

**Chapter
3****Fair Game Review**

Complete the number sentence with $<$, $>$, or $=$.

1. $\frac{3}{4}$ _____ 0.2

2. $\frac{7}{10}$ _____ 0.7

3. 0.6 _____ $\frac{2}{3}$

4. $\sqrt{3}$ _____ 1.75

5. 6 _____ $\sqrt{12}$

6. 1.8 _____ $\frac{31}{16}$

7. Your height is 5 feet and $1\frac{5}{8}$ inches. Your friend's height is 5.6 feet.
Who is taller? Explain.

**Chapter
3****Fair Game Review** (continued)

Graph the inequality.

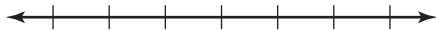
8. $x < 3$



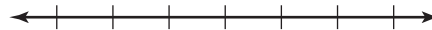
9. $x \geq 5$



10. $x \leq 2$



11. $x > 7$



12. $x \leq 2.3$



13. $x > \frac{2}{5}$



14. The deepest free dive by a human in the ocean is 417 feet. The depth humans have been in the ocean can be represented by the inequality $x \leq 417$. Graph the inequality.



3.1**Writing and Graphing Inequalities**

For use with Activity 3.1

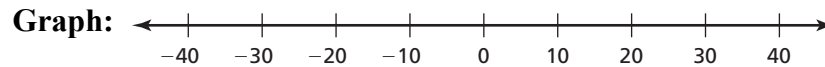
Essential Question How can you use an inequality to describe a real-life statement?

1 ACTIVITY: Writing and Graphing Inequalities

Work with a partner. Write an inequality for the statement. Then sketch the graph of all the numbers that make the inequality true.

- a. **Statement:** The temperature t in Minot, North Dakota has never been below -36°F .

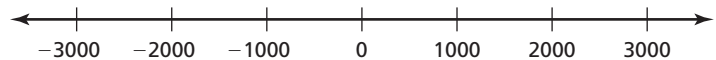
Inequality: _____



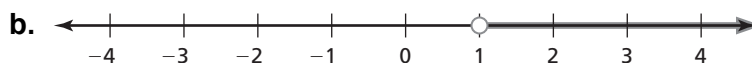
- b. **Statement:** The elevation e in Wisconsin is at most 1951.5 feet above sea level.

Inequality: _____

Graph: _____

**2 ACTIVITY: Writing and Graphing Inequalities**

Work with a partner. Write an inequality for the graph. Then, in words, describe all the values of x that make the inequality true.



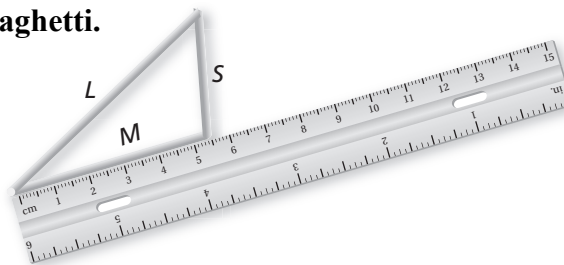
3.1 Writing and Graphing Inequalities (continued)



3 ACTIVITY: Triangle Inequality

Work with a partner. Use 8 to 10 pieces of spaghetti.

- Break one piece of spaghetti into three parts that can be used to form a triangle.
- Form a triangle and use a centimeter ruler to measure each side. Round the side lengths to the nearest tenth.
- Record the side lengths in the table.
- Repeat the process with two other pieces of spaghetti.



Side Lengths That Form a Triangle			
Small	Medium	Large	$S + M$

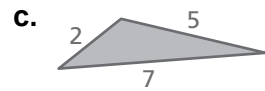
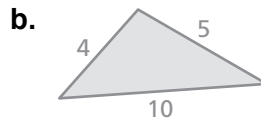
- Repeat the experiment by breaking pieces of spaghetti into three pieces that *do not* form a triangle. Record the lengths in a table.

Side Lengths That Do Not Form a Triangle			
Small	Medium	Large	$S + M$

3.1 Writing and Graphing Inequalities (continued)

- **INDUCTIVE REASONING** Write a rule that uses an inequality to compare the lengths of three sides of a triangle.

- Use your rule to decide whether the following triangles are possible. Explain.

**What Is Your Answer?**

4. **IN YOUR OWN WORDS** How can you use an inequality to describe a real-life statement? Give two examples of real-life statements that can be represented by inequalities.

3.1**Practice**

For use after Lesson 3.1

Write the word sentence as an inequality.

1. A number p is no greater than -6 .
2. A number n divided by -2 is no less than $\frac{1}{2}$.

Tell whether the given value is a solution of the inequality.

3. $q + 7 \geq 8$; $q = 10$
4. $-12r < -6$; $r = -2$

5. $-2.4k \geq -4$; $k = 0.5$
6. $\frac{x}{4} < x - 9$; $x = 8$

Graph the inequality on a number line.

7. $p \leq 4\frac{1}{2}$
8. $z > -8.3$



9. For your birthday, you want to invite some friends to join you at the movies. Movie tickets cost \$8. You can spend no more than \$35. Write an inequality to represent this situation. Then solve the inequality to find the greatest number of people you can invite.

3.2**Solving Inequalities Using Addition or Subtraction**

For use with Activity 3.2

Essential Question How can you use addition or subtraction to solve an inequality?

1 ACTIVITY: Quarterback Passing Efficiency

Work with a partner. The National Collegiate Athletic Association (NCAA) uses the following formula to rank the passing efficiency P of quarterbacks.

$$P = \frac{8.4Y + 100C + 330T - 200N}{A}$$

Y = total length of all completed passes (in Yards)

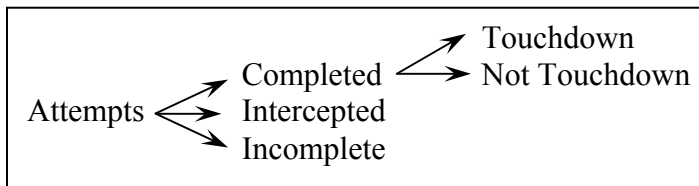
C = Completed passes

T = passes resulting in a Touchdown

N = iNtercepted passes

A = Attempted passes

M = incoMplete passes



Which of the following equations or inequalities are true relationships among the variables? Explain your reasoning.

a. $C + N < A$ b. $C + N \leq A$ c. $T < C$ d. $T \leq C$

e. $N < A$ f. $A > T$ g. $A - C \geq M$ h. $A = C + N + M$

3.2 Solving Inequalities Using Addition or Subtraction (continued)

2 ACTIVITY: Quarterback Passing Efficiency

Work with a partner. Which of the following quarterbacks has a passing efficiency rating that satisfies the inequality $P > 100$? Show your work.

Player	Attempts	Completions	Yards	Touchdowns	Interceptions
A	149	88	1065	7	9
B	400	205	2000	10	3
C	426	244	3105	30	9
D	188	89	1167	6	15

3 ACTIVITY: Finding Solutions of Inequalities

Work with a partner. Use the passing efficiency formula to create a passing record that makes the inequality true. Then describe the values of P that make the inequality true.

a. $P < 0$

Attempts	Completions	Yards	Touchdowns	Interceptions

b. $P + 100 \geq 250$

Attempts	Completions	Yards	Touchdowns	Interceptions

c. $180 < P - 50$

Attempts	Completions	Yards	Touchdowns	Interceptions

3.2 Solving Inequalities Using Addition or Subtraction (continued)

d. $P + 30 \geq 120$

Attempts	Completions	Yards	Touchdowns	Interceptions

e. $P - 250 > -80$

Attempts	Completions	Yards	Touchdowns	Interceptions

What Is Your Answer?

4. Write a rule that describes how to solve inequalities like those in Activity 3. Then use your rule to solve each of the inequalities in Activity 3.

5. **IN YOUR OWN WORDS** How can you use addition or subtraction to solve an inequality?

6. How is solving the inequality $x + 3 < 4$ similar to solving the equation $x + 3 = 4$? How is it different?

3.2**Practice**

For use after Lesson 3.2

Solve the inequality. Graph the solution.

1. $x - 4 < 8$

2. $16 + p \geq 14$



3. $9 > y + \frac{3}{4}$

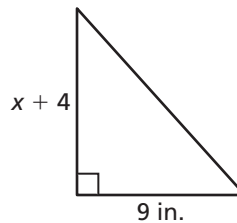
4. $-9.6 \leq z - 2.1$

**Write and solve an inequality that represents the value of x .**

5. The perimeter is less than 15 feet.



6. The height is greater than the base.



7. Your goal is to sell at least 50 boxes of cookies for your school fundraiser.

a. Write an inequality that represents your goal.

b. You sell 26 boxes. Write and solve a new inequality to represent how many boxes you need to sell to reach your goal.

3.3**Solving Inequalities Using Multiplication or Division**

For use with Activity 3.3

Essential Question How can you use multiplication or division to solve an inequality?

1 ACTIVITY: Using a Table to Solve an Inequality

Work with a partner.

- Complete the table.
- Decide which graph represents the solution of the inequality.
- Write the solution of the inequality.

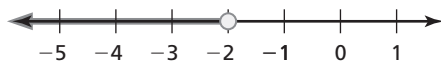
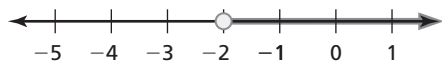
a. $3x \leq 6$

x	-1	0	1	2	3	4	5
$3x$							
$3x \leq 6$							



b. $-2x > 4$

x	-5	-4	-3	-2	-1	0	1
$-2x$							
$-2x > 4$							



3.3 Solving Inequalities Using Multiplication or Division (continued)**2 ACTIVITY:** Writing a Rule

Work with a partner. Use a table to solve each inequality.

a. $3x > 3$

b. $4x \leq 4$

c. $-2x \geq 6$

d. $-5x < 10$

x									
3x									
4x									
-2x									
-5x									

Write a rule that describes how to solve inequalities like those in Activity 1.
Then use your rule to solve each of the four inequalities above.

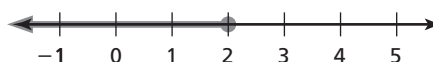
3 ACTIVITY: Using a Table to Solve an Inequality

Work with a partner.

- Complete the table.
- Decide which graph represents the solution of the inequality.
- Write the solution of the inequality.

a. $\frac{x}{2} \geq 1$

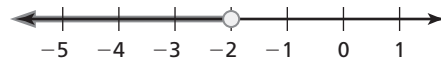
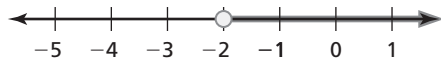
x	-1	0	1	2	3	4	5
$\frac{x}{2}$							
$\frac{x}{2} \geq 1$							



3.3 Solving Inequalities Using Multiplication or Division (continued)

b. $\frac{x}{-3} < \frac{2}{3}$

x	-5	-4	-3	-2	-1	0	1
$\frac{x}{-3}$							
$\frac{x}{-3} < \frac{2}{3}$							



4 ACTIVITY: Writing a Rule

Work with a partner. Use a table to solve each inequality.

a. $\frac{x}{4} \geq 1$

b. $\frac{x}{2} < \frac{3}{2}$

c. $\frac{x}{-2} > 2$

d. $\frac{x}{-5} \leq \frac{1}{5}$

x											
$\frac{x}{4}$											
$\frac{x}{2}$											
$\frac{x}{-2}$											
$\frac{x}{-5}$											

Write a rule that describes how to solve inequalities like those in Activity 3.
Then use your rule to solve each of the four inequalities above.

What Is Your Answer?

5. **IN YOUR OWN WORDS** How can you use multiplication or division to solve an inequality?

3.3**Practice**

For use after Lesson 3.3

Solve the inequality. Graph the solution.

1. $5n < 75$

2. $\frac{x}{6} \leq -12$

3. $-15t > -60$



4. $-4q \geq 122$

5. $-8p < \frac{4}{5}$

6. $-9 \geq 2.4m$



7. $-\frac{r}{2} \leq -11$

8. $-\frac{t}{6} > 1.2$

9. $-4 \geq \frac{q}{-0.1}$



10. To win a trivia game, you need at least 60 points. Each question is worth 4 points. Write and solve an inequality that represents the number of questions you need to answer correctly to win the game.

3.4

Solving Multi-Step Inequalities

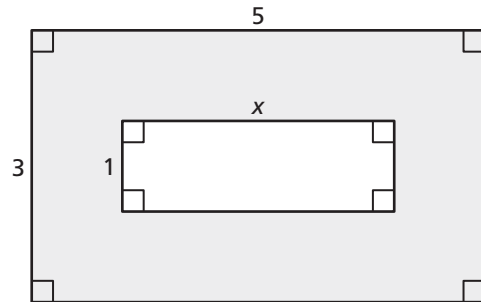
For use with Activity 3.4

Essential Question How can you use an inequality to describe the area and perimeter of a composite figure?

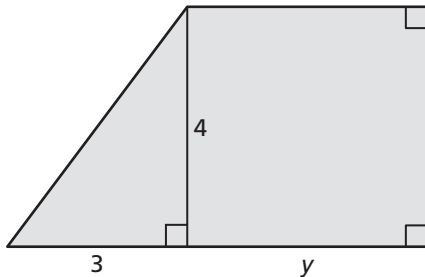
1 ACTIVITY: Areas and Perimeters of Composite Figures

Work with a partner.

- a. For what values of x will the area of the shaded region be greater than 12 square units?



- b. For what values of x will the sum of the inner and outer perimeters of the shaded region be greater than 20 units?

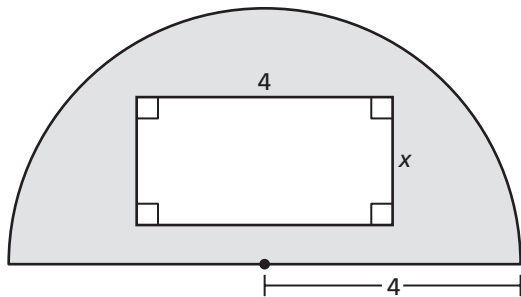
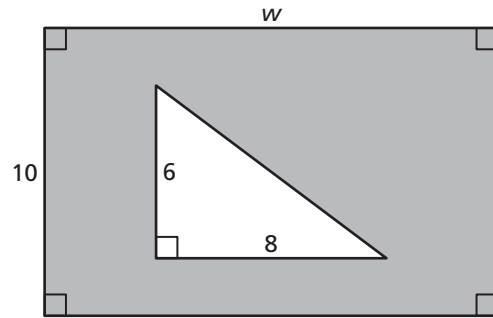


- c. For what values of y will the area of the trapezoid be less than or equal to 10 square units?

- d. For what values of y will the perimeter of the trapezoid be less than or equal to 16 units?

3.4 Solving Multi-Step Inequalities (continued)

- e. For what values of w will the area of the shaded region be greater than or equal to 36 square units?
- f. For what values of w will the sum of the inner and outer perimeters of the shaded region be greater than 47 units?

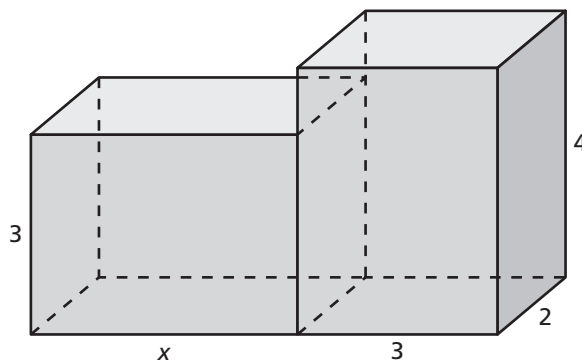


- g. For what values of x will the area of the shaded region be less than 4π square units?
- h. For what values of x will the sum of the inner and outer perimeters of the shaded region be less than $4\pi + 20$ units?

2 ACTIVITY: Volume and Surface Area of a Composite Solid

Work with a partner.

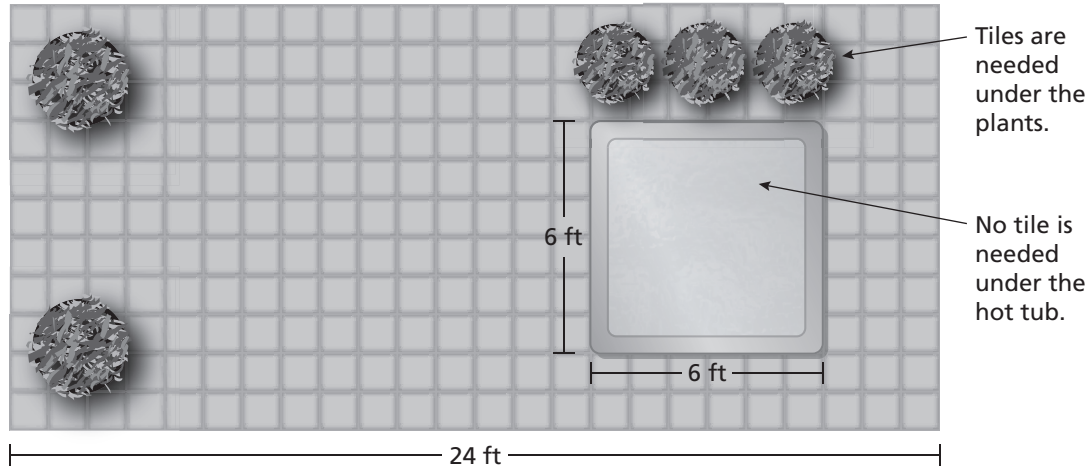
- a. For what values of x will the volume of the solid be greater than or equal to 42 cubic units?
- b. For what values of x will the surface area of the solid be greater than 72 square units?



3.4 Solving Multi-Step Inequalities (continued)**3 ACTIVITY:** Planning a Budget

Work with a partner.

You are building a patio. You want to cover the patio with Spanish tile that costs \$5 per square foot. Your budget for the tile is \$1700. How wide can you make the patio without going over your budget?

**What Is Your Answer?**

4. **IN YOUR OWN WORDS** How can you use an inequality to describe the area and perimeter of a composite figure? Give an example. Include a diagram with your example.

3.4**Practice**

For use after Lesson 3.4

Solve the inequality. Graph the solution, if possible.

1. $9x - 6 > 66$

2. $\frac{d}{3} + 7 \leq -11$



3. $14.9 - 5.2n < 20.1$

4. $\frac{9}{10} \geq 5z + \frac{3}{10}$



5. $8(p + 3) > 2(4p - 1)$

6. $-\frac{1}{2}(y + 8) < -\frac{1}{4}(2y + 20)$



7. In the United States music industry, an album is awarded gold certification with at least 500,000 albums sold. A recording artist is selling about 1200 albums each day. The artist has already sold 15,000 albums. About how many more days will it take before the album is awarded gold certification?

Extension
3.4
Practice

For use after Extension 3.4

Write the word sentence as an inequality. Graph the inequality.

1. A number
- q
- is more than 4 and less than 6.



2. A number
- r
- is fewer than
- -5
- and no less than
- -8
- .



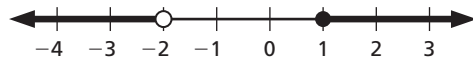
3. A number
- s
- is greater than or equal to 3 and no more than 7.



4. A number
- t
- is greater than or equal to 1 or less than
- -3
- .



5. Write an inequality to describe the graph.



6. Triglycerides are a type of fat in the human bloodstream. Triglyceride levels greater than or equal to 150 milligrams per deciliter and less than 200 milligrams per deciliter are considered borderline high. Write and graph a compound inequality that describes triglyceride levels that are borderline high.



Extension
3.4**Practice (continued)**

Solve the inequality. Graph the solution, if possible.

7. $3 < a + 2 < 6$

8. $7 < x + 4 \leq 10$



9. $4b + 3 > 7$ or $3b + 2 \leq -7$

10. $5y + 10 < 20$ or $7y + 46 > 95$



11. $|2c - 1| \leq 5$

12. $-2|3z + 6| + 3 > 27$



13. A country's mint has a rule that the weight of a certain coin must be within 0.02 gram of 3.00 grams to be released into circulation. Use a model to write and solve an absolute value inequality to find the least and greatest weight of a coin that the country's mint will allow to be released into circulation.

3.5**Graphing Linear Inequalities in Two Variables**

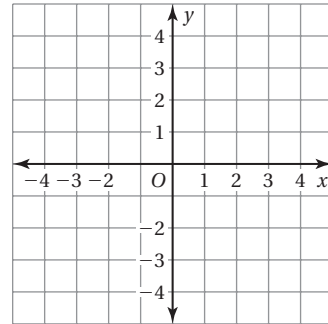
For use with Activity 3.5

Essential Question How can you use a coordinate plane to solve problems involving linear inequalities?

1 ACTIVITY: Graphing Inequalities

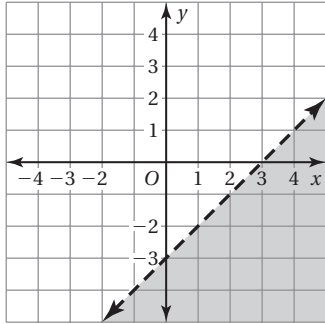
Work with a partner.

- a. Graph $y = x + 1$ in the coordinate plane.
- b. Choose three points that lie above the graph of $y = x + 1$. Substitute the values of x and y of each point in the inequality $y > x + 1$. If the substitutions result in true statements, plot the points on the graph.
- c. Choose three points that lie below the graph of $y = x + 1$. Substitute the values of x and y of each point in the inequality $y > x + 1$. If the substitutions result in true statements, plot the points on the graph.
- d. To graph $y > x + 1$, would you choose the points above or below $y = x + 1$?
- e. Choose a point that lies on the graph of $y = x + 1$. Substitute the values of x and y in the inequality $y > x + 1$. What do you notice? Do you think the graph of $y > x + 1$ includes the points that lie on the graph of $y = x + 1$? Explain your reasoning.



3.5 Graphing Linear Inequalities in Two Variables (continued)

- f. Explain how you could change the inequality so that it includes the points that lie on the graph of $y = x + 1$.

2 ACTIVITY: Writing and Graphing Inequalities

Work with a partner. The graph of a linear inequality in two variables shows all the solutions of the inequality in a coordinate plane. An ordered pair (x, y) is a solution of an inequality if the inequality is true when the values of x and y are substituted into the inequality.

- Write an equation for the graph of the dashed line.
- The solutions of the inequality are represented by the shaded region. In words, describe the solutions of the inequality.
- Write an inequality for the graph. Which inequality symbol did you use? Explain your reasoning.

3 EXAMPLE: Using a Graphing Calculator

Use a graphing calculator to graph $y \geq \frac{1}{4}x - 3$.

- Enter the equation $y = \frac{1}{4}x - 3$ into your calculator.

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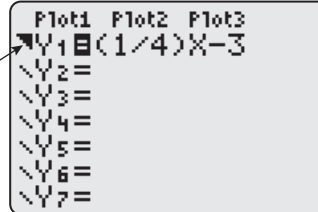
Plot1 Plot2 Plot3
Y1=(1/4)X-3
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=

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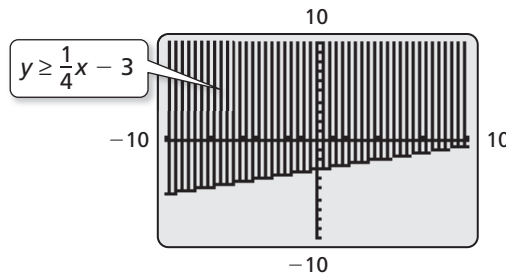
3.5 Graphing Linear Inequalities in Two Variables (continued)

- b. The inequality contains the symbol $\geq$. So, the region to be shaded is above the graph of $y = \frac{1}{4}x - 3$. Adjust your graphing calculator so that the region above the graph will be shaded.

For some calculators, this icon represents the region above the graph.



- c. Graph $y \geq \frac{1}{4}x - 3$ on your calculator.



Some graphing calculators always use a solid line when graphing inequalities. In this case, you will have to decide whether the line should be dashed or solid.

What Is Your Answer?

4. Use a graphing calculator to graph each inequality in a standard viewing window.
- a. $y > x + 5$ b. $y \leq -\frac{1}{2}x + 1$ c. $y \geq -x - 4$
5. **IN YOUR OWN WORDS** How can you use a coordinate plane to solve problems involving linear inequalities? Give an example of a real-life problem that can be represented by an inequality in two variables.

3.5

Practice

For use after Lesson 3.5

Tell whether the ordered pair is a solution of the inequality.

1. $-4x + y > 15$; $(-4, 0)$

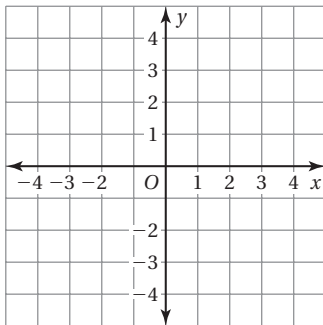
2. $-8 - 9y \leq 50$; $(1, -9)$

3. $3x + 2y \geq 7$; $(1, 2)$

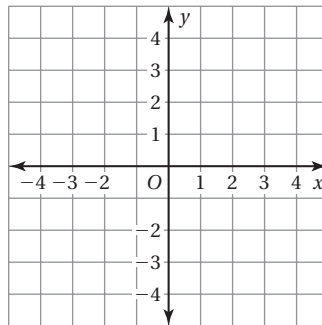
4. $5x - 7y < -24$; $(-9, -3)$

Graph the inequality in a coordinate plane.

5. $y \geq -3$



6. $x + y < 2$



7. You can spend at most \$20 on tomatoes and red peppers for a soup. Tomatoes cost \$2.50 per pound and red peppers cost \$4 per pound.

a. Write and graph an inequality that represents the amounts of tomatoes and red peppers you can buy.

b. Identify and interpret two solutions of the inequality that are on the boundary line.

