7.1   Modeling Linear Relationships

Essential Question: How can you model linear relationships given limited information?

⊘ Explore   Modeling Linear Relationships with Slope-Intercept Form

A department store offers a frequent-buyers card to earn rewards for purchases customers make at the store. Each transaction is worth 12 points, and customers automatically earn 25 points when they sign up.

Write an equation for the function that gives the card value based on the number of transactions that have occurred.

(A)   What units would be associated with the variables in this function?

_____

(B)   Complete the verbal model for the frequent-buyers card function. Include units.

Card Value (points) = Initial Value (points) + ⬚ · ⬚

(C)   Write the function rule for the card-value function C.

$C(t) =$ ⬚ + ⬚ t, where t is the number of transactions.

(D)   For each 100 points, the customer receives a gift certificate. How many transactions will it take for the customer to earn the first gift certificate?

_____

_____

_____

_____

_____

(E)   What is the y-intercept for this linear function, and what does it represent?

_____

_____

(F)   What is the slope for this linear function, and what does it represent?

_____

_____

Reflect

1. **Discussion** Use the function rule to show that the units for $C(t)$ are points.

    _____

2. **Critical Thinking** What types of number are appropriate for the domain of $C(t)$?

    _____

    _____

3. Using inequalities, express the restrictions on the range of $C(t)$.

    _____

🔑 Explain   Creating and Interpreting Linear Models

You can create linear equations and inequalities to model some real-world situations.

Example   **Given the real-world situation, solve the problem.**

Fundraising The Band Booster Club is selling T-shirts and blanket wraps to raise money for a trip. The band director has asked the club to raise at least $1000.

The booster club president wants to know how many T-shirts and how many blanket wraps the club needs to sell to meet their goal of $1000. The T-shirts cost $10 each, and the blanket wraps cost $25 each. Write a linear equation that describes the problem, and then graph the linear equation. How can the booster club president use the sales price of each item to meet the goal?

🧩 Analyze Information

Identify the important information.

- T-shirts cost $_____ each.

- Blanket wraps cost $_____ each.

- The booster club needs to raise a total of $_____ .

🧩 Formulate a Plan

The total amount of revenue earned by selling T-shirts is $_____ t. The total amount

of revenue earned from selling blanket wraps is $_____ b. These two results can be

added and set equal to the sales goal to find the number of T-shirts and blanket

wraps that need to be sold to reach $_____ . Graph this function to find all of the

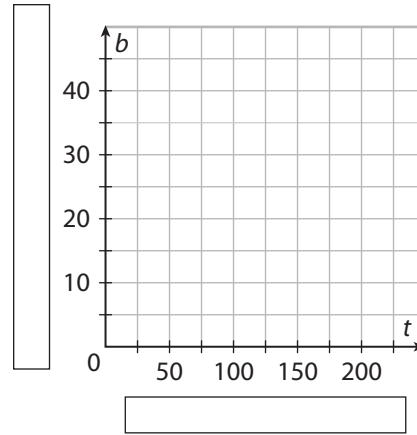possible combinations of T-shirts and blanket wraps sold to reach $_____ .

🧩 Solve

Write a linear equation for the sales goal.

$$\boxed{}\, b + \boxed{}\, t = \boxed{}$$

Calculate three pairs of values for t and b, and graph a line through those points to find possible solutions. Be sure to label the graph.

| t	b
0	
50	
	0

Justify and Evaluate

The x-intercept represents the number of _____ that need to be sold if no _____

are sold. The y-intercept represents the number of _____ to be sold if no _____

are sold. The booster club president can use the _____ to find the possible combinations

of T-shirts and blankets to reach $_____.

Reflect

4. **Critical Thinking** Technically, the graph of possible combinations of T-shirts and blanket wraps that reach the goal of $1000 should be discrete, but for convenience the graph is shown as a connected line. Explain why the solutions to this problem would be only the points on the line that have whole-number coordinates.

_____

_____

Your Turn

5. **Business** A sandwich shop sell sandwiches for $5 each and bottles of water for $1 each. The owner of this shop needs to earn a total of $100 by the end of the day. Write a linear equation that describes the problem; then graph the linear equation. Make sure to label both axes with appropriate titles. Then use the graph to determine how many sandwiches the shop must sell if no waters are sold.
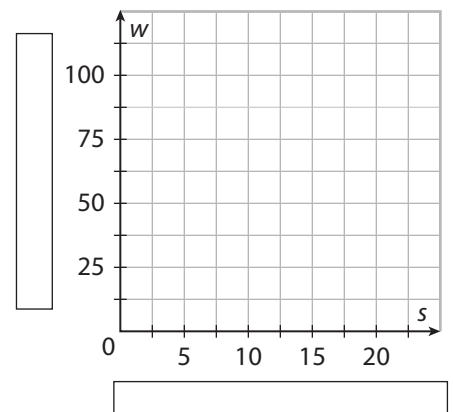
6. How can the graph of a linear function be used to find answers to a real-world problem?

_____

7. **Essential Question Check-In** What is the first step when modeling linear relationships given limited information?

_____

⭐ Evaluate: Homework and Practice

Food A baker sells bread for $3 a loaf and rolls for $1 each. The baker needs to sell $24 worth of baked goods by the end of the day.

1. Write a linear equation that describes the problem.

2. Graph the linear equation. Make sure to label both axes with appropriate titles.

3. Use the graph to approximate how many loaves of bread the baker must sell if 12 rolls are sold.
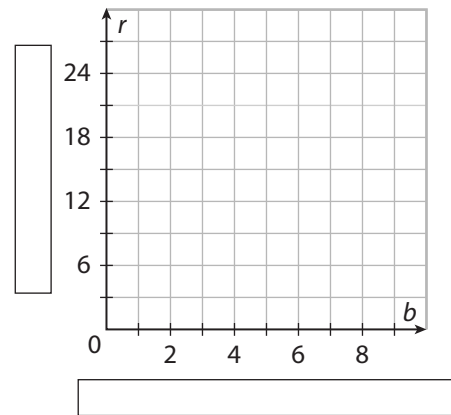
Charity A local charity is selling seats to a baseball game. Seats cost $20 each, and snacks cost an additional $5 each. The charity needs to raise $400 to consider this event a success.

4. Write a linear equation that describes the problem.

5. Graph the linear equation. Make sure to label both axes with appropriate titles.

6. Use the graph to approximate how many snacks the charity must sell if 10 seats are sold.
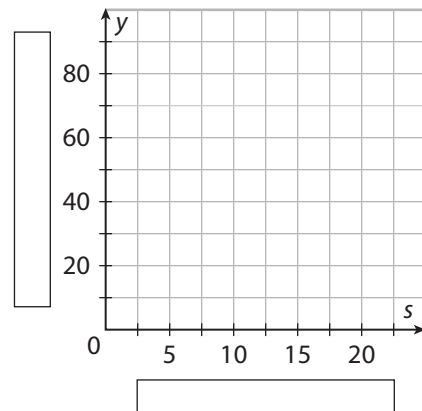
Movies A movie theater sells tickets to a new show for $10 each. The theater also sells small containers of popcorn for $6 each. The theater needs to make $3000 in order to break even on the show.

7. Write a linear equation that describes the problem.

8. Graph the linear equation. Make sure to label both axes with appropriate titles.

9. Use the graph to approximate how many buckets of popcorn must the movie theater must sell if it sells 210 movie tickets.
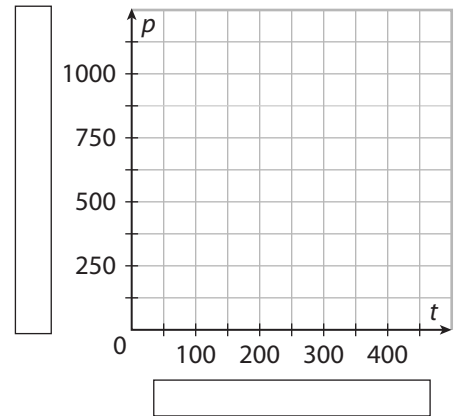

Sports A golf course charges $18 for a package including the full 18-hole course. The course also sells buckets of golf balls for $20 each. The golf course would like to earn $400 by the end of the day.

10. Write a linear equation that describes the problem.

11. Graph the linear equation. Make sure to label both axes with appropriate titles.

12. Use the graph to approximate how many buckets of balls the golf course must sell if it sells 10 course packages.
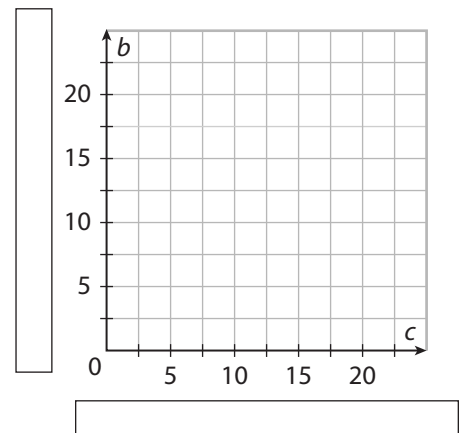
Reading A bookstore sells textbooks for $80 each and notebooks for $4 each. The bookstore would like to sell $800 in merchandise by the end of the week.

13. Write a linear equation that describes the problem.

14. Graph the linear equation. Make sure to label both axes with appropriate titles.

**15.** Use the graph to approximate how many textbooks the bookstore must sell if it sells 40 notebooks.
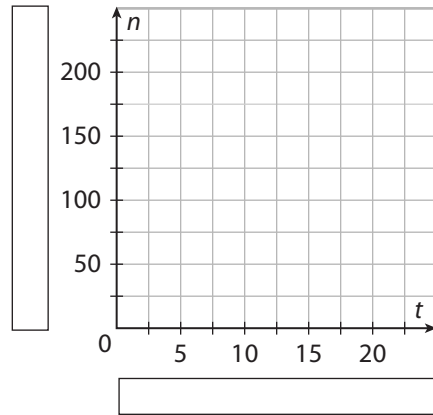
Fitness A gym is selling monthly memberships for $30 each and reusable water bottles for $7 each. The gym needs to make $1050 by the end of the month.

16. Write a linear equation that describes the problem.

17. Graph the linear equation. Make sure to label both axes with appropriate titles.

18. Use the graph to approximate the number of water bottles that the gym must sell if it sells 28 gym memberships.
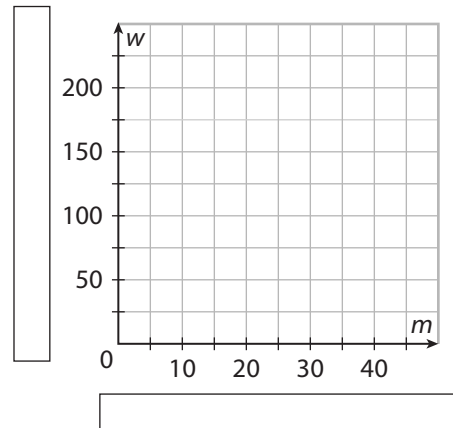
A shoe store offers a frequent-buyers card. Each transaction is worth 8 points, and customers automatically earn 20 points when they sign up.

19. The value of the card is a function of the number of transactions. What are the units for a card?

20. Complete the verbal model for the transaction function. Include units.

Card Value $=$ Initial Value $+$ [   ] $\cdot$ [   ]
(points)   (points)

21. Write the function rule for the transaction function.

$N(p) = $ [ ] $+$ [ ] p

In graphing the function, _____ would be the slope and _____ would be the y-intercept.

22. In each equation of the form $ax + by = c$, state a, b, and c.

$y = 2$

$3x = 0$

$3x + 2y = 6$

$5x - y = 1$

$4y + 2x = 3$

H.O.T. Focus on Higher Order Thinking

23. Critical Thinking Suppose that you were given the graph of a monthly revenue function that is a linear relationship and are asked to interpret a point. What would it mean if the point were located on the graph, two units to the right of the origin and slightly above the y-intercept?

24. Represent Real-World Problems Describe a situation not used in the lesson that is best described by a linear relationship.

25. Explain the Error Consider the following situation. Lacie pays a babysitter an initial fee of $35 in addition to $6 per hour.
When trying to model this situation, Juan created the function $y = 35x + 6$.
Explain his error.

Lesson Performance Task

A computer store sells both tablets and laptops. One brand of tablet costs $200. That same brand of laptop costs $400. The store manager wants to sell enough of this brand of tablets and laptops to reach the sales goal of $20,000.

a. Write an equation that models the situation. Then graph the equation.

b. Interpret the x- and y-intercepts.

c. Will the store manger meet her goal if the sales team sells 45 tablets and 25 laptops? If so, explain. If not, find how many more tablets need to be sold to meet the goal.

d. Will the store manager meet her goal if the sales team sells 80 tablets and 10 laptops? If so, explain. If not, find how many more tablets need to be sold to meet the goal.
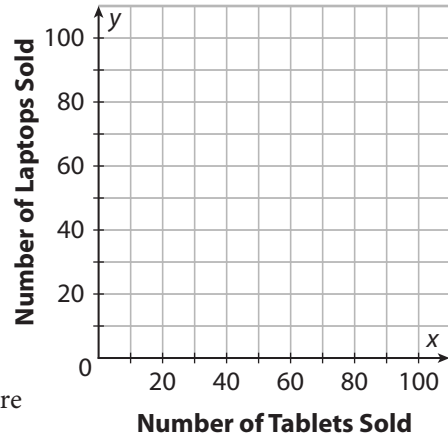
7.2 Using Functions to Solve One-Variable Equations

Essential Question: How can you use functions to solve one-variable equations?

⊘ Explore   Creating Functions to Solve One-Variable Equations

Finance Susan wants to hire a babysitter for this weekend for her 3 children. She has two choices. Babysitter A charges $10 per child and $5 per hour. Babysitter B charges $15 per child and $2 per hour. When will they charge the same amount of money?

Ⓐ Write and solve a one-variable equation to find the number of hours for which the two babysitters will charge the same amount of money. Let x represent the number of hours.

Ⓑ Write a function for each babysitting service. Enter the two functions in a graphing calculator. Use the graphing calculator to compare their tables and find the intersection point of their graphs.

x	$f(x) = y_1$	$g(x) = y_2$
0		
1		
2		
3		
4		
5		
6		
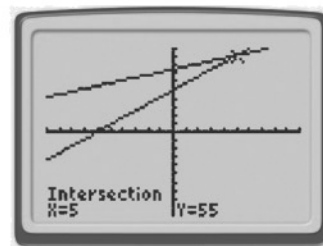
Intersection
X=5   Y=55

1. **Discussion** Why are the x-coordinates of the points where the graphs of the equations $f(x) = y_1$ and $g(x) = y_2$ intersect the solutions of the equation $f(x) = g(x)$.

    _____

    _____

    _____

2. **Discussion** How should the graph provided by the graphing calculator be changed to make the graph an accurate representation of this situation?

    _____

    _____

    _____

Explain 1 Using Intersections to Determine Approximate Solutions of One-Variable Equations

You can use tables and graphs of the functions $y_1 = f(x)$ and $y_2 = g(x)$ to solve an equation of the form $f(x) = g(x)$.

**Use a table and a graphing calculator to estimate the solution.**

Example 1

(A) John needs to hire a painter. Painter A is offering his services for an initial $175 in addition to $14.25 per hour. Painter B is offering her services for an initial $200 in addition to $11 per hour. For what number of hours will the two painters charge the same amount of money?

$f(x) = 250 + 4x$
$g(x) = 200 + 11x$

x	f(x)	g(x)
0	175	200
1	189.25	211
2	203.5	222
3	217.75	233
4	232	244
5	246.25	255
6	260.5	266
7	274.75	277
8	289	288

Intersection
X=7.6923077 _Y=284.61538 _
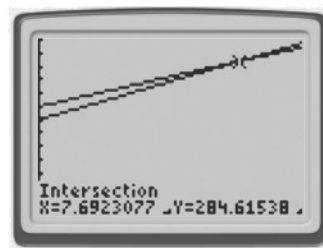
From the table, the solution must be between 7 and 8 hours.

Based on the intersection point in the graph, the solution is approximately 7.7 hours.

B Georgia is in need of an electrician. Electrician A is offering his services for an initial fee of $125 in addition to $45 per hour. Electrician B is offering her services for an initial fee of $150 in addition to $38 per hour. For what number of hours will the two electricians charge the same amount of money?

$f(x) =$ _____ $g(x) =$ _____

x	f(x)	g(x)
0		
1		
2		
3		
4		
5		
6		

Intersection
X=3.5714286 Y=285.71429
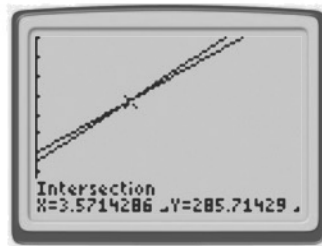
From the table, the solution must be between _____ and _____ hours. From the graph, the solution is about 3.6 hours.

Reflect

3. What limitations, if any, exist on the range of the functions?

_____

_____

4. Why is using a graph better than using a table when finding the solution to two one-variable equations?

_____

_____

_____

Your Turn

5. Sarah would like to hire a clown for her daughter's birthday party. Clown A is offering his services for an initial fee of $100 in addition to $11 per hour. Clown B is offering her services for an initial $150 fee in addition to $8 per hour. When will the two clowns charge the same amount of money? Use a table and a graphing calculator to estimate the solution.

Using Intercepts to Determine Approximate Solutions for One-Variable Equations

Use a table to estimate the solution to the given situation. Then use a graphing calculator to approximate the x-intercept.

When the amount in a bank account is less than the amount of the payment due, an automatic payment would overdraw the account. That is, the value of the account would be less than zero. In discrete situations like the ones described in the examples, there is no actual point at which the value of the account would be zero, unless the amount in the account is a multiple of the monthly payment. However, you can use the related continuous functions to make an estimation of when the account would theoretically reach zero.
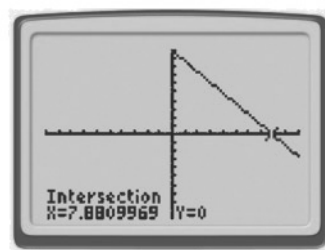
Example 2

(A) Tara has $800 in a bank account that she uses to make automatic payments of her $101.51 monthly cable bill. If Tara stops making deposits to that account, when would automatic payments make the value of the account zero?

The function that describes the amount in the account after x automatic payments is $f(x) = 800 - 101.51x$

The other function that describes the situation is $g(x) = 0$

Intersection
X=7.8809969 Y=0

x	0	1	2	3	4	5	6	7	8
f(x)	800	698.49	596.98	495.47	393.96	292.45	190.94	89.43	−12.08
g(x)	0	0	0	0	0	0	0	0	0

 From the table, the value of the account would be 0 between 7 and 8 months. From the graph, the x-intercept is about 7.9.

(B) Craig has $1850 dollars in a bank account that he uses to make automatic payments on his $400.73 car loan. If Craig stops making deposits to that account, when would automatic payments make the value of the account zero?

The function that describes the amount in the account after x automatic payments is

$f(x) =$ _____ − _____ x.

The other function that describes the situation is $g(x) =$ _____.

x	f(x)	g(x)
0		
1		
2		
3		
4		
5		

As illustrated in the table above, Craig will run out of money between _____ and _____ months. Based on the x-intercept in the graph, his bank account will reach zero in _____ months.

6. How are the examples in this section similar to the examples in the previous section?

_____

_____

7. **Discussion** Name one way to better approximate the solution without the use of technology.

_____

_____

Your Turn

8. Cassandra has $2000 dollars in a bank account that she uses to make automatic $900.01 mortgage payments each month. If Cassandra stops making deposits to that account, when would automatic payments make the value of the account zero? Use a table to estimate the solution. Then use a graphing calculator to approximate the x-intercept.

💬 Elaborate

9. Throe would like to hire a guitarist for his charity concert. Guitarists A and B are offering their services to Throe but each guitarist charges different initial fees and hourly rates. How can Throe check to see when they will charge the same amount of money? Name three ways to perform this task.

_____

_____

_____

10. **Essential Question Check-In** What is the first step in using functions to solve one-variable equations?

_____

_____

_____

_____

⭐ Evaluate: Homework and Practice

Personal
Math
Trainer

• Online Homework
• Hints and Help
• Extra Practice

Use a table to find the solution to each situation.

1. Bridget needs an actor. Actor A is offering her services for an initial $250 in addition to $50 per day. Actor B is offering her services for an initial $200 in addition to $60 per day. When will the two actors charge the same amount of money?

2. Yuma needs a singer. Singer A is offering her services for an initial $50 in addition to $20 per hour. Singer B is offering his services for an initial $100 in addition to $10 per hour. When will the two singers charge the same amount of money?

3. Sam needs a web designer. Designer A is offering her services for an initial $500 in addition to $100 per hour. Designer B is offering her services for an initial $600 in addition to $50 per hour. When will the two designers charge the same amount of money?

4. Lindsey needs a jeweler to repair her earrings. Jeweler A is offering her services for an initial $125 in addition to $15 per hour. Jeweler B is offering his services for an initial $140 in addition to $12 per hour. When will the two jewelers charge the same amount of money?

5. Stan needs a mime. Mime A is offering his services for an initial $75 in addition to $25 per hour. Mime B is offering her services for an initial $30 in addition to $40 per hour. When will the two mimes charge the same amount of money?
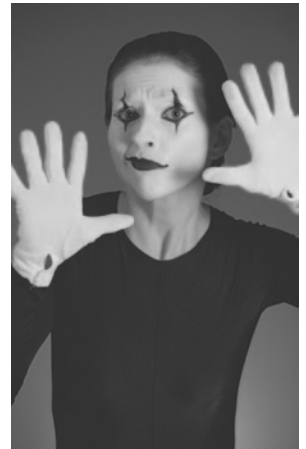
6. Lottie needs a driver. Driver A is offering his services for an initial $200 in addition to $80 per hour. Driver B is offering his services for an initial $230 in addition to $70 per hour. When will the two drivers charge the same amount of money?

7. Garrett needs a baseball coach. Coach A is offering her services for an initial $5000 in addition to $450 per hour. Coach B is offering her services for an initial $4000 in addition to $700 per hour. When will the two coaches charge the same amount of money?

8. Zena needs a salesperson. Salesperson A is offering his services for an initial $50 in addition to $5 per hour. Salesperson B is offering her services for $15 per hour. When will the two salespeople charge the same amount of money?

In Exercises 9–14, each person uses the given bank account to make automatic monthly payments and stops making deposits to the account. Use a table to find when automatic payments would make the value of the account zero.

9. Charles has $1600 dollars in his account and makes automatic $400 monthly payments on a utility bill.

10. Lena has $2800 dollars in her account and makes automatic $700 monthly payments on a cell phone bill.

11. Malcolm has $3600 dollars in his account and makes automatic $600 monthly mortgage payments.

12. Isabelle has $4900 dollars in her account and makes automatic $700 monthly payments on a home loan.

13. Larry's small business has $60,000 dollars in its account and makes automatic monthly payments that total $12,000.

14. Sharon has $12,000 dollars in her account and makes automatic monthly payments that total $6000.

Use a graphing calculator to find the solution to each situation.

15. Aaron needs to hire a waiter. Waiter A is offering his services for an initial $25 in addition to $5.25 per hour. Waitress B is offering her services for an initial $30 in addition to $4.25 per hour. When will the two waiters charge the same amount of money?

16. **Finance** Lucy needs to hire a host. Host A is offering his services for an initial $60 in addition to $13.25 per hour. Hostess B is offering her services for an initial $75 in addition to $11.50 per hour. When will the two hosts charge the same amount of money?

17. Ida needs to hire a singer for her wedding. Singer A is offering his services for an initial $90 in addition to $13.15 per hour. Singer B is offering her services for an initial $100 in addition to $11.85 per hour. When will the two singers charge the same amount of money?

18. Emily needs to hire a pilot. Pilot A is offering his services for an initial $32 in addition to $22.18 per hour. Pilot B is offering her services for an initial $46.75 in addition to $18.24 per hour. When will the two pilots charge the same amount of money?

In Exercises 19–22, each person uses the given bank account to make automatic monthly payments and stops making deposits to the account. Use a graphing calculator to approximate the *x*-intercept of the point where the value of the account would be zero.

19. Rafael has $1875 in his account. and makes automatic monthly payments of $225.18 for a smartphone service plan.

20. Zach has $43,408 dollars in his account. and makes automatic monthly rent payments of $4500.

21. Rebecca has $326.74 dollars in her account. and makes automatic monthly payments of $113.51 for bike rental.

22. Greg has $1464.54 in his account and makes automatic monthly payments of $321.46 for a car loan.

23. Given that $f(x)$ and $g(x)$ are equal, write a one-variable equation. No solutions need to be found for this problem.

   a. $f(x) = 45x + 12$, $g(x) = 244x + 234$

   b. $f(x) = 13x + 48$, $g(x) = 24x + 47$

   c. $f(x) = 71x + 145$, $g(x) = 43x + 17$

   d. $f(x) = 8x + 11$, $g(x) = 55x + 123$

H.O.T. Focus on Higher Order Thinking

24. Critical Thinking Given a table of values for a one-variable linear equation, how can $f(x)$ be found?

25. Communicate Mathematical Ideas In a real-world problem one variable is solved with a graphing calculator. What quadrants of the graph are never used for the problem?

26. Explain the Error A student was trying to solve a problem and came up with this table as a result:

Time (Weeks)	Profit($)
1	200
2	500
3	800
4	1100
5	1400
6	1700
7	2000
8	2300
9	2600

The student stated that the range of this function is all real numbers. What is wrong with the student's answer?

Lesson Performance Task

Laura wants to hire a lawyer to file deeds for some properties she owns. The graph illustrates costs for her two choices of lawyers. Using the points on the graph, construct a table of results and two one-variable equations. Which lawyer is a better choice for her if she has 8 deeds? Which lawyer is a better choice if she has 2 deeds? Why? Over the long run, which lawyer is more cost-effective?
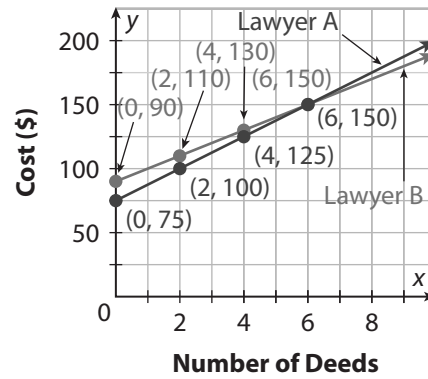
7.3 Linear Inequalities in Two Variables

Essential Question: How do you write and graph linear inequalities in two variables?

Resource
Locker

⊘ Explore   Graphing Linear Inequalities Involving ≤ or ≥

A **linear inequality in two variables** can be written in one of the following forms: $Ax + By < C$, $Ax + By \leq C$, $Ax + By \geq C$, or $Ax + By > C$, where $A, B,$ and C are constants and A and B are not both 0. The **solution of an inequality in two variables** is one or more ordered pairs that make the inequality true.

Some students at a music recital perform 3-minute pieces and some perform 5-minute pieces. The total time of this part of the recital needs to be at least 30 minutes long. An inequality that represents this is $3x + 5y \geq 30$.

Ⓐ   Solve the inequality for y.

Ⓒ   Graph the boundary line. The inequality $y \geq -\frac{3}{5}x + 6$ uses the symbol $\geq$, so the line will be solid, to show that the points on the boundary line are part of the solution set.

Ⓑ   Replace the inequality symbol in the inequality with an equal sign. The inequality is now an equation that will be used to graph a line. The line is called the **boundary line** of the solution set of the inequality. Write the equation of the line.

Ⓓ   The part of the coordinate plane containing the solution set to the inequality, which may include the line, is called a **half-plane**. Since the inequality symbol is $\geq$, two conditions must be met. (1) The boundary line is solid, and (2) the half-plane above the boundary line is shaded. Shade the appropriate part of the graph.
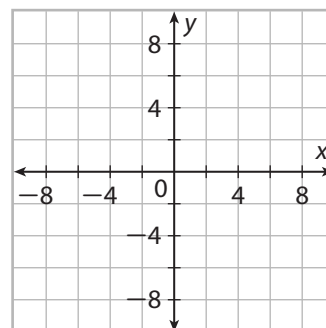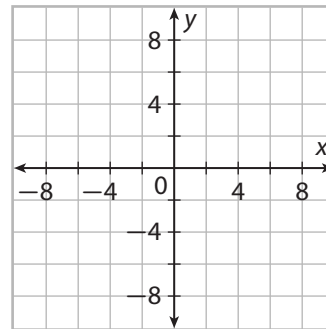
Check the solution by filling in the table.

Point	Above or Below Line	Inequality	True or False?
$(0, 0)$		$3\left(\boxed{}\right) + 5\left(\boxed{}\right) \geq 30$	
$(8, 8)$		$3\left(\boxed{}\right) + 5\left(\boxed{}\right) \geq 30$	

Reflect

1. **Discussion** How would the graph change if the inequality were $>$ instead of $\geq$?

✏ Explain 1 Graphing Linear Inequalities Involving < or >

Example 1 Graph the solution set for the given inequality using the method given.

(A) Graph $21 - 3y < 9x$ using a graphing calculator.

Solve the inequality for y.

$21 - 3y < 9x$

$-3y < 9x - 21$

$y > -3x + 7$

Enter the equation into Y_1 in the graphing calculator.

Go to the far left and hit enter two times until it looks like this.

Now view the graph. Note that the calculator will draw a solid line. Determine whether the line should be solid or not.
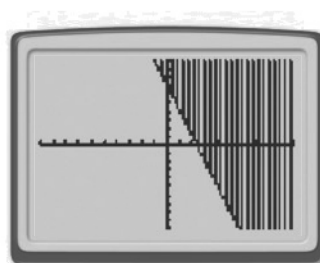
Since the inequality is strictly greater than, the line should be dashed.

(B) Graph $-14 + 2y < -x$ by hand.

Solve the inequality for y.

$$-14 + 2y < -x$$

$$+ 2y < -x + \boxed{}$$

$$y < \frac{-x + \boxed{}}{\boxed{}}$$

$$y < -\boxed{}\, x + \boxed{}$$

Graph the boundary line. The inequality uses the symbol _____, so use a _____ line to show that points on the line _____ part of the solution.
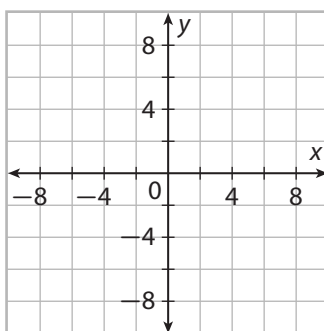
Shade the appropriate part of the graph. The inequality uses the symbol _____, so shade _____ the boundary line.
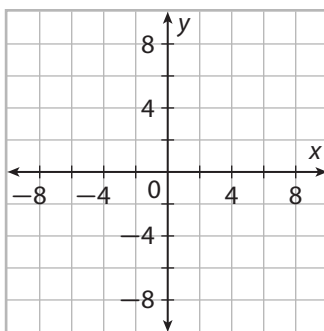
Check the solution by filling in the table.

Point	Above or Below Line	Inequality	True or False?
$(0, 0)$		$-14 + 2\left(\boxed{}\right) < -\left(\boxed{}\right)$	
$(8, 8)$		$-14 + 2\left(\boxed{}\right) < -\left(\boxed{}\right)$	

2. Is $(6, 4)$ part of the solution?

_____

Your Turn

Graph the inequality.

3. $3 - y < -5x$
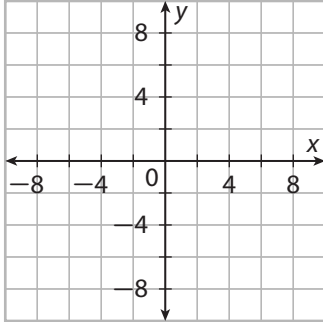
4. $10x + 8y < 64$
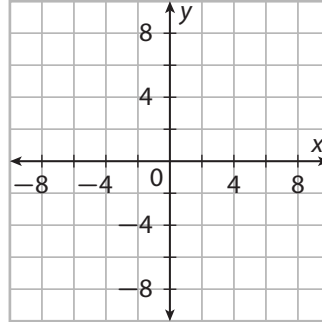
🎤 **Explain 2** **Creating Models with Linear Inequalities**

Example 2 **Write a linear inequality to represent the information or graph given.**

Ⓐ Elijah can spend at most $8.25 on snacks for a party. Carrots cost $2.00 per package and grapes cost $0.75 per bag.

Write a linear inequality to describe the situation.

Let x represent the number of packages of carrots and let y represent the number of bags of grapes.

Use $\leq$ for "at most".

Total cost of carrots	Plus	Total cost of grapes	is at most	$8.25
$2x$	$+$	$0.75y$	$\leq$	8.25

Solve the inequality for y.

$2x + 0.75y \leq 8.25$

$0.75y \leq -2x + 8.25$

$y \leq -\dfrac{8}{3}x + 11$

(B)

The slope of the line is _____.

The y-intercept of the line is _____.

The boundary line is $y =$ [____].

The boundary line on the graph is _____ and the shaded

region is _____ the graph so the symbol

will be _____.

So the inequality is [_____].
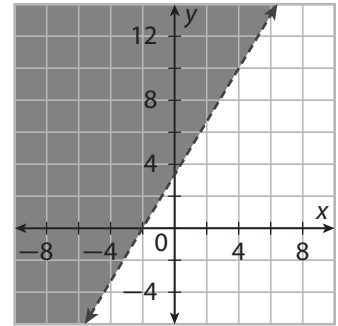
Your Turn

5. Complete the linear inequality that represents the relationship shown in the table: y [___] $2x$

x	y
−3	−8
−2	−10
−1	−2.5
0	0
1	1
2	4
3	0

6. Ramona has $18 that she can spend on food for her dog. Dry dog food costs $5.50 per small bag and wet dog food costs $2.00 per can. Write a linear inequality that describes how many bags and cans of dog food Ramona can buy.

7. Describe a real-world problem situation that can be represented by a linear inequality in two variables. Write an inequality and explain what each part means. Are there any solutions of the solution set that are not solutions to the problem?

_____

_____

_____

_____

_____

_____

8. How can you tell which side of the boundary line should be shaded?

_____

_____

_____

9. **Essential Question Check-In** How do you graph a linear inequality in two variables?

_____

_____

_____

_____

_____

In order to graph the inequality using a graphing calculator, tell what function to enter for the boundary line, whether the graph should be shaded above or below the line, and if the boundary line is included in the solution.

1. $30 + 5y \geq 4x$

2. $-\frac{1}{2} + y \leq 6x$

3. $-\frac{1}{2}y \leq -\frac{3}{4}x + \frac{5}{4}$
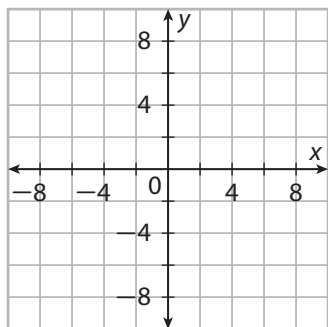
4. $-\frac{8}{3}x \geq y + 9$
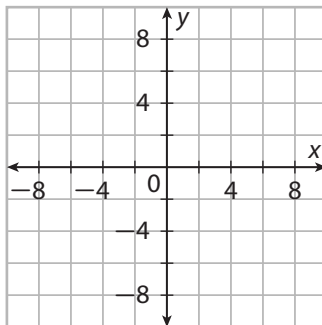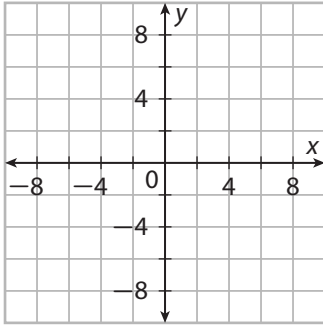
Graph the inequality.

5. $4x - 4y \geq 28$
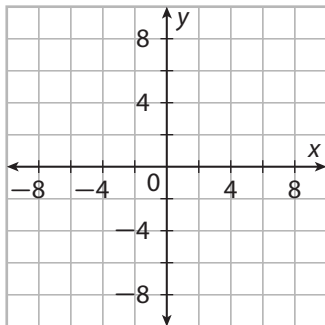
6. $3x + 2y \leq 12$
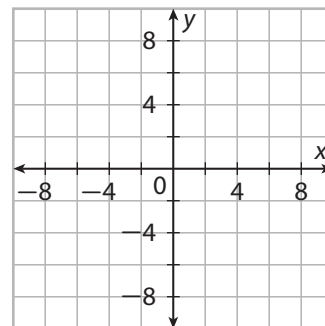
7. $y \leq 3$

8. $5x - y \geq 4$

In order to graph the inequality using a graphing calculator, tell what function to enter for the boundary line, whether the graph should be shaded above or below the line, and if the boundary line is included in the solution.

9. $x + 5y > 25$

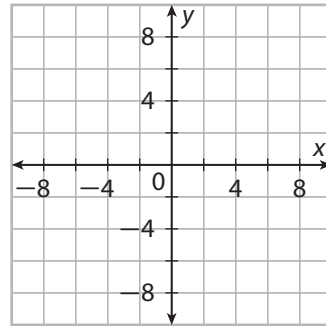**10.** $-x - 7y \geq 0$

11. $-\frac{9}{2}x - y \geq -10y + 3$

12. $15x + 20y < 140$
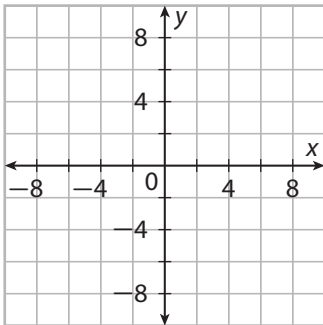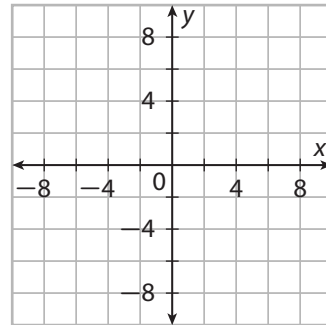
Graph the inequality.

13. $4y + 3x - y > -6x + 12$

14. $-15y > 30x - 45$

15. $10x - 6y > -36$


16. $7x + 2y < 2$

Write a linear inequality to represent the information or graph given.

17. Shanley would like to give $5 gift cards and $4 teddy bears as party favors. Shanley has $120 to spend on party favors. Write an inequality to find the number of gift cards x and teddy bears y Shanley could purchase. Give one solution to the inequality.

18. The total fees for the high school play are $250. Tickets to the play cost $5 for students and $8 for nonstudents. Write a linear inequality that describes the number of student and nonstudent tickets that need to be sold for the drama class to be able to pay the fees.

19.

20.
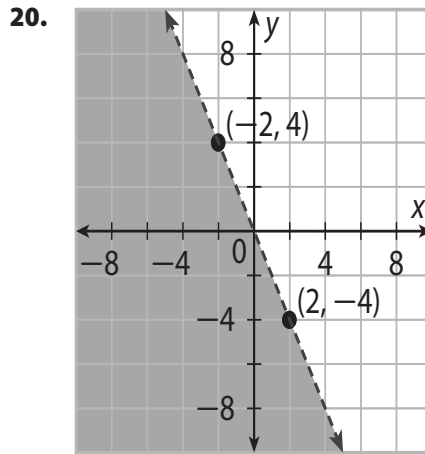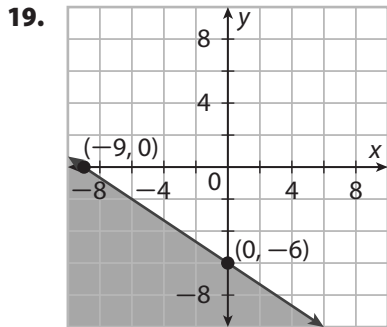
21. Complete the linear inequality that represents the relationship shown in the table:

$$y \boxed{} x + 1$$

x	y
−3	0
−2	−1
−1	5
0	1
1	3
2	4
3	4

22. Complete the linear inequality that represents the relationship shown in the table:

$$y \boxed{} 3x - \frac{1}{2}$$

x	y
−3	−10.5
−2	−7
−1	−4
0	−1
1	1
2	5
3	7.5

23. Critique Reasoning Austin thinks that the inequality $6x - 4y \geq 10$ should be shaded above the boundary line because it uses the $\geq$ inequality symbol. Is he correct? Explain.

24. Analyze Relationships For the graph of $x > 10$, the boundary line is the vertical line $x = 10$. Would you shade to the left or right of the boundary? Explain.

25. Multi-step The fare for a taxi cab is $2.50 per passenger and $0.75 for each mile. A group of friends has $22.00 for cab fare.

   a. Write a linear inequality to represent how many miles, y, the group can travel if there are x people in the group.

   **b.** If there are 3 people in the group, how far can they travel by taxi? Show all work.

   c. If the group wants to travel 10 miles, what is the greatest number of passengers that can travel by taxi? Explain.

26. Communicate Mathematical Ideas How is graphing a linear inequality on a coordinate plane similar to graphing an inequality on a number line?

Lesson Performance Task

Students are raising money for a field trip by selling candles and soap. The candles cost $0.75 each and will be sold for $2.75, and the soap costs $1.50 per bar and will be sold for $4. The students need to raise at least $300 to cover their trip costs.

    a. Write an inequality that relates the number of candles c and the number of bars of soap s to the needed income.

    b. The wholesaler can supply no more than 100 bars of soap and no more than 130 candles. Graph the inequality from part a and the inequalities that represent the constraints. Graph the number of candles on the vertical axis.

Number of Bars of Soap
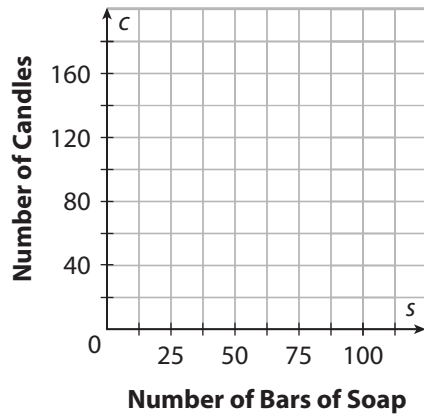
    c. What does the shaded area of your graph represent?