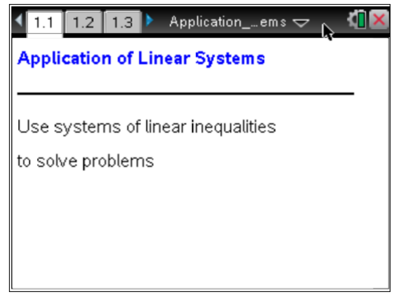
Application of Linear Systems

Student Activity

Name ______________

Class ______________

Open the TI-Nspire document *Application_of_Linear_Systems.tns*.



Systems of inequalities can be used to represent real-world problems. By graphing the system of inequalities on the same coordinate plane, the solutions can be found and visualized. These solutions can provide valuable information pertaining to the context of the problem.

Suppose you purchase a 750-square-meter piece of property in the city and decide to turn it into a parking area for cars and buses. Each car will need 5 square meters to park, and each bus will need 30 square meters. Due to city regulations, no more than 70 vehicles can be parked on the lot at one time. You decide to charge $4.50 for cars and $9.75 for buses to park. How many of each type of vehicle would need to be parked in the lot to maximize your income?

1. Write an inequality that represents the number of cars and buses that can park in the 750-square-meter parking lot. Remember that a car needs 5 square meters and a bus needs 30 square meters to park. Use *x* to represent the number of cars and *y* to represent the number of buses.

2. Write an inequality using *x* (number of cars) and *y* (number of buses) to represent the total number of vehicles that are allowed to be parked in the lot at one time according to the city regulations.

Move to page 1.7.

3. On page 1.7 is a graph of the two inequalities from Questions 1 and 2. How do your inequalities compare?

On page 1.7, grab point *P* and move it around the graph. Notice the coordinates of the points change as the point is moved. Also notice the words *true* and *false* next to the inequalities at the top change.

4. On the graph on page 1.7, what do the different shaded areas represent? Explain.

5. Explain what *true* and *false* on the graph mean for the two inequalities.

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6. Would negative coordinates make sense in the context of this problem? Explain why or why not.

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7. On page 1.7, what does the function $f(x, y)$ represent?

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Return to the graph and move point P around inside the feasible solution area. Calculate $f(x, y)$ (**MENU > Actions > Calculate**), using the x and y coordinates from point P, to see the incomes based on different numbers of cars and buses. Record the values for three different points in the table below.

x	***y***	***f*(*x*, *y*)**

Now find the point of intersection of the two lines (**MENU > Points & Lines > Intersection Point(s)**). Using this point, calculate $f(x, y)$ and record the data in the table.

8. Based on the information in the table, how many cars and buses would need to be parked in the lot to maximize your income?

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