4 REI. 12 **Graphing Inequalities Application** Name: Key

Objective: Use a system of inequalities to solve a problem in context.

In order to raise money, you are planning to work during the summer babysitting and cleaning houses. You earn $10 per hour while babysitting and $20 per hour while cleaning houses. You need to earn at least $1000 during the summer.

1. Write an **expression** to represent the amount of money earned while babysitting. Be sure to choose a variable to represent the number of hours spent babysitting.

   10b

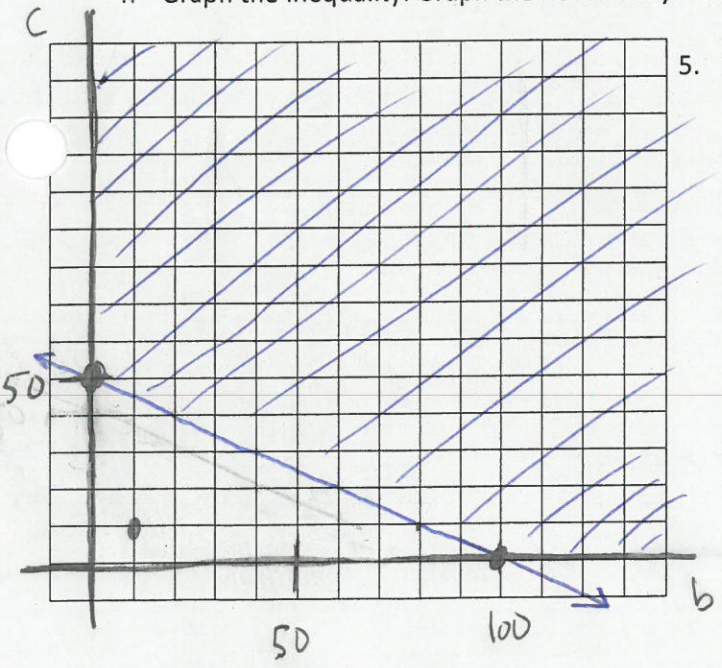
2. Write an **expression** to represent the amount of money earned while cleaning houses.

   20c

3. Write a mathematical model (inequality) representing the total amount of money earned over the summer from babysitting and cleaning houses.

   $10b + 20c \geq 1000$

4. Graph the inequality. Graph the hours babysitting on the x-axis and the hours cleaning houses on the y-axis.



5. Use the graph to answer the following questions:
   a. Why does the graph only fall in the 1st quadrant?

      can't have negative hours

   b. Is it acceptable to earn exactly $1000?

      yes

   c. What are some possible combinations of outcomes that total more than $1000?

      50 hours babysitting, 40 hours cleaning
      20 hours babysitting, 60 hours cleaning

   d. Where do all of these outcomes fall on the graph?

      above the line

   e. Is it acceptable to work 10 hours babysitting and 10 hours cleaning houses?
      i. Why or why not? not if you want to earn at least $1000. only $300

   f. Where does the combination of 10 hours babysitting and 10 hours cleaning houses fall on the graph?

      that point is below the line

   g. Are combinations that fall in this area a solution? no, they don't satisfy the inequality.
      i. Why or why not?

6. How would the model change if you could only earn more than $1000? Write a new model to represent needing to earn more than $1000.

$10b + 20c > 1000$

a. How would this change the graph of the model?

the line would be dashed

b. Would the line still be part of the solution?

no

c. How would you change the line to show this?

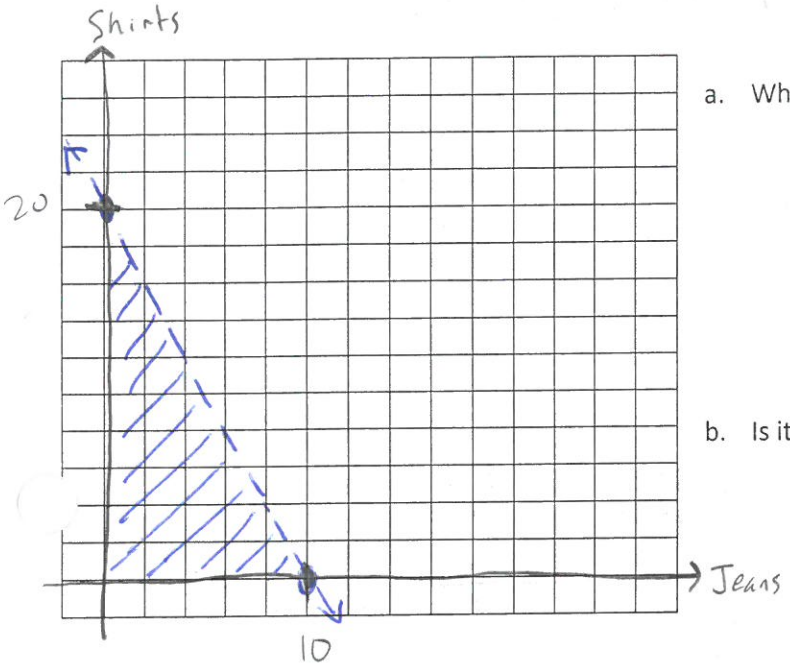
dashed

4 REI. 12 **Graphing Inequalities Application** **Name:** _____

7. You plan to use part of the money you earned from your summer job to buy jeans and shirts for school. Jeans cost $40 per pair and shirts are $20 each. You want to spend less than $400 of your money on these items.
   a. Write an inequality representing the amount of money spent on jeans and shirts.

      $40j + 20s < 400$

   b. Graph the inequality. Graph the number of jeans on the x-axis and shirts on the y-axis.



   a. Why does the graph only fall in the 1st quadrant?

      can't sell a negative quantity of jeans or shirts.

   b. Is it acceptable to spend less than $400?

      yes!

   c. What are some possible combinations of outcomes that total less than $400?

      1 jeans, 2 shirts

      4 jeans, 1 shirt

   f. Is it acceptable to spend exactly $400? How does the graph show this?

      no, the line is dashed meaning it is not part of the solution.

   g. Is it acceptable to spend more than $400? Where do all of the combinations that total more than $400 fall?

      no, the points lie above the line, not in the shaded region.

8. Explain the difference between a solid line and a dashed line when graphing inequalities.

   a. How can you determine from the inequality whether or not the line will be solid or dashed?

   ≥ or ≤ → solid

   > or < → dashed

   b. How can you look at the graph and know if the line is part of the solution?

   the line is part of the solution only when the line is solid.

9. How do you determine which area of the graph of an inequality to shade?

   > or ≥ → above

   < or ≤ → below

   you could also try a sample point

   a. What is special about the shaded area of an inequality?

   all points in the shaded region are solutions... they satisfy the inequality

   b. What is special about the area that is not shaded?

   not solutions... they don't satisfy the inequality

Graphing Inequalities Application

Name: _____

10. A store sells two types of toys, zingers and zappers. The store owner pays $8 for each zinger and $14 for each zapper. The store owner estimates that no more than 2000 toys will be sold every month. Additionally, she plans to spend less than $20,000 on the toys.

a. What are we trying to find?

How many zingers and zappers the owner should buy.

b. What variables will be used, and what do they represent?

x = zinger

y = zapper

c. What information is given?

$8 = cost of 1 zinger

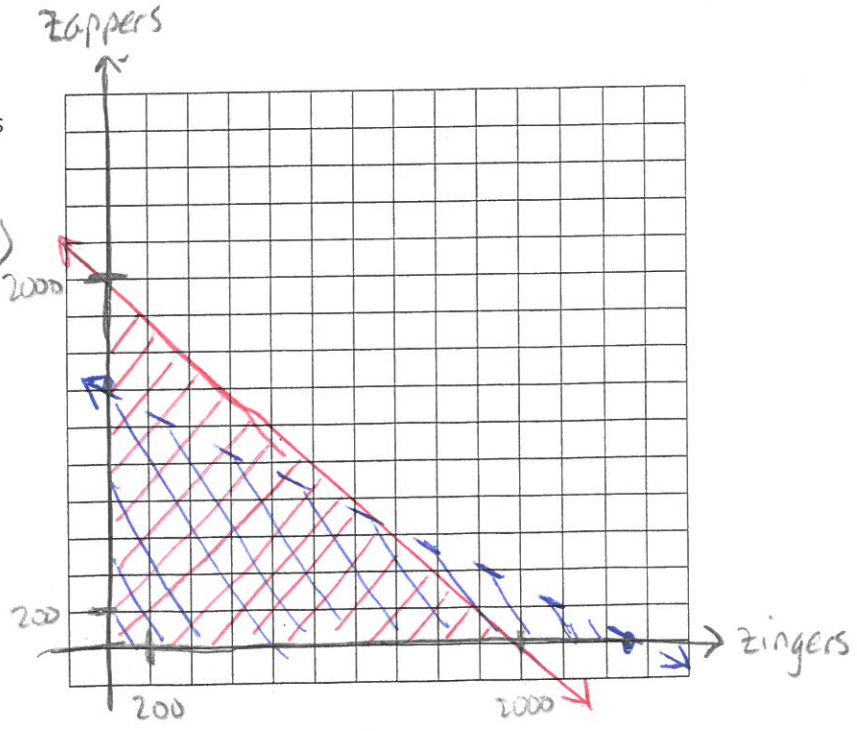
$14 = cost of 1 zapper

d. Write a system of inequalities to represent the situation.

$8x + 14y < 20000$

$x + y \leq 2000$

e. Graph the system.



f. List 3 ordered pairs that are solutions to the system.

(200, 400) (600, 300)
(1000, 200)

g. List one ordered pair that is on a line, but not part of the solution.

(400, 1600)

h. List one ordered pair that is on a line, and part of the solution.

(1800, 200)

Graphing Inequalities Application

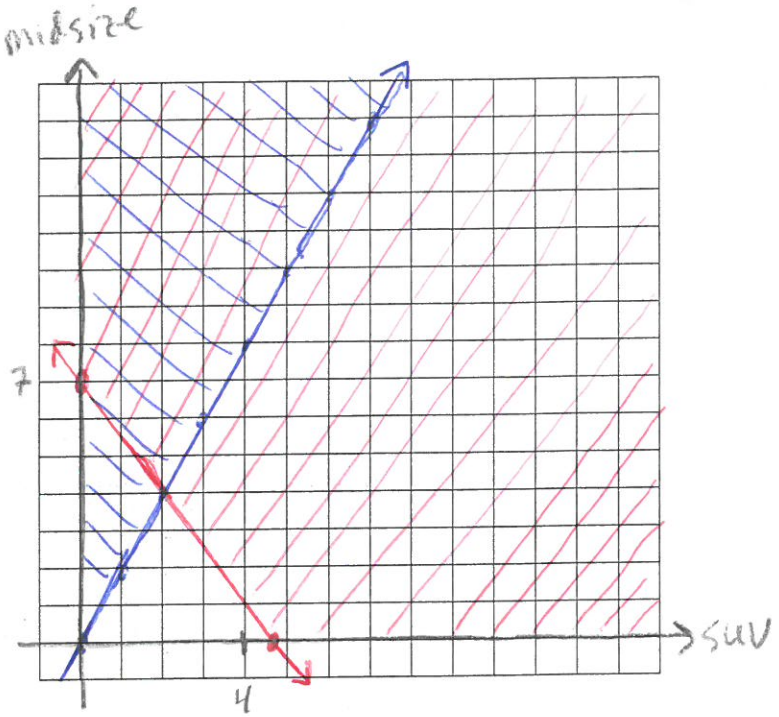
Name: _____

11. Suppose a car dealer makes a profit of $500 for each mid-sized car sold and $750 for each SUV sold. The dealer must sell at least two mid-sized car for each SUV sold. They also want to make at $3500 in profit each week.

a. Graph the scenario.

$500m + 750s \geq 3500$

$m \geq 2s$



b. Suppose the dealer sells 2 SUVs. How many mid-size cars must be sold to reach the profit goal of at least $3500?

At least 4. more would be great

c. If the dealer sells only one SUV, how many mid-size cars must be sold to meet the goal?

At least 6. more would be great.

d. How many SUVs need to be sold to meet the goal if 5 mid-size cars are sold?

two.

CHALLENGE:

12. Use the scenario from #10. If the store owner can spend up to $20,000 (not just less than), and she makes $2 profit on every zinger and $3 profit on every zapper, how many of each type of toy should be purchased in order to maximize her monthly total profit?

$8x + 14y \leq 20000$

1333 zingers → 4667 dollars

667 zappers