afford this assortment of tile? Show all your work and use a complete sentence to explain your reasoning.

4. Does the group have to spend all of the money to get enough tile? Use a complete sentence to explain your reasoning.

   Write an inequality that represents the amounts of money the group can spend on x bags of glass tiles and y bags of metallic tiles.

Investigate Problem 1

5. Can the group buy more bags of tiles than is needed and not spend all the money? Use a complete sentence to explain your reasoning.

Write an inequality that represents the total numbers of bags of tiles they can use to complete the project.

6. **Just the Math: System of Linear Inequalities**
Together, the linear inequalities in Questions 4 and 5 form a **system of linear inequalities.** Write the system of linear inequalities below.

What do you think it means to be a solution of a system of linear inequalities? Use a complete sentence in your answer.

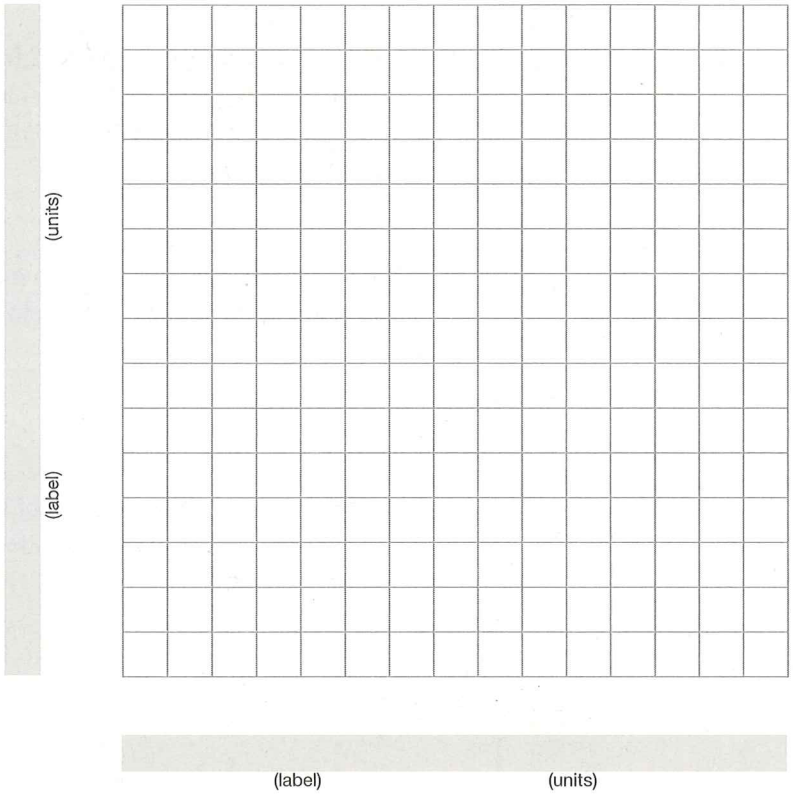
Determine whether the numbers of bags of tiles given in Questions 1 through 3 are solutions of your system of inequalities. Show all your work.

7. How many solutions do you think a system of linear inequalities can have? Use complete sentences to explain your reasoning.

Investigate Problem 1

8. Create a graph of your system of inequalities on the grid below. Use a different color pen or pencil for each inequality. First, choose your bounds and intervals. Be sure to label your graph clearly.

Variable quantity	Lower bound	Upper bound	Interval



9. What part of the graph do you think represents the solution of the system of linear inequalities? Use a complete sentence in your answer.

10. Identify three different solutions of the system of inequalities. What do these solutions represent in the problem situation? Use complete sentences in your answer.