Coordinate Algebra Agenda:

1st in 10: Match the stories on pages 5 - 8 with the graphs on pages 11 & 13. Work with a partner.

Go over homework.

Section 7.2

Aaron Hill - you're signing out!!
Something's Fishy
Candice is a building manager for the Crowley Enterprise office building. One of her responsibilities is cleaning the office building's 200-gallon aquarium. For cleaning, she must remove the fish from the aquarium and drain the water. The water drains at a constant rate of 10 gallons per minute.

- independent quantity: time in minutes
- dependent quantity: Gallons Per minute

He tells you that you only need to pay $1 in interest initially, and then the interest will double each week after that. You consider his offer and wonder: is this really a good deal?

- independent quantity:
- dependent quantity:
Smart Phone, but Is It a Smart Deal?

You have had your eye on an upgraded smart phone. However, you currently do not have the money to purchase it. Your cousin will provide the funding, as long as you pay him interest. He tells you that you only need to pay $1 in interest initially, and then the interest will double each week after that. You consider his offer and wonder: is this really a good deal?

- independent quantity: time in weeks
- dependent quantity: interest
Can’t Wait to Hit the Slopes!

Andrew loves skiing—he just hates the ski lift ride back up to the top of the hill. For some reason the ski lift has been acting up today. His last trip started fine. The ski lift traveled up the mountain at a steady rate of about 83 feet per minute. Then all of a sudden it stopped and Andrew sat there waiting for 10 minutes! Finally, the ski lift began to ascend up the mountain to the top.

- independent quantity: time in minutes
- dependent quantity: Feet

It’s Magic

The Amazing Aloysius is practicing one of his tricks. As part of this trick, he cuts a rope into many pieces and then magically puts the pieces of rope back together. He begins the trick with a 20-foot rope and then cuts it in half. He then takes one of the halves and cuts that piece in half. He repeats this process until he is left with a piece so small he can no longer cut it. He wants to know how many total cuts he can make and the length of each remaining piece of rope after the total number of cuts.

- independent quantity:
- dependent quantity:
It's Magic

The Amazing Aloysius is practicing one of his tricks. As part of this trick, he cuts a rope into many pieces and then magically puts the pieces of rope back together. He begins the trick with a 20-foot rope and then cuts it in half. He then takes one of the halves and cuts that piece in half. He repeats this process until he is left with a piece so small he can no longer cut it. He wants to know how many total cuts he can make and the length of each remaining piece of rope after the total number of cuts.

- independent quantity:
- dependent quantity:

# of cuts
length of each piece (ft)

D
Baton Twirling

Jill is a drum major for the Alhaden High School marching band. She has been practicing for the band's halftime performance. For the finale, Jill tosses her baton in the air so that it reaches a maximum height of 22 feet. This gives her 2 seconds to twirl around twice and catch the baton when it comes back down.

- independent quantity: amount of time she has to catch it.
- dependent quantity: height

Graph F

Jermaine loves music. He can lip sync almost any song at a moment's notice. He joined Songs When I Want Them, an online music store. By becoming a member, Jermaine can purchase just about any song he wants. Jermaine pays $1 per song.

- independent quantity:
- dependent quantity:
Music Club

Jermaine loves music. He can lip sync almost any song at a moment's notice. He joined Songs When I Want Them, an online music store. By becoming a member, Jermaine can purchase just about any song he wants. Jermaine pays $1 per song.

- independent quantity:
  How many songs he gets

- dependent quantity:
  The amount he will owe  

Graph A
A Trip to School
On Monday morning, Myra began her 1.3-mile walk to school. After a few minutes of walking, she walked right into a spider's web—and Myra hates spiders! She began running until she ran into her friend Tanisha. She stopped and told Tanisha of her adventurous morning and the icky spider's web! Then they walked the rest of the way to school.

- independent quantity:
  How long she walks
- dependent quantity:
  Distance walked

This game was the perfect way for Myra and Tanisha to get some exercise. They kept a record of everyone's guesses and the number of jelly beans that each person's guess was off by.

- independent quantity:
- dependent quantity:
Jelly Bean Challenge

Mr. Wright judges the annual Jelly Bean Challenge at the summer fair. Every year, he encourages the citizens in his town to guess the number of jelly beans in a jar. He keeps a record of everyone's guesses and the number of jelly beans that each person's guess was off by.

- independent quantity:
  - # of JellyBeans in jar
  - how far they were off

8  Chapter 1  Quantities and Relationships
3a.)

Test (0, 0)
0 > 0 + 3
0 > 3
False

\( y > x + 3 \)
\( m = \frac{1}{3} \)
\( y \text{int} = 3 \)
dotted
3b. \[ y \leq -\frac{1}{3}x + 4 \]

\[ m = -\frac{1}{3} \]

\[ y \text{ int} = 4 \]

Solid

\[ 0 \leq -\frac{1}{3}(0) + 4 \]

\[ 0 \leq 4 \]

True
3c.) \(2x - y < 4\)

\[
\begin{align*}
2(0) - 0 &\leq 4 \\
0 &\leq 4 \\
\text{True}
\end{align*}
\]

\[
\begin{align*}
\frac{x\text{int}}{2x = 4} &\quad \frac{y\text{int}}{-y = 4} \\
\text{dotted} &\quad y = -4 \\
x = 2 &\quad y = -y
\end{align*}
\]

\[
\begin{align*}
2x - y &< 4 \\
2x - 4 &< y \\
-y &< -2x \\
y &> -4 + 2x
\end{align*}
\]
Your cousin's graduation party is a video game party at the arcade! Each person at the party receives a card with 50 points on it to play the games in the arcade. One of your favorite driving games uses 12 points per game. You also like a basketball game that uses 8 points per game. You want to determine how many times you can play each of these games without exceeding the 50 points on the game card.

1. Write an inequality to represent the problem situation. Define your variables.

\[ x = \text{# of times played driving games} \]
\[ y = \text{# of times played basketball} \]

\[ 12x + 8y \leq 50 \]
2. Complete the table that represents different numbers of times you play the driving game and the basketball game and the total numbers of points used.

<table>
<thead>
<tr>
<th>Number of Driving Games Played</th>
<th>Number of Basketball Games Played</th>
<th>Total Number of Points Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>24</td>
<td>48</td>
</tr>
<tr>
<td>24</td>
<td>32</td>
<td>56</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>52</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>48</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>56</td>
</tr>
</tbody>
</table>
3. Graph the inequality you wrote in Question 1 on the coordinate plane shown. Then use the data in the table to plot the ordered pairs.

12x + 8y ≤ 50

x:int
12x = 50
x = 4.2

y:int
8y = 50
y = 6.2

12(0) + 8(0) ≤ 50
0 ≤ 50
True

5. Is the ordered pair (7, -3) a solution of the inequality you wrote for this problem situation? Why or why not.

6. What can you interpret about the solution set from the graph of this problem situation? Explain your reasoning.

Be prepared to share your solutions and methods.
4. Is the ordered pair \((-1, 8)\) a solution of the inequality you wrote for this problem situation? Why or why not.
   
   \text{Not in shaded area AND can't have -1 games.}

5. Is the ordered pair \((7, -3)\) a solution of the inequality you wrote for this problem situation? Why or why not.
   
   \text{In shaded area BUT can't have -3 games.}

6. What can you interpret about the solution set from the graph of this problem situation? Explain your reasoning.
   
   \text{In the shaded region BUT only the 1st Quadrant.}
Whitewater rafting is a challenging outdoor activity. It involves navigating through a river or other body of water in an inflatable raft. There are 6 different grades of difficulty in whitewater rafting based on the speed of the current and the hazards rafters may encounter. Grade 1 rafting involves very few rough areas that require some maneuvering of the raft. Grade 1 rafting is good for beginners or children. Grade 6 rafting is so dangerous that there may be times when the waterway is impassable. Rafters can expect to see huge waves and rocks as well as substantial drops. Grade 6 rafting can actually be deadly! However, by using the proper safety gear and traveling with a reliable guide, thousands of people safely enjoy rafting trips every year!

Whitewater rafting often involves a number of people rafting together. Do you think having more or fewer people in the raft would make the trip safer or more dangerous? What else might affect the safety of the raft?
Chase is an experienced whitewater rafter who guides groups of adults and children out on the water for amazing adventures. The super-raft he uses can hold 800 pounds of weight. Any weight greater than 800 pounds will cause the raft to sink, hit more rocks, and maneuver more slowly.

1. Chase estimates the weight of each adult as approximately 200 pounds, and the weight of each child under age sixteen as approximately 100 pounds. Chase charges adults $75 and children under age sixteen $50 to ride down the river with him. His goal is to earn at least $150 each rafting trip.
   a. Write an inequality to represent the most weight Chase can carry in terms of rafters. Define your variables.

   \[ 200a + 100c \leq 800 \]

   Chase wants to earn per trip.

   In a system of linear inequalities, the inequalities are known as constraints because the values of the expressions are “constrained” to lie within a certain region on the graph.

2. Let’s consider the past two trips that Chase guides. Determine whether each combination of rafters is a solution of the system of linear inequalities. Then describe the meaning of the solution in terms of this problem situation.
   a. First Trip: Chase guides 2 adults and 2 children.

   Does Chase count when determining the weight and the cost?
b. Write an inequality to represent the least amount of money Chase wants to collect for each rafting trip.

75(a-1) + 50c ≥ 150

Let a = # adults
Let c = # children

75(a-1) + 50c ≥ 150

200a + 100c ≤ 800

Chapter 7: Systems of Inequalities
2. Let's consider the past two trips that Chase guides. Determine whether each combination of rafters is a solution of the system of linear inequalities. Then describe the meaning of the solution in terms of this problem situation.

<table>
<thead>
<tr>
<th>Weight</th>
<th>Money</th>
</tr>
</thead>
<tbody>
<tr>
<td>200a + 100c ≤ 800</td>
<td>75(a-1) + 50c ≥ 150</td>
</tr>
<tr>
<td>600 + 200 ≤ 800</td>
<td>150 + 100 ≥ 150</td>
</tr>
</tbody>
</table>

| a = 3 | c = 2 |
b. Second Trip: Chase guides 5 adults.

The solution of a system of linear inequalities is the intersection of the solutions to each inequality. Every point in the intersection region satisfies the solution.

4. Analyze your graph.
   a. Describe the possible number of solutions for a system of linear inequalities.

   b. Is the intersection point a solution to this system of inequalities? Why or why not?
3. Graph the system of linear inequalities on the coordinate plane shown.

Shade the half-plane of each inequality differently. You can use colored pencils or simply vertical and horizontal lines.

\[
\begin{align*}
200a + 100c & \leq 800 \\
75(a - 1) + 50c & \geq 150
\end{align*}
\]

\[a - \text{int} \quad 200a = 800 \quad a = 4\]

b. Is the intersection point a solution to this system of inequalities? Why or why not?