Essential Question: How do we solve real-world problems using a system of linear inequalities?

Do Now:

Sergio is building a garden. He wants the length of the garden to be at least 30 feet and the perimeter of the garden to be no more than 100 feet.

Write a system of linear inequalities that represents the situation described. Let x represent the length of the garden and let y represent the width.

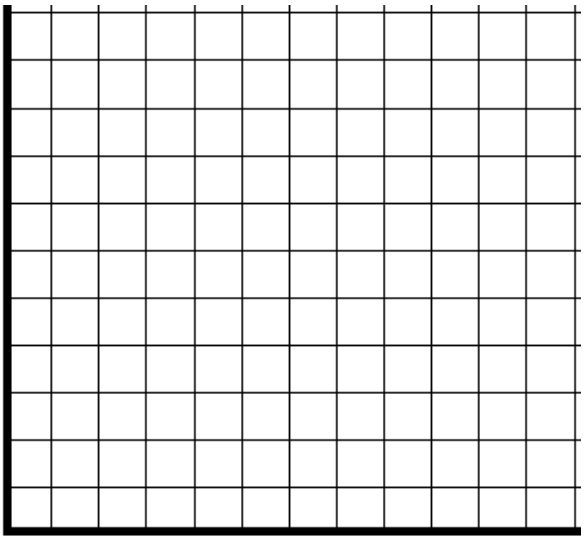
MODELING WITH SYSTEMS OF INEQUALITIES

There are many situations that arise in business and engineering that necessitate the use of a system of linear inequalities. The region in the coordinate plane that solves the system represents all of the possible solutions to the problem.

Example 1:

Sergio is building a garden. He wants the length of the garden to be at least 30 feet and the perimeter of the garden to be no more than 100 feet. Let x represent the length of the garden and let y represent the width.

(a) Using the system you created in the Do Now, determine all the possible dimensions of the garden by graphing the system.



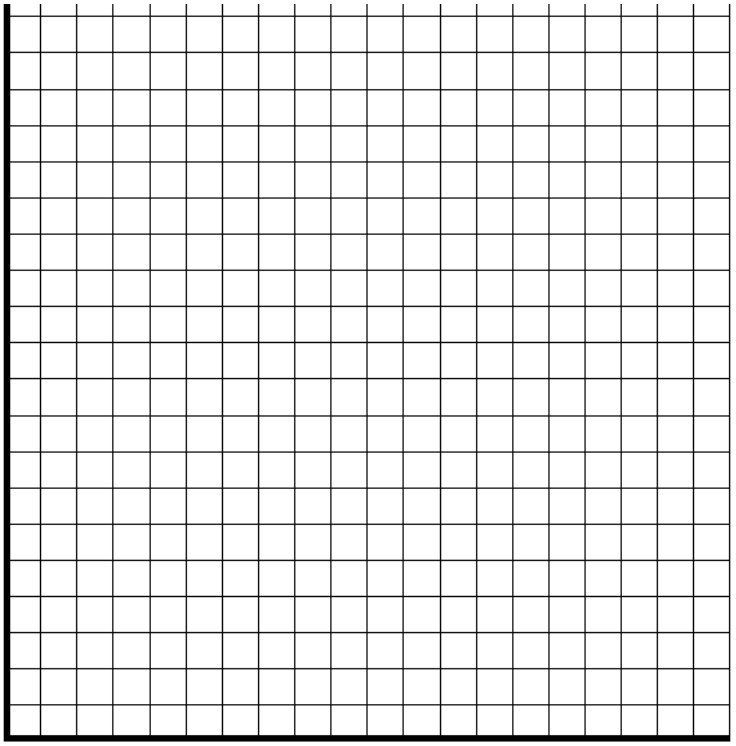
(b) Is a length of 35 feet and a width of 10 feet a possible combination? How do you know?

(c) State another set of dimensions possible for the garden.

Example 2:

Paul works x hours a week at a bagel shop that pays \$6 an hour. He has also accepted a job that pays \$12 an hour mowing lawns for y hours a week. He will work both jobs. Paul wants to earn at least \$120 a week, but due to school commitments, he must work less than 30 hours a week.

(a) Write a system of inequalities that describes the situation. Graph the system.



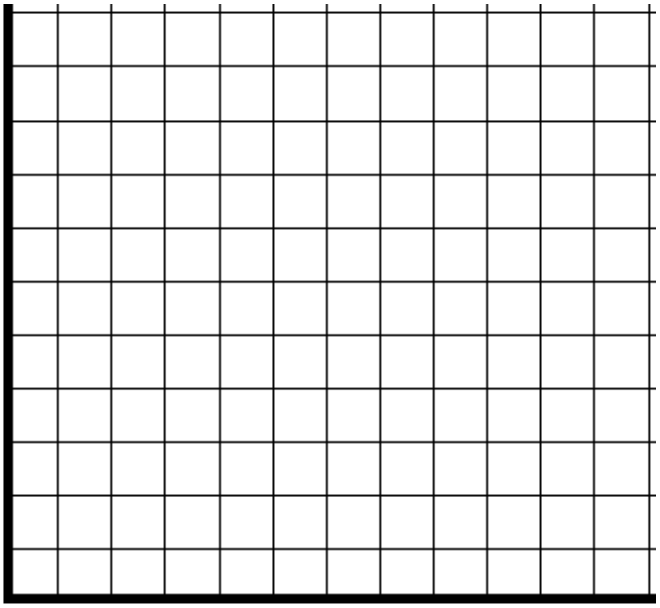
(b) Determine and state one combination of hours that will allow Paul to earn at least \$120 per week while working less than 30 hours.

Systems of Linear Inequalities help us develop solution sets to different types of problems. When developing a system, use two _____ to represent two different quantities. Write two _____ that describe the situation. The solution set to the problem is represented by the ordered pairs shown in the region where both graphs _____.

Example 3:

The Royal Crown Players of Roslyn High School are raising money for their club by putting on a production of The Music Man. They have 500 seats in the auditorium. They are selling student tickets for $5 each and non-student tickets for $10 each. They must sell at least $2000 worth of tickets to cover their expenses.

(a) If x represents the number of student tickets sold and y represents the number of non-student tickets sold, write a system of inequalities that can be used to model this situation. Graph the system.



(b) List two possible combinations of student and non-student tickets that must be sold to cover the club's expenses.

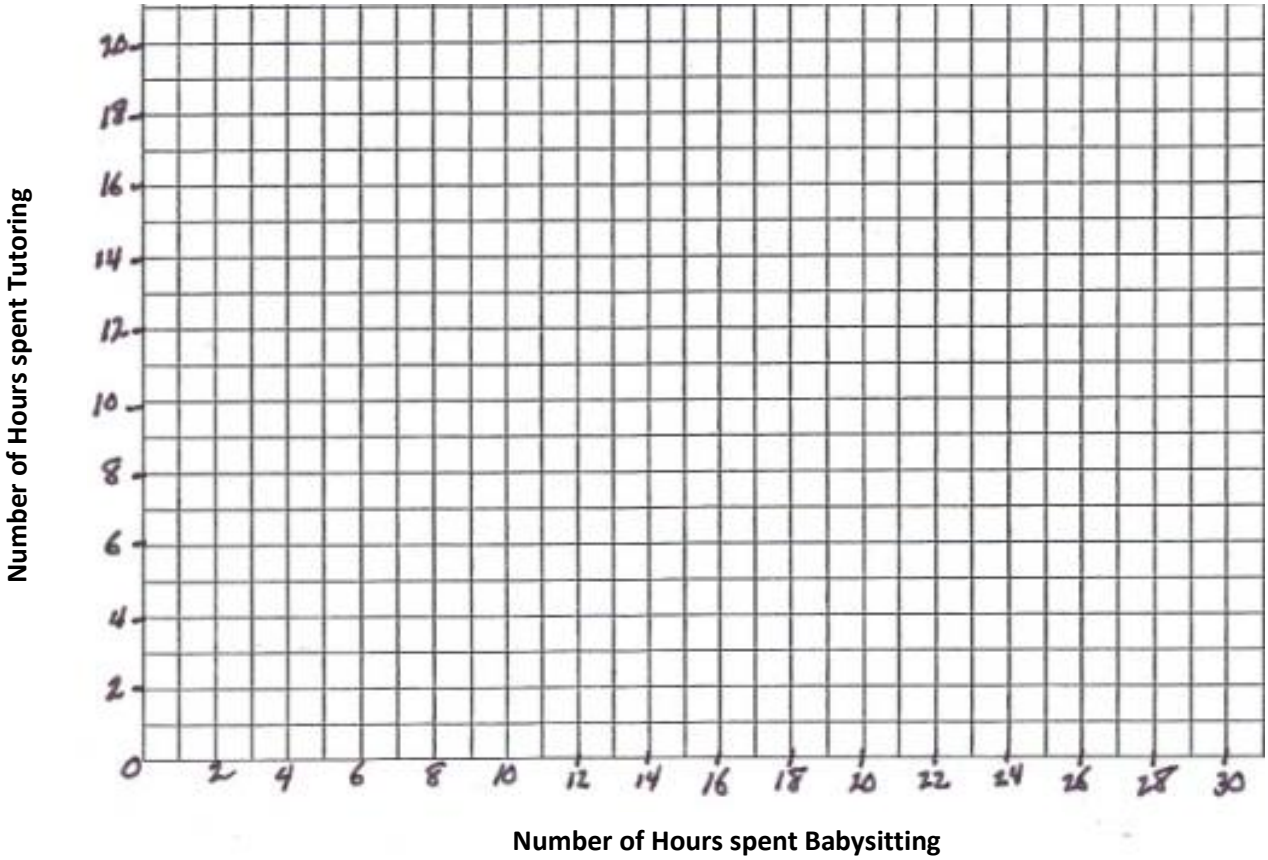
(c) Will the club cover their expenses if they sell 150 student tickets and 100 non-student tickets? Justify your response.

IT'S YOUR TURN NOW!

Karen likes her job as a babysitter, but it pays only $5 per hour. She has been offered a job as a tutor that pays $10 per hour. Because of school work, her parents only allow her to work a maximum of 20 hours per week. How many hours can Karen tutor and babysit if she wants to earn at least $100 per week?

(a) Write a system of inequalities that can be used to answer the question. Use ***x*** to represent the number of hours Karen babysits and ***y*** to represent the number of hours Karen tutors.

(b) Graph the system.



(c) Determine and state one solution that would allow Karen to work a maximum of 20 hours while making at least $100 in one week. *Explain* your solution in the context of the situation.