

Chapter 5 Pre-Algebra	Systems of Linear Equations
<p>MAFS.8.EE</p> <p>Expressions and Equations</p>	<p><u>MAFS.8.EE.3</u> Analyze and solve linear equations and pairs of simultaneous linear equations.</p> <p><u>MAFS.8.EE.3.8a</u> Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.</p> <p><u>MAFS.8.EE.3.8b</u> Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.</p> <p><u>MAFS.8.EE.3.8c</u> Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.</p>
<p>Essential Question</p>	<p>How can you solve a system of linear equations?</p> <p>In this lesson I am learning how to read mapping diagrams, so I can show the relationships between two data sets.</p>
<p>5.1</p> <p>Solving Systems of Linear Equations by Graphing</p>	<p>A system of linear equations is a set of two or more linear equations in the same variables. An example is shown below.</p> $y = x + 1 \quad \text{Equation 1}$ $y = 2x - 7 \quad \text{Equation 2}$ <p>A solution of a system of linear equations in two variables is an ordered pair that is a solution of each equation in the system. The solution of a system of linear equations is the point of intersection of the graphs of the equations.</p> <p>Solving a System of Linear Equations by Graphing</p> <p>Step 1: Graph each equation in the same coordinate plane.</p> <p>Step 2: Estimate the point of intersection.</p> <p>Step 3: Check the point from Step 2 by substituting for x and y in each equation of the original system.</p>
<p>Example 1</p> <p>Solving a System of Linear Equations by Graphing</p>	<p>Solve the system by graphing.</p> $y = 2x + 5$ $y = -4x - 1$
<p>On Your Own</p>	<p>Solve the system of linear equations by graphing.</p> <p>1. $y = x - 1$ $y = -x + 3$</p> <p>2. $y = -5x + 14$ $y = x - 10$</p> <p>3. $y = x$ $y = 2x + 1$</p>

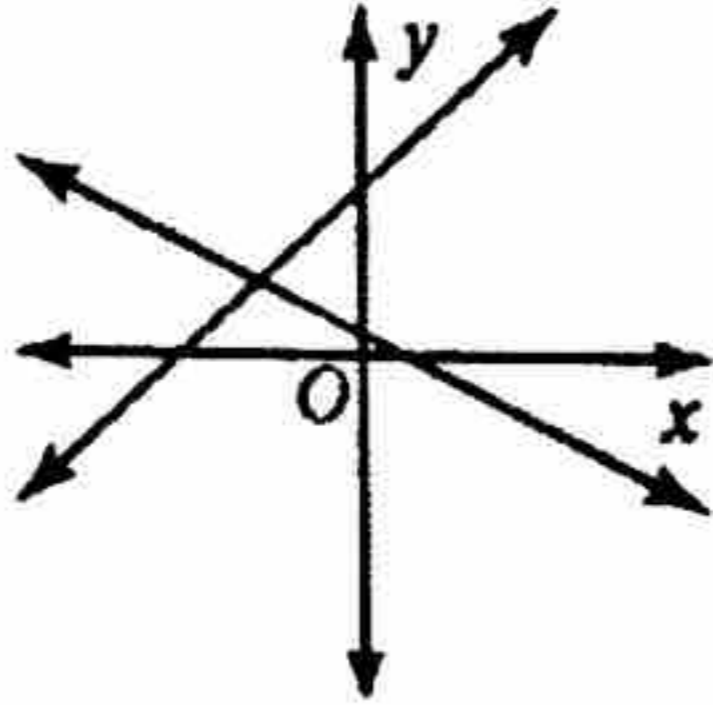
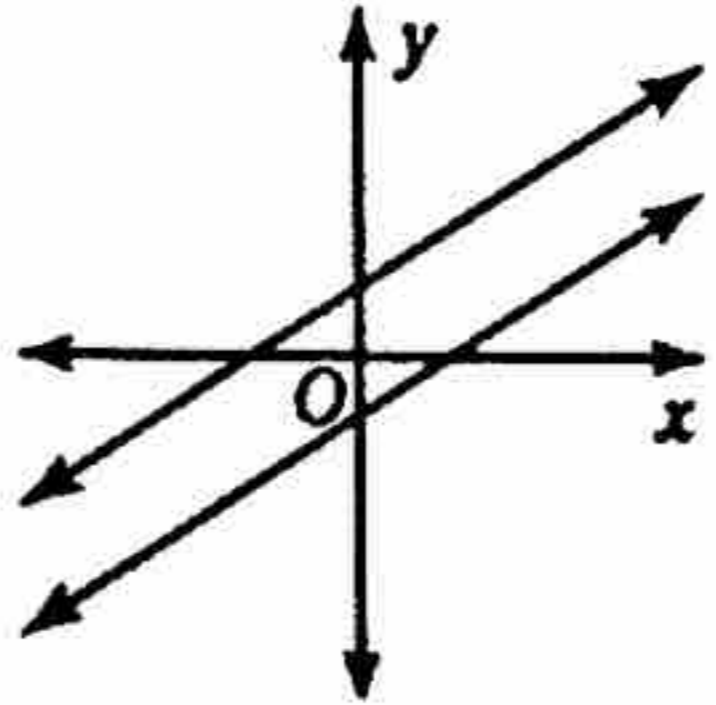
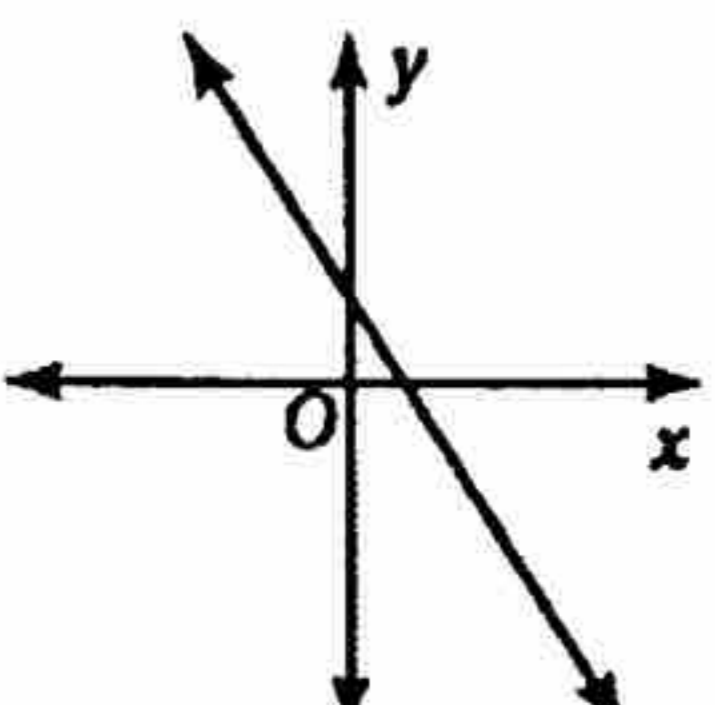
<p>Example 2 Real Life Application</p>	<p>A kicker on a football team scores 1 point for making an extra point and 3 points for making a field goal. The kicker makes a total of 8 extra points and field goals in a game and scores 12 points. Write and solve a system of linear equations to find the number x of extra points and the number y of field goals.</p>
<p>On Your Own</p>	<p>Solve the system of linear equations by graphing.</p> <p>4. $y = -4x - 7$ 5. $x - y = 5$ 6. $\frac{1}{2}x + y = -6$ $x + y = 2$ $-3x + y = -1$ $6x + 2y = 8$</p> <p>7. WHAT IF? The kicker makes a total of 7 extra points and field goals and scores 17 points. Write and solve a system of linear equations to find the numbers of extra points and field goals.</p>
<p>Essential Question</p>	<p>How can you use substitution to solve a system of linear equations?</p> <p>In this lesson I am learning how to use substitution, so I can solve systems of linear equations.</p>
<p>5.2 Solving Systems of Linear Equations by Substitution</p>	<p>Solving a System of Linear Equations by Substitution</p> <p>Step 1: Solve one of the equations for one of the variables.</p> <p>Step 2: Substitute the expression from Step 1 into the other equation and solve for the other variable.</p> <p>Step 3: Substitute the value from Step 2 into one of the original equations and solve.</p>
<p>Example 1 Solving a System of Linear Equations by Substitution</p>	<p>Solve the system by substitution.</p> <p>$y = 2x - 4$ $7x - 2y = 5$</p>

<p>On Your Own</p>	<p>Solve the system of linear equations by substitution. Check your solution.</p> <p>1. $y = 2x + 3$ $y = 5x$</p> <p>2. $4x + 2y = 0$ $y = \frac{1}{2}x - 5$</p> <p>3. $x = 5y + 3$ $2x + 4y = -1$</p>
<p>Example 2 Real Life Application</p>	<p>You buy a total of 50 turkey burgers and veggie burgers for \$90. You pay \$2 per turkey burger and \$1.50 per veggie burger. Write and solve a system of linear equations to find the number x of turkey burgers and the number y of veggie burgers you buy.</p>
<p>On Your Own</p>	<p>4. You sell lemonade for \$2 per cup and orange juice for \$3 per cup. You sell a total of 100 cups for \$240. Write and solve a system of linear equations to find the number of cups of lemonade and the number of cups of orange juice you sold.</p>

Essential Question	<p>How can you use elimination to solve a system of linear equations?</p> <p>In this lesson I am learning how to use elimination, so I can solve systems of linear equations.</p>			
5.3 Solving Systems of Linear Equations by Elimination	<p>Solving a System of Linear Equations by Elimination</p> <p>Step 1: Multiply, if necessary, one or both equations by a constant so at least 1 pair of like terms has the same or opposite coefficients.</p> <p>Step 2: Add or subtract the equations to eliminate one of the variables.</p> <p>Step 3: Solve the resulting equation for the remaining variable.</p> <p>Step 4: Substitute the value from Step 3 into one of the original equations and solve.</p>			
Example 1 Solving a System of Linear Equations by Elimination	<p>Solve the system by elimination.</p> $x + 3y = -2$ $x - 3y = 16$			
On Your Own	<p>Solve the system of linear equations by elimination. Check your solution.</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%; vertical-align: top;"> 1. $2x - y = 9$ $4x + y = 21$ </td> <td style="width: 33%; vertical-align: top;"> 2. $-5x + 2y = 13$ $5x + y = -1$ </td> <td style="width: 33%; vertical-align: top;"> 3. $3x + 4y = -6$ $7x + 4y = -14$ </td> </tr> </table>	1. $2x - y = 9$ $4x + y = 21$	2. $-5x + 2y = 13$ $5x + y = -1$	3. $3x + 4y = -6$ $7x + 4y = -14$
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Example 2 Solving a System of Linear Equations by Elimination	<p>Solve the system by elimination.</p> $-6x + 5y = 25$ $-2x - 4y = 14$			

<p>On Your Own</p>	<p>Solve the system of linear equations by elimination. Check your solution.</p> <p>4. $3x + y = 11$ $6x + 3y = 24$</p> <p>5. $4x - 5y = -19$ $-x - 2y = 8$</p> <p>6. $5y = 15 - 5x$ $y = -2x + 3$</p>										
<p>Example 3 Real-Life Application</p>	<p>You buy 8 hostas and 15 daylilies for \$193. Your friend buys 3 hostas and 12 daylilies for \$117. Write and solve a system of linear equations to find the cost of each daylily.</p>										
<p>On Your Own</p>	<p>7. A landscaper buys 4 peonies and 9 geraniums for \$190. Another landscaper buys 5 peonies and 6 geraniums for \$185. Write and solve a system of linear equations to find the cost of each peony.</p>										
<p>Summary</p>	<p>Methods for Solving Systems of Linear Equations</p> <table border="1"> <thead> <tr> <th>Method</th> <th>When to Use</th> </tr> </thead> <tbody> <tr> <td>Graphing (<i>Lesson 5.1</i>)</td> <td>To estimate solutions</td> </tr> <tr> <td>Substitution (<i>Lesson 5.2</i>)</td> <td>When one of the variables in one of the equations has a coefficient of 1 or -1</td> </tr> <tr> <td>Elimination (<i>Lesson 5.3</i>)</td> <td>When at least 1 pair of like terms has the same or opposite coefficients</td> </tr> <tr> <td>Elimination (Multiply First) (<i>Lesson 5.3</i>)</td> <td>When one of the variables cannot be eliminated by adding or subtracting the equations</td> </tr> </tbody> </table>	Method	When to Use	Graphing (<i>Lesson 5.1</i>)	To estimate solutions	Substitution (<i>Lesson 5.2</i>)	When one of the variables in one of the equations has a coefficient of 1 or -1	Elimination (<i>Lesson 5.3</i>)	When at least 1 pair of like terms has the same or opposite coefficients	Elimination (Multiply First) (<i>Lesson 5.3</i>)	When one of the variables cannot be eliminated by adding or subtracting the equations
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Essential Question	<p>Can a system of linear equations have no solution? Or infinitely many solutions?</p> <p>In this lesson I am solving systems of equations, so I can identify when they are no solution or infinitely many solutions.</p>
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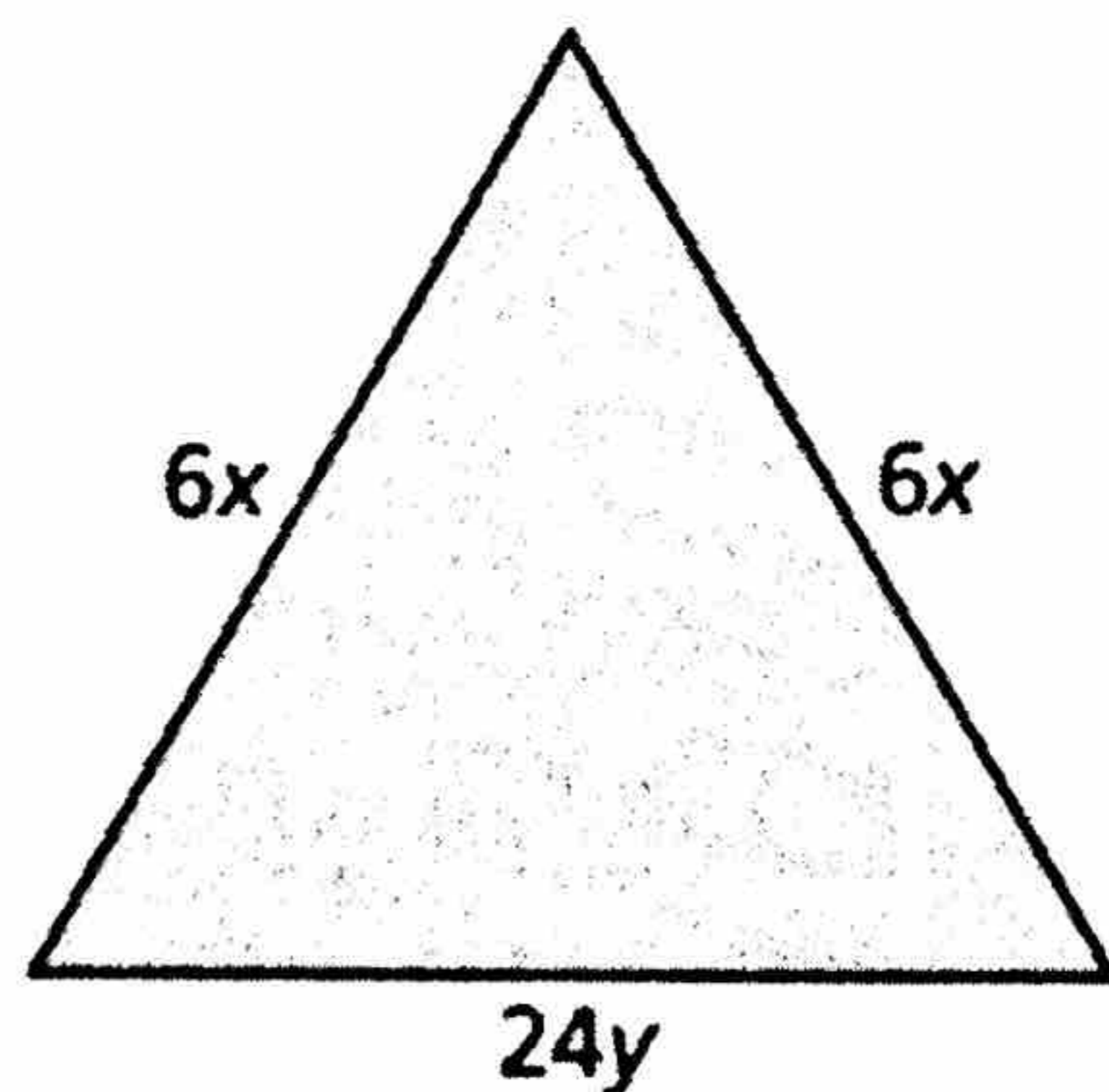
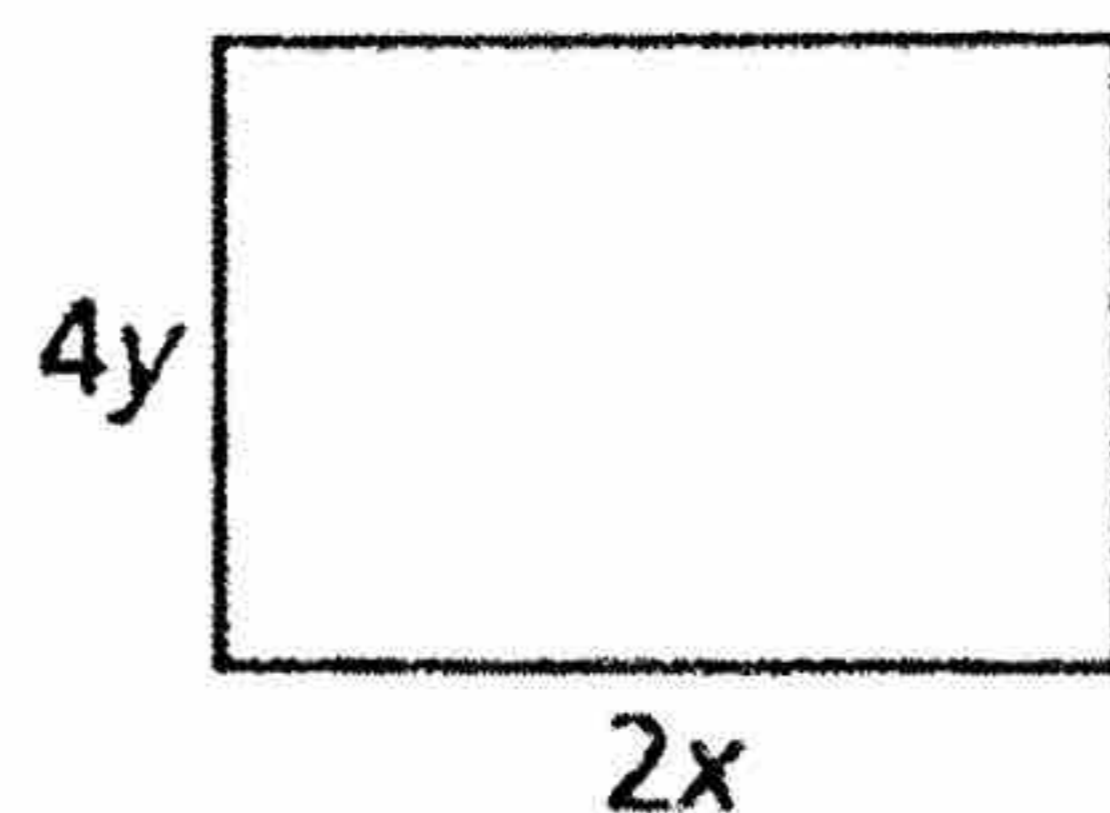
5.4 Solving Special Systems of Linear Equations	<p>Solutions of Systems of Linear Equations</p> <p>A system of linear equations can have <i>one solution</i>, <i>no solution</i>, or <i>infinitely many solutions</i>.</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>One solution The lines intersect.</p> </div> <div style="text-align: center;">  <p>No solution The lines are parallel.</p> </div> <div style="text-align: center;">  <p>Infinitely many solutions The lines are the same.</p> </div> </div>
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Example 1 Solving a System: No Solution	<p>Solve the system.</p> $y = 3x + 1$ $y = 3x - 3$
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On Your Own	<p>Solve the system of linear equations. Check your solution.</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>1. $y = -x + 3$ $y = -x + 5$</p> </div> <div style="width: 30%;"> <p>2. $y = -5x - 2$ $5x + y = 0$</p> </div> <div style="width: 30%;"> <p>3. $x = 2y + 10$ $2x + 3y = -1$</p> </div> </div>
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Example 2
Solving a
System:
Infinitely Many
Solutions

The perimeter of the rectangle is 36 units. The perimeter of the triangle is 108 units. Write and solve a system of linear equations to find the values of x and y .



On Your Own

Solve the system of linear equations. Check your solution.

4. $x + y = 3$

$x - y = -3$

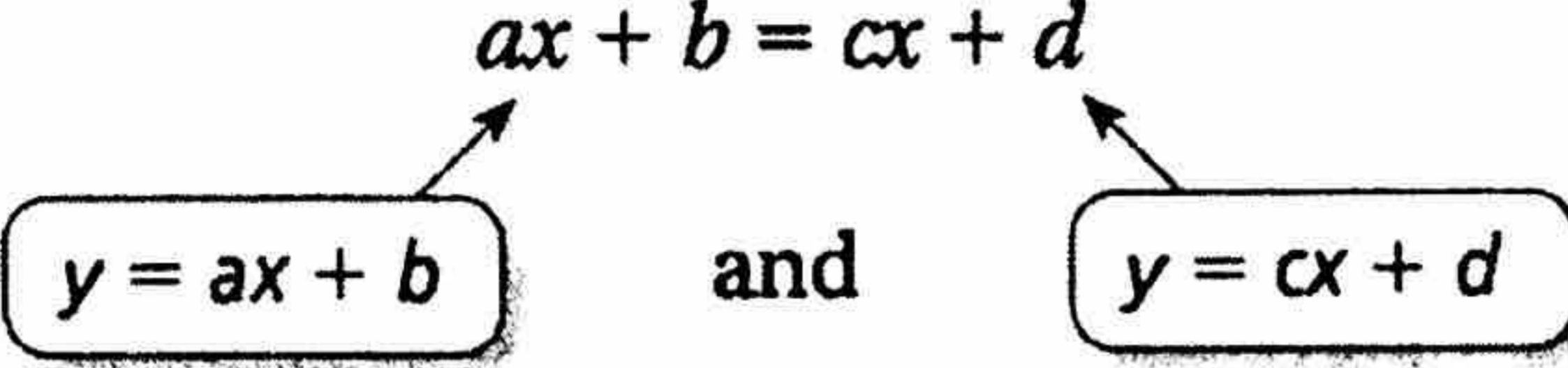
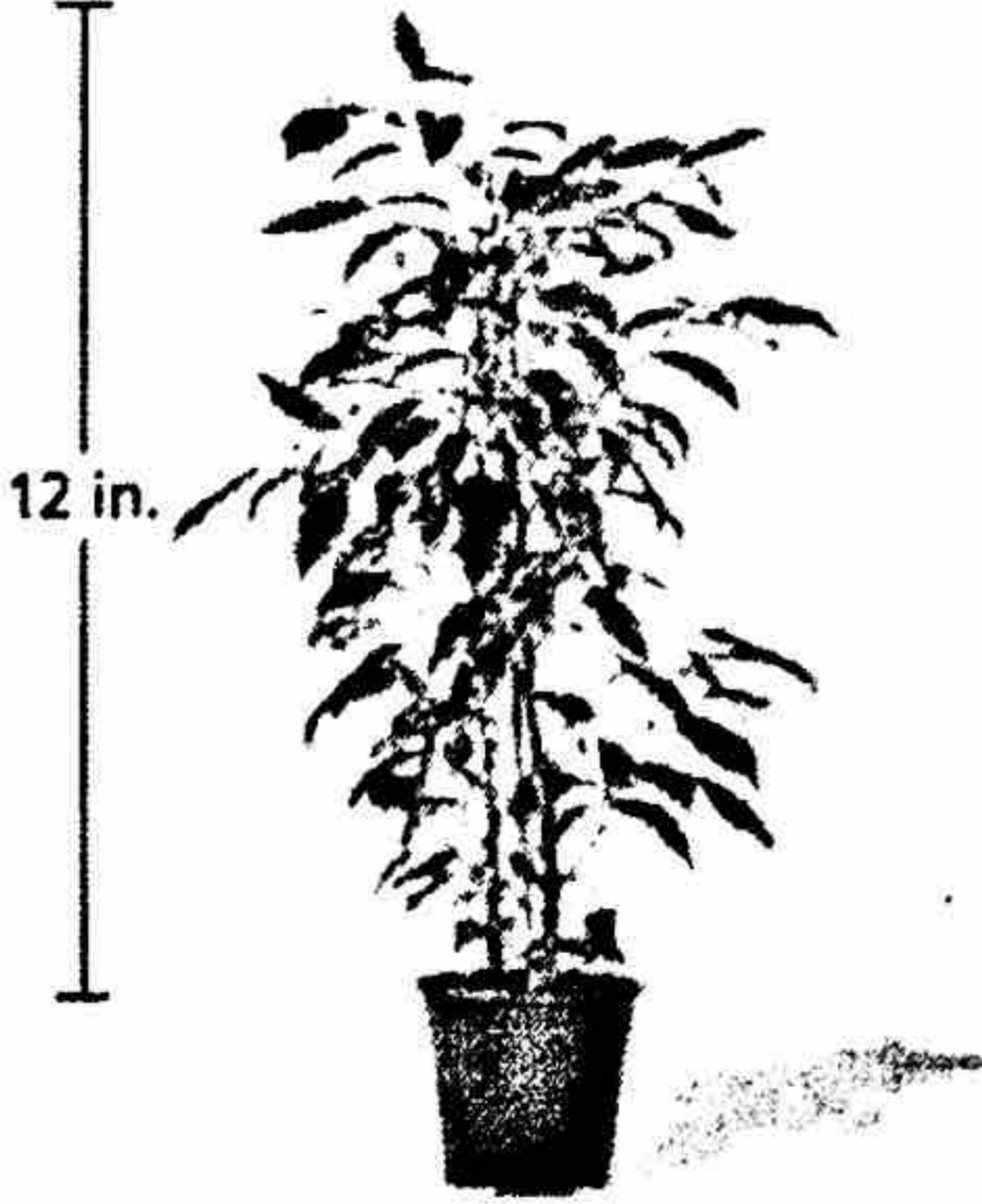
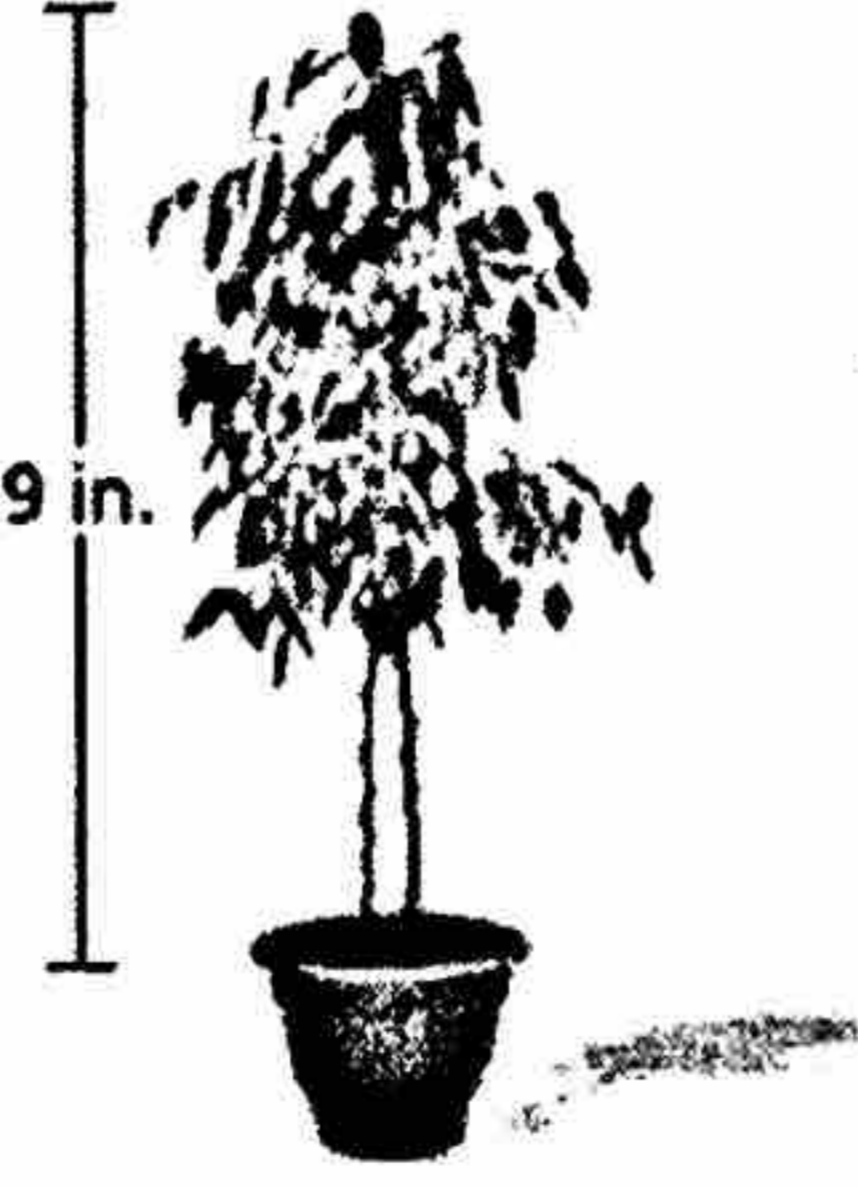
5. $2x + y = 5$

$4x + 2y = 0$

6. $2x - 4y = 10$

$-12x + 24y = -60$

7. **WHAT IF?** What happens to the solution in Example 2 if the perimeter of the rectangle is 54 units? Explain.

Essential Question	<p>How can you use a graph to represent relationships between quantities without using numbers?</p> <p>In this lesson I am learning about graphs, so I can represent relationships.</p>
5.4 ext.	<p>Solving Equations Using Graphs</p> <p>Step 1: To solve the equation $ax + b = cx + d$, write two linear equations.</p> <div style="text-align: center;"> $ax + b = cx + d$  </div> <p>Step 2: Graph the system of linear equations. The x-value of the solution of the system of linear equations is the solution of the equation $ax + b = cx + d$.</p>
Example 1 Solving an Equation Using a Graph	<p>Solve $x - 2 = -\frac{1}{2}x + 1$ using a graph. Check your solution.</p>
On Your Own	<p>Use a graph to solve the equation. Check your solution.</p> <p>1. $2x + 3 = 4$ 2. $2x = x - 3$ 3. $3x + 1 = 3x + 2$</p> <p>4. $\frac{1}{3}x = x + 8$ 5. $1.5x + 2 = 11 - 3x$ 6. $3 - 2x = -2x + 3$</p> <p>7. STRUCTURE Write an equation with variables on both sides that has no solution. How can you change the equation so that it has infinitely many solutions?</p>
Example 2 Real Life Application	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>Plant A</p>  <p>12 in.</p> </div> <div style="text-align: center;"> <p>Plant B</p>  <p>9 in.</p> </div> <div style="text-align: right;"> <p>Plant A grows 0.6 inch per month. Plant B grows twice as fast.</p> <p>a. Use the model to write an equation.</p> <p>b. After how many months x are the plants the same height?</p> </div> </div>
On Your Own	<p>Use a graph to solve the equation. Check your solution.</p> <p>8. $6x - 2 = x + 11$ 9. $\frac{4}{3}x - 1 = \frac{2}{3}x + 6$ 10. $1.75x = 2.25x + 10.25$</p> <p>11. WHAT IF? In Example 2, the growth rate of Plant A is 0.5 inch per month. After how many months x are the plants the same height?</p>

5.1 Exercises

Vocabulary and Concept Check

- VOCABULARY** Do the equations $4x - 3y = 5$ and $7y + 2x = -8$ form a system of linear equations? Explain.
- WRITING** What does it mean to solve a system of equations?
- WRITING** You graph a system of linear equations, and the solution appears to be $(3, 4)$. How can you verify that the solution is $(3, 4)$?

Practice and Problem Solving

Use a table to find the break-even point. Check your solution.

4. $C = 15x + 150$
 $R = 45x$

5. $C = 24x + 80$
 $R = 44x$

6. $C = 36x + 200$
 $R = 76x$

Match the system of linear equations with the corresponding graph.
Use the graph to estimate the solution. Check your solution.

7. $y = 1.5x - 2$

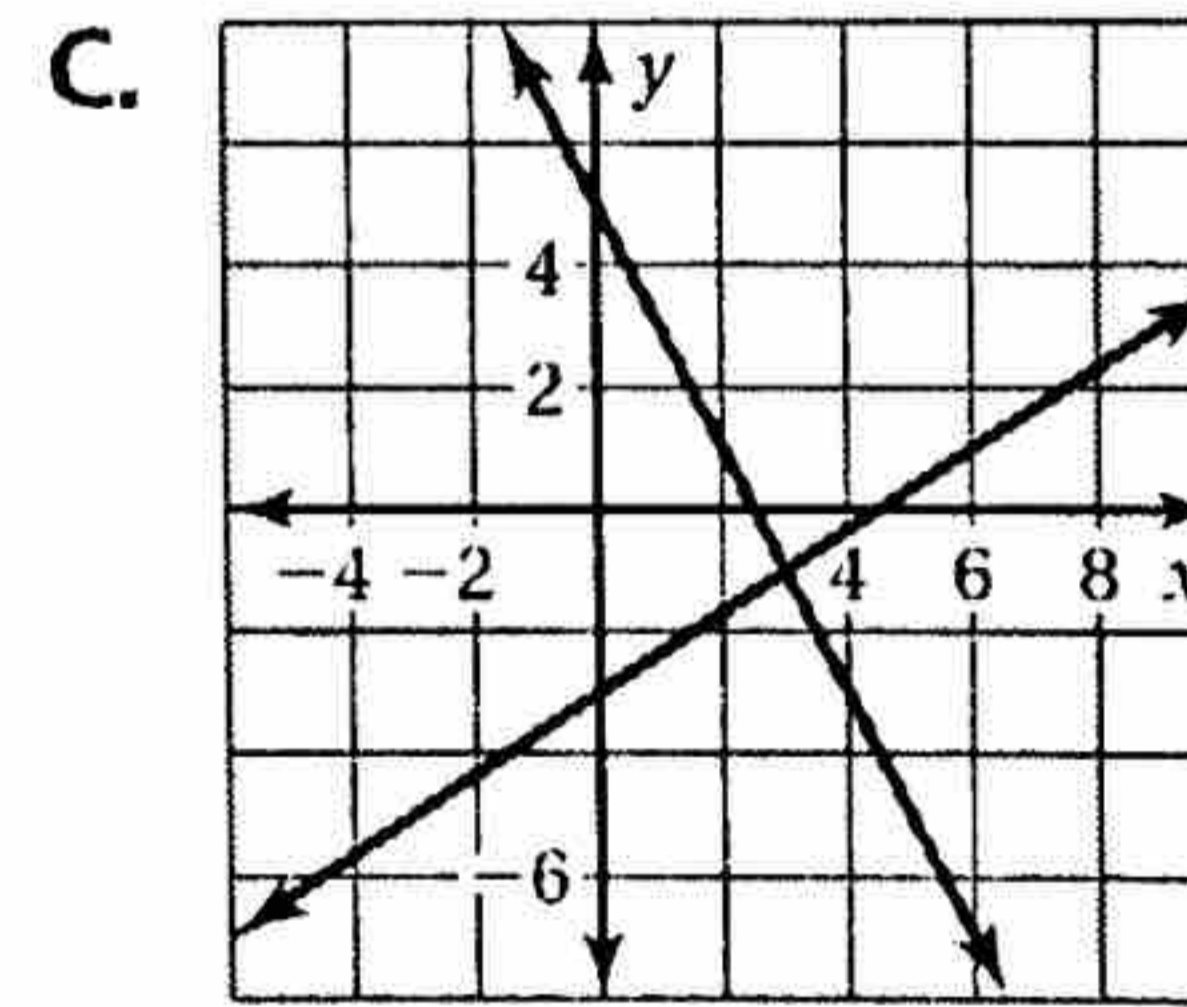
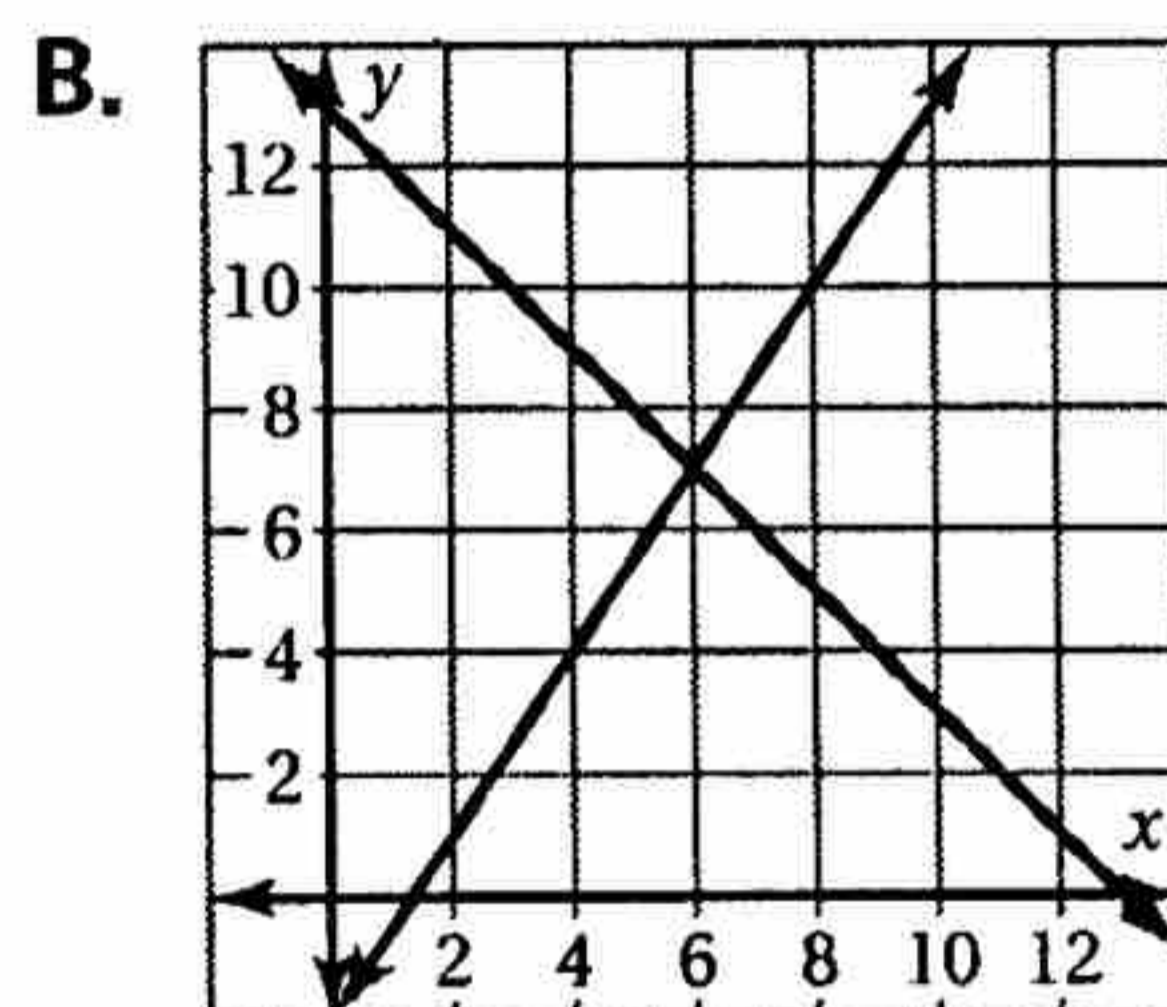
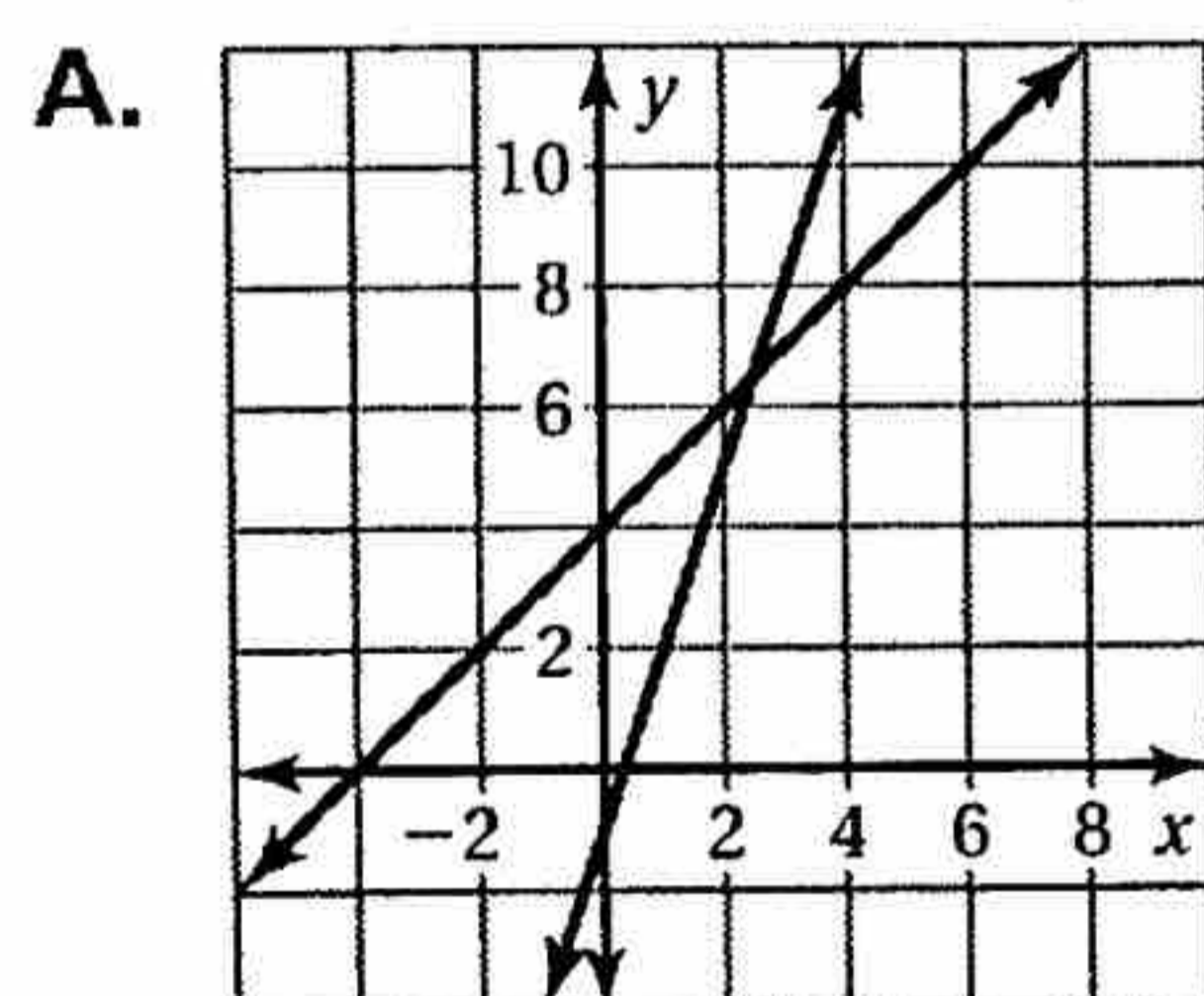
$y = -x + 13$

8. $y = x + 4$

$y = 3x - 1$

9. $y = \frac{2}{3}x - 3$

$y = -2x + 5$



Solve the system of linear equations by graphing.

10. $y = 2x + 9$

$y = 6 - x$

11. $y = -x - 4$

$y = \frac{3}{5}x + 4$

12. $y = 2x + 5$

$y = \frac{1}{2}x - 1$

13. $x + y = 27$

$y = x + 3$

14. $y - x = 17$

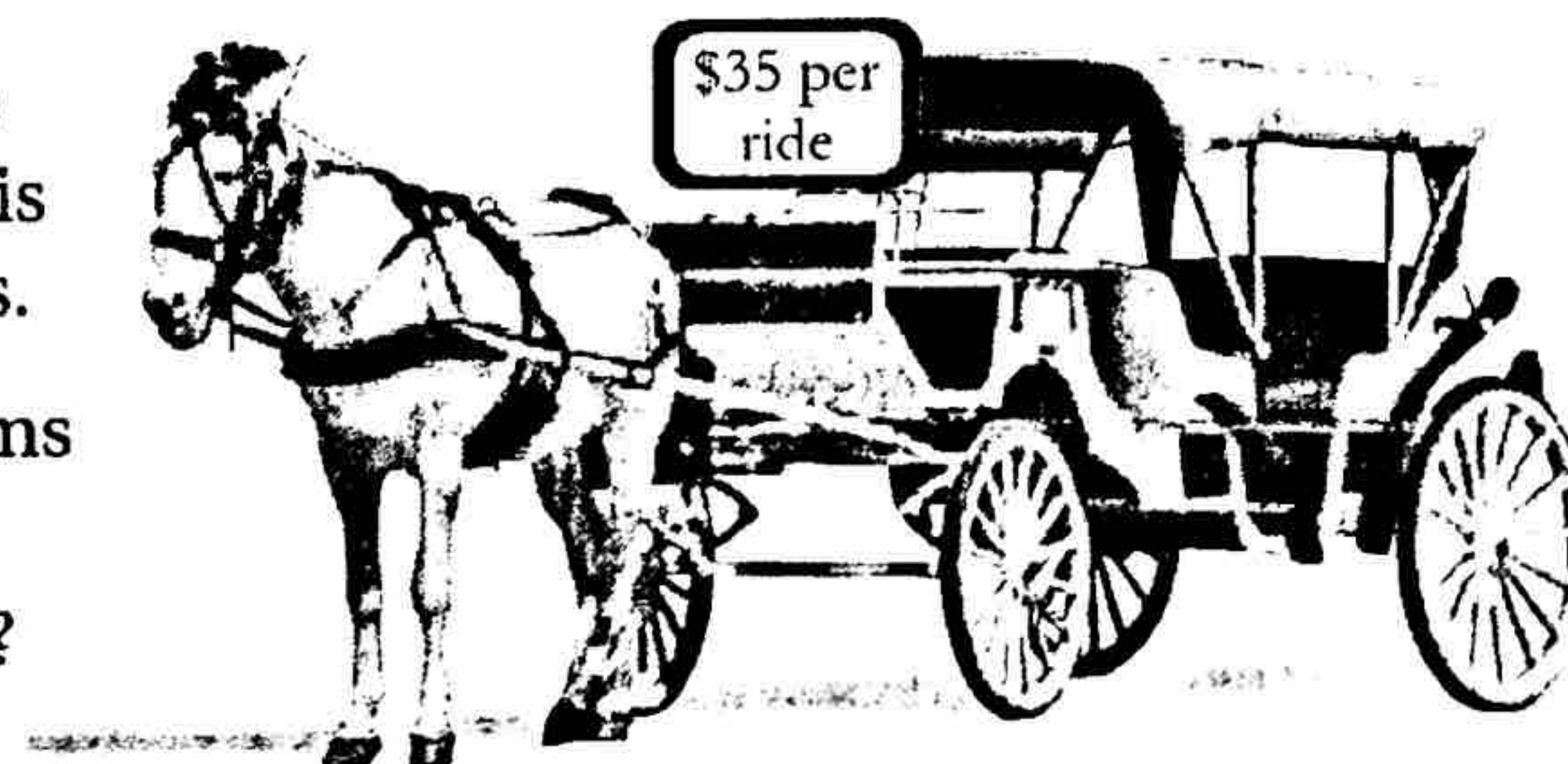
$y = 4x + 2$

15. $x - y = 7$

$0.5x + y = 5$

16. **CARRIAGE RIDES** The cost C (in dollars) for the care and maintenance of a horse and carriage is $C = 15x + 2000$, where x is the number of rides.

- Write an equation for the revenue R in terms of the number of rides.
- How many rides are needed to break even?



Use a graphing calculator to solve the system of linear equations.

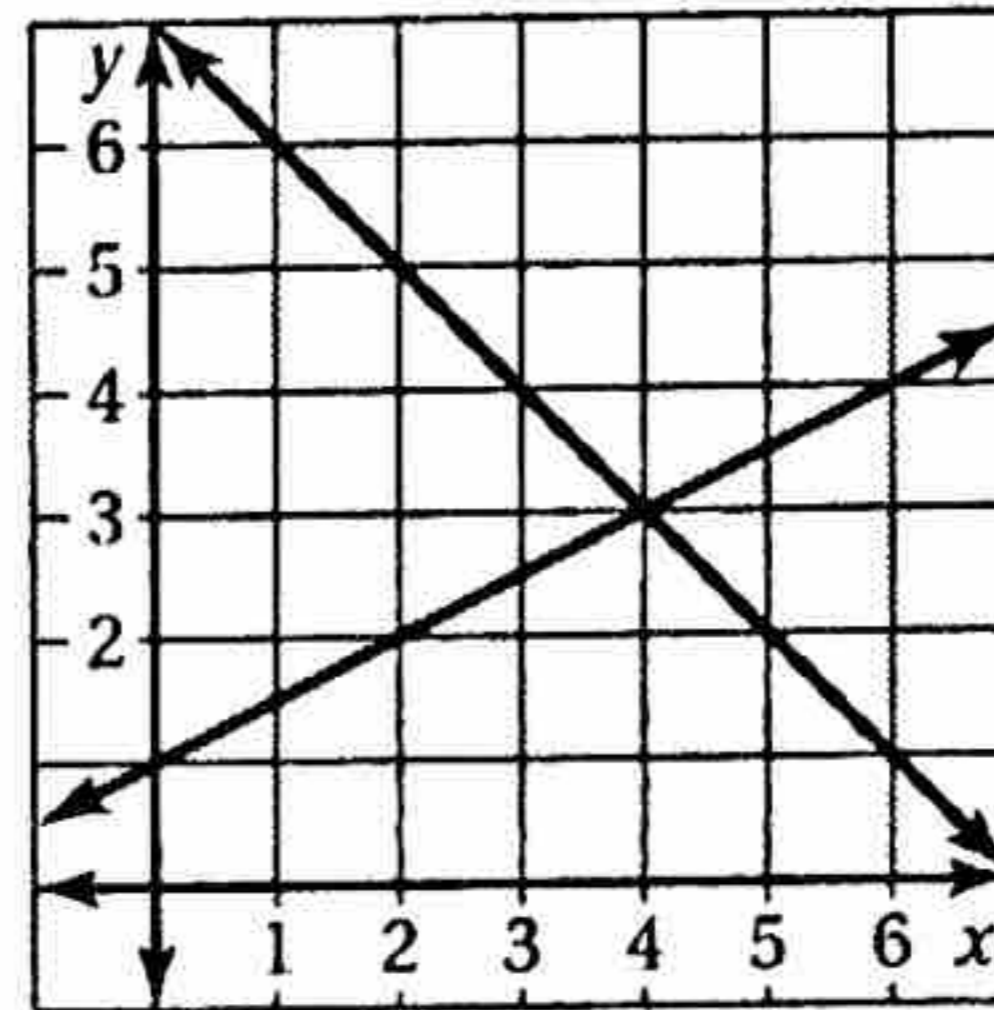
17. $2.2x + y = 12.5$
 $1.4x - 4y = 1$

18. $2.1x + 4.2y = 14.7$
 $-5.7x - 1.9y = -11.4$

19. $-1.1x - 5.5y = -4.4$
 $0.8x - 3.2y = -11.2$

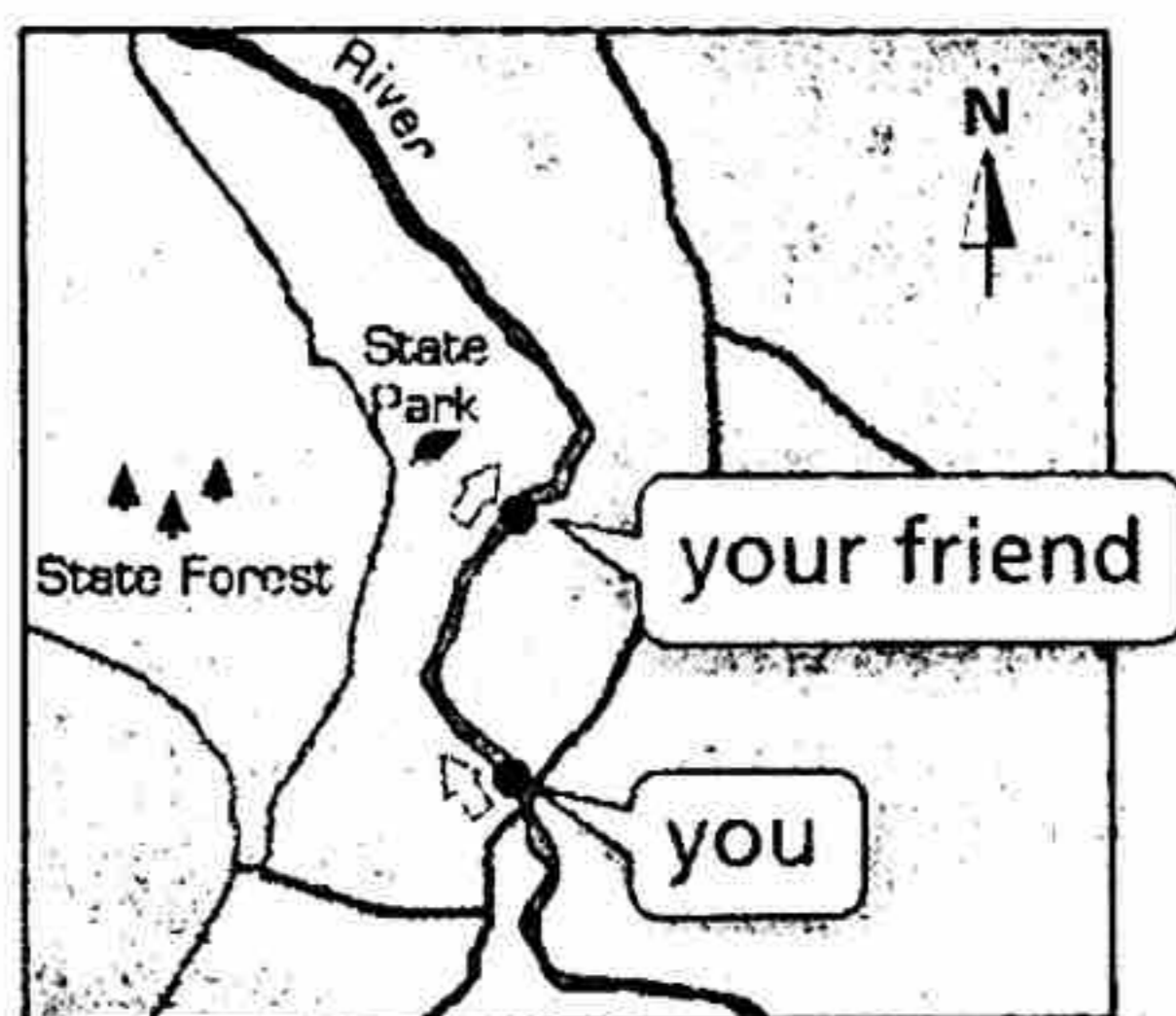
20. **ERROR ANALYSIS** Describe and correct the error in solving the system of linear equations.

21. **REASONING** Is it possible for a system of two linear equations to have exactly two solutions? Explain your reasoning.



The solution of the linear system $y = 0.5x + 1$ and $y = -x + 7$ is $x = 4$.

22. **MODELING** You have a total of 42 math and science problems for homework. You have 10 more math problems than science problems. How many problems do you have in each subject? Use a system of linear equations to justify your answer.



23. **CANOE RACE** You and your friend are in a canoe race. Your friend is a half mile in front of you and paddling 3 miles per hour. You are paddling 3.4 miles per hour.

- You are 8.5 miles from the finish line. How long will it take you to catch up to your friend?
- You both maintain your paddling rates for the remainder of the race. How far ahead of your friend will you be when you cross the finish line?

24. **Critical Thinking** Your friend is trying to grow her hair as long as her cousin's hair. The table shows their hair lengths (in inches) in different months.

Month	Friend's Hair (in.)	Cousin's Hair (in.)
3	4	7
8	6.5	9

- Write a system of linear equations that represents this situation.
- Will your friend's hair ever be as long as her cousin's hair? If so, in what month?



Fair Game Review

what you learned in previous grades & lessons

Solve the equation. Check your solution. (Section 1.2)

25. $\frac{3}{4}c - \frac{1}{4}c + 3 = 7$

26. $5(2 - y) + y = -6$

27. $6x - 3(x + 8) = 9$


28. **MULTIPLE CHOICE** What is the slope of the line that passes through $(-2, -2)$ and $(3, -1)$? (Section 4.2)

(A) -5

(B) $-\frac{1}{5}$

(C) $\frac{1}{5}$

(D) 5



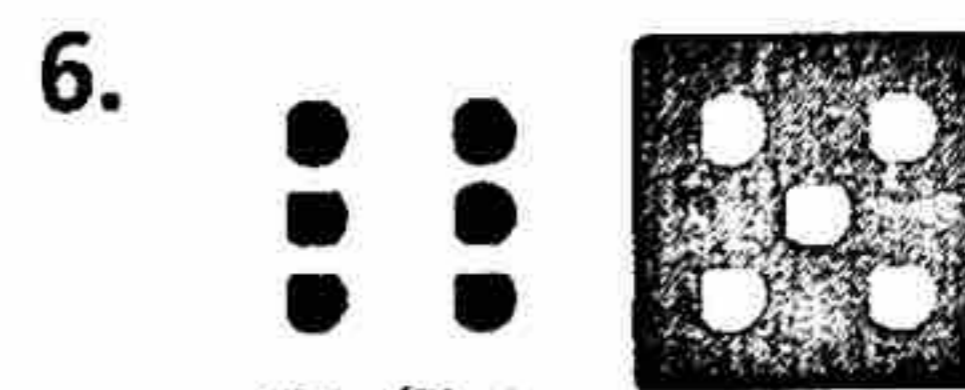
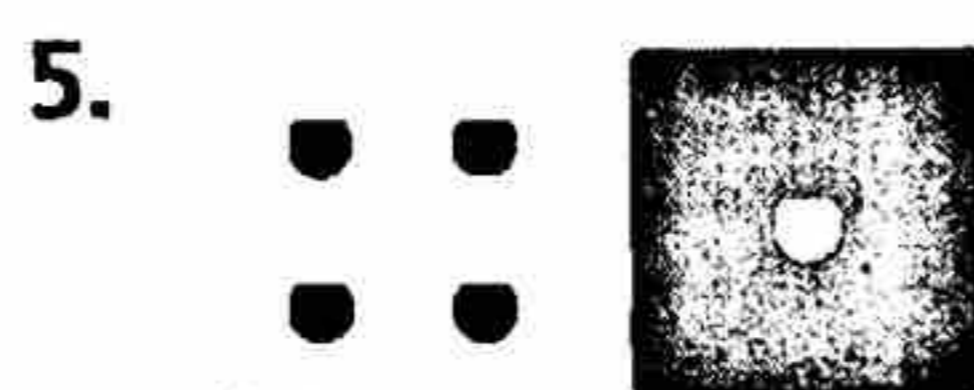
Vocabulary and Concept Check

- 1. WRITING** Describe how to solve a system of linear equations by substitution.
- 2. NUMBER SENSE** When solving a system of linear equations by substitution, how do you decide which variable to solve for in Step 1?
- 3. REASONING** Does solving a system of linear equations by graphing give the same solution as solving by substitution? Explain your reasoning.



Practice and Problem Solving

Write a system of linear equations that has the ordered pair as its solution.
Use a method from Activity 1 to solve the system.



Tell which equation you would choose to solve for one of the variables when solving the system by substitution. Explain your reasoning.

7. $2x + 3y = 5$

$4x - y = 3$

8. $\frac{2}{3}x + 5y = -1$

$x + 6y = 0$

9. $2x + 10y = 14$

$5x - 9y = 1$

Solve the system of linear equations by substitution. Check your solution.

10. $y = x - 4$
 $y = 4x - 10$

11. $y = 2x + 5$
 $y = 3x - 1$

12. $x = 2y + 7$
 $3x - 2y = 3$

13. $4x - 2y = 14$
 $y = \frac{1}{2}x - 1$

14. $2x = y - 10$
 $x + 7 = y$

15. $8x - \frac{1}{3}y = 0$
 $12x + 3 = y$

16. **SCHOOL CLUBS** There are a total of 64 students in a drama club and a yearbook club. The drama club has 10 more students than the yearbook club.

- Write a system of linear equations that represents this situation.
- How many students are in the drama club? the yearbook club?

17. **THEATER** A drama club earns \$1040 from a production. It sells a total of 64 adult tickets and 132 student tickets. An adult ticket costs twice as much as a student ticket.

- Write a system of linear equations that represents this situation.
- What is the cost of each ticket?



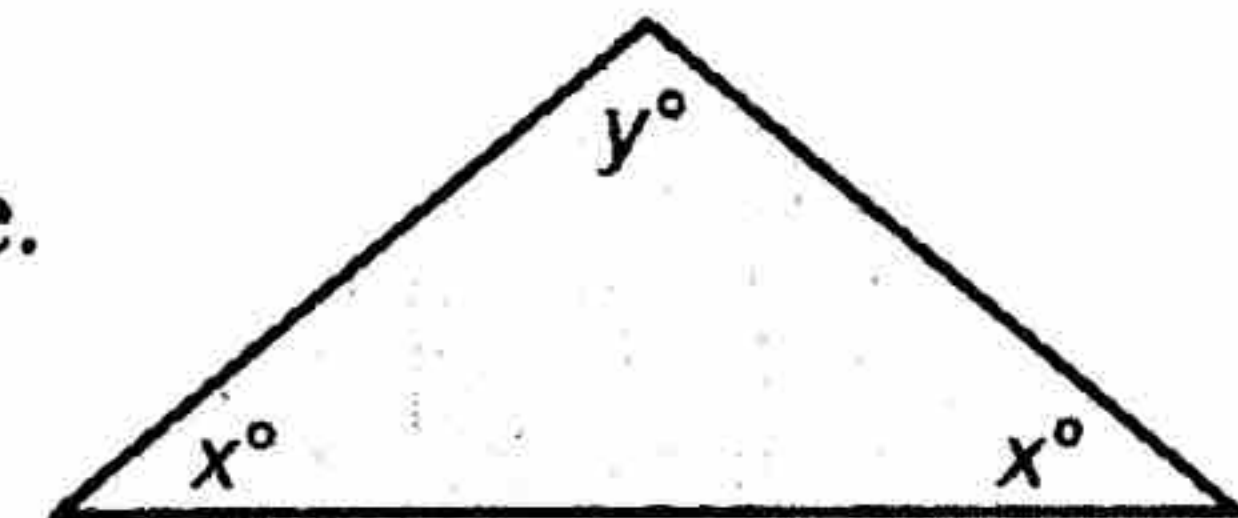
Solve the system of linear equations by substitution. Check your solution.

- ② 18. $y - x = 0$ 19. $x + 4y = 14$ 20. $-2x - 5y = 3$
 $2x - 5y = 9$ $3x + 7y = 22$ $3x + 8y = -6$

21. **ERROR ANALYSIS** Describe and correct the error in solving the system of linear equations.

X	$2x + y = 5$ Equation 1	Step 1:	$2x + y = 5$	Step 2:	$2x + (-2x + 5) = 5$
	$3x - 2y = 4$ Equation 2		$y = -2x + 5$		$2x - 2x + 5 = 5$

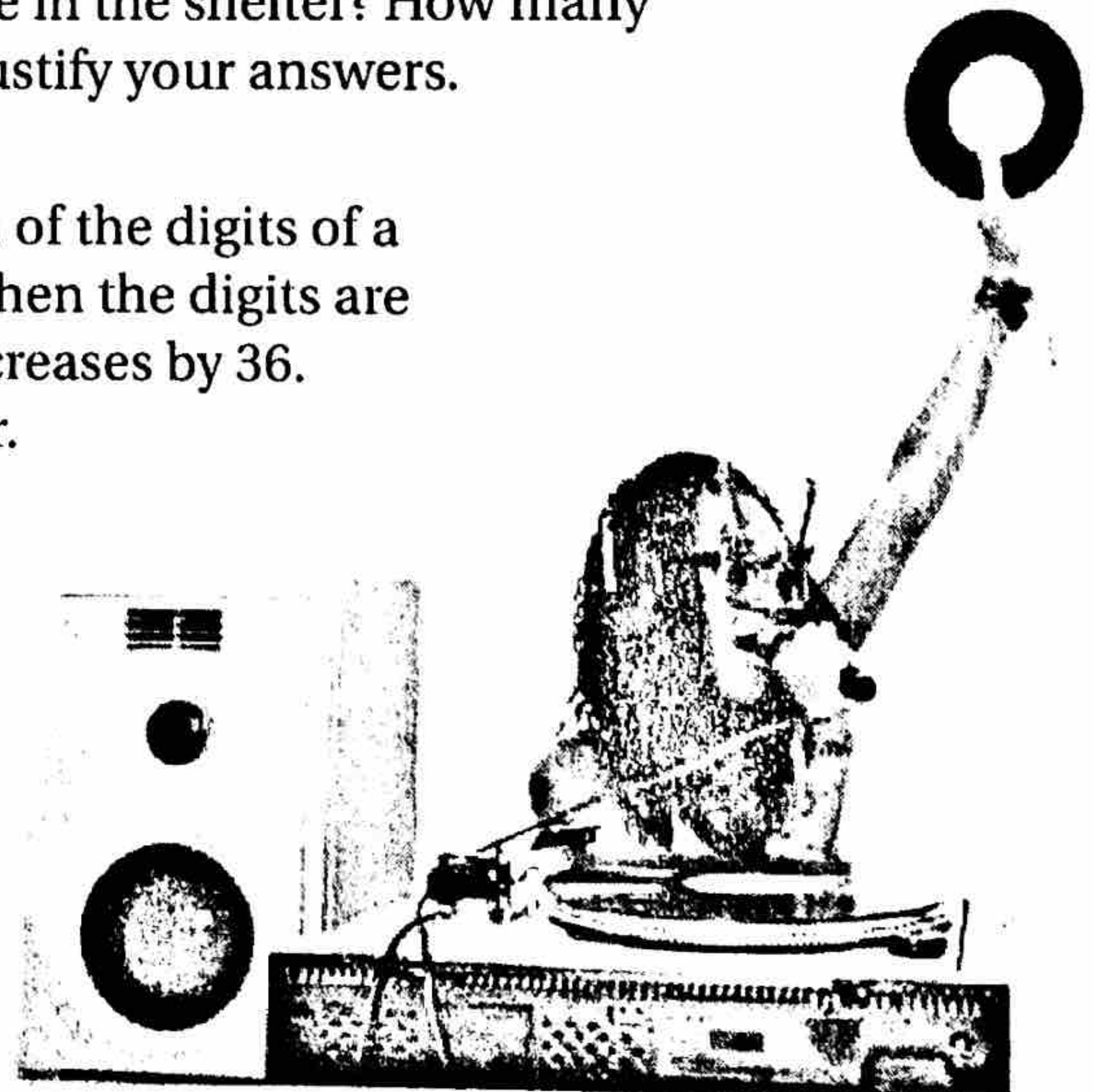
22. **STRUCTURE** The measure of the obtuse angle in the isosceles triangle is two and a half times the measure of one base angle. Write and solve a system of linear equations to find the measures of all the angles.



23. **ANIMAL SHELTER** An animal shelter has a total of 65 abandoned cats and dogs. The ratio of cats to dogs is 6:7. How many cats are in the shelter? How many dogs are in the shelter? Justify your answers.

24. **NUMBER SENSE** The sum of the digits of a two-digit number is 8. When the digits are reversed, the number increases by 36. Find the original number.

25. **Repeated Reasoning** A DJ has a total of 1075 dance, rock, and country songs on her system. The dance selection is three times the size of the rock selection. The country selection has 105 more songs than the rock selection. How many songs on the system are dance? rock? country?



Fair Game Review

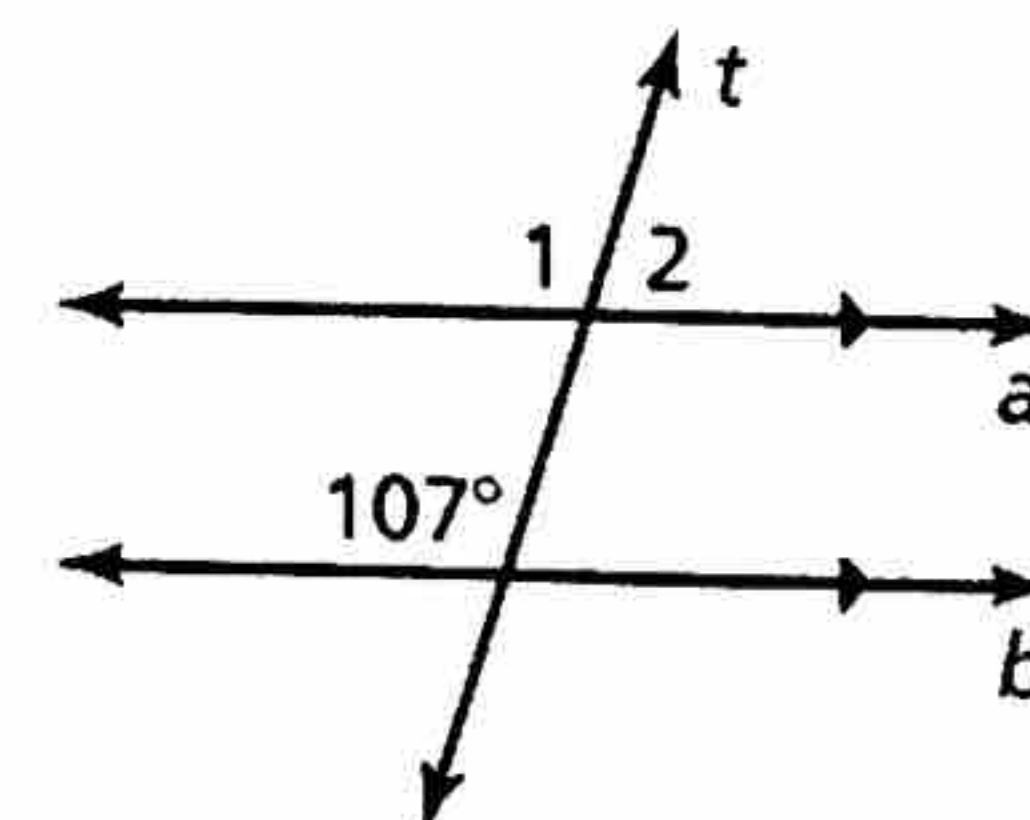
What you learned in previous grades & lessons

Write the equation in standard form. (Section 4.5)

26. $3x - 9 = 7y$ 27. $8 - 5y = -2x$ 28. $6x = y + 3$

29. **MULTIPLE CHOICE** Use the figure to find the measure of $\angle 2$. (Section 3.1)

- (A) 17° (B) 73°
 (C) 83° (D) 107°



5.3 Exercises

Vocabulary and Concept Check

- 1. WRITING** Describe how to solve a system of linear equations by elimination.
- 2. NUMBER SENSE** When should you use multiplication to solve a system of linear equations by elimination?
- 3. WHICH ONE DOESN'T BELONG?** Which system of equations does *not* belong with the other three? Explain your reasoning.

$$3x + 3y = 3$$

$$2x - 3y = 7$$

$$-2x + y = 6$$

$$2x - 3y = -10$$

$$2x + 3y = 11$$

$$3x - 2y = 10$$

$$x + y = 5$$

$$3x - y = 3$$

Practice and Problem Solving

Use a method from Activity 1 to solve the system.

4. $x + y = 3$

$$x - y = 1$$

5. $-x + 3y = 0$

$$x + 3y = 12$$

6. $3x + 2y = 3$

$$3x - 2y = -9$$

Solve the system of linear equations by elimination. Check your solution.

7. $x + 3y = 5$

$$-x - y = -3$$

8. $x - 2y = -7$

$$3x + 2y = 3$$

9. $4x + 3y = -5$

$$-x + 3y = -10$$

10. $2x + 7y = 1$

$$2x - 4y = 12$$

11. $2x + 5y = 16$

$$3x - 5y = -1$$

12. $3x - 2y = 4$

$$6x - 2y = -2$$

13. **ERROR ANALYSIS** Describe and correct the error in solving the system of linear equations.

$$\begin{array}{r} \times \\ 5x + 2y = 9 \\ 3x - 2y = -1 \\ \hline 2x = 10 \\ x = 5 \end{array}$$

Equation 1

Equation 2

The solution is $(5, -8)$.

14. **RAFFLE TICKETS** You and your friend are selling raffle tickets for a new laptop. You sell 14 more tickets than your friend sells. Together, you and your friend sell 58 tickets.
- Write a system of linear equations that represents this situation.
 - How many tickets does each of you sell?
15. **JOGGING** You can jog around your block twice and the park once in 10 minutes. You can jog around your block twice and the park 3 times in 22 minutes.
- Write a system of linear equations that represents this situation.
 - How long does it take you to jog around the park?



Solve the system of linear equations by elimination. Check your solution.

② ③ 16. $2x - y = 0$
 $3x - 2y = -3$

17. $x + 4y = 1$
 $3x + 5y = 10$

18. $-2x + 3y = 7$
 $5x + 8y = -2$

19. $3x + 3 = 3y$
 $2x - 6y = 2$

20. $2x - 6 = 4y$
 $7y = -3x + 9$

21. $5x = 4y + 8$
 $3y = 3x - 3$

22. **ERROR ANALYSIS** Describe and correct the error in solving the system of linear equations.

X

$x + y = 1$	Equation 1	Multiply by -5.	$-5x + 5y = -5$
$5x + 3y = -3$	Equation 2		$5x + 3y = -3$
			$8y = -8$
			$y = -1$

The solution is $(2, -1)$.

23. **REASONING** For what values of a and b should you solve the system by elimination?

a. $4x - y = 3$
 $ax + 10y = 6$

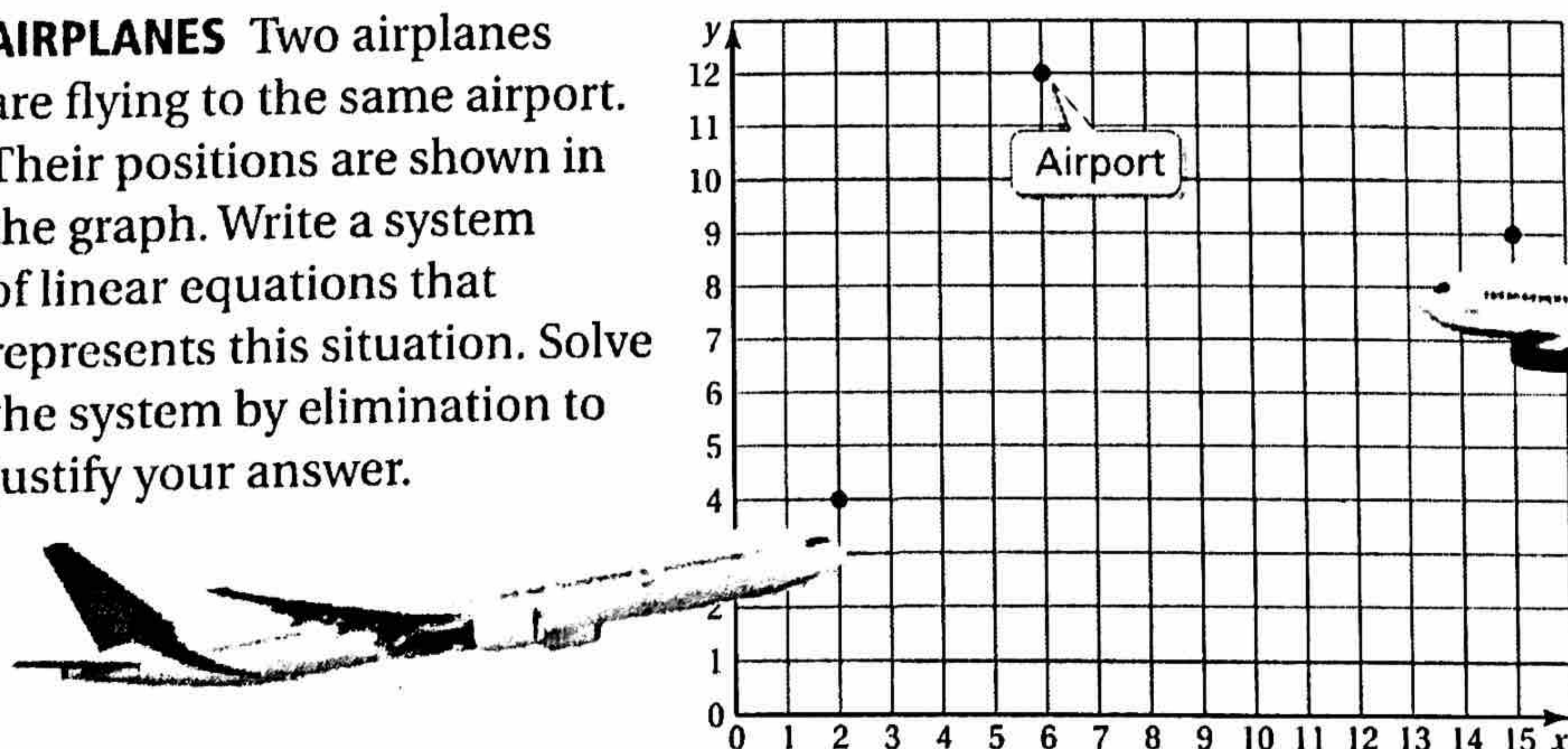
b. $x - 7y = 6$
 $-6x + by = 9$

Determine whether the line through the first pair of points intersects the line through the second pair of points. Explain.

24. Line 1: $(-2, 1), (2, 7)$
 Line 2: $(-4, -1), (0, 5)$

25. Line 1: $(3, -2), (7, -1)$
 Line 2: $(5, 2), (6, -2)$


26. **AIRPLANES** Two airplanes are flying to the same airport. Their positions are shown in the graph. Write a system of linear equations that represents this situation. Solve the system by elimination to justify your answer.



27. **TEST PRACTICE** The table shows the number of correct answers on a practice standardized test. You score 86 points on the test, and your friend scores 76 points.

	You	Your Friend
Multiple Choice	23	28
Short Response	10	5

- a. Write a system of linear equations that represents this situation.
- b. How many points is each type of question worth?


Vocabulary and Concept Check

- 1. WRITING** Describe the difference between the graph of a system of linear equations that has *no solution* and the graph of a system of linear equations that has *infinitely many solutions*.
- 2. REASONING** When solving a system of linear equations algebraically, how do you know when the system has *no solution*? *infinitely many solutions*?


Practice and Problem Solving

Let x and y be two numbers. Find the solution of the puzzle.

3. y is $\frac{1}{3}$ more than 4 times the value of x .

The difference of $3y$ and $12x$ is 1.

4. $\frac{1}{2}$ of x plus 3 is equal to y .

x is 6 more than twice the value of y .

Without graphing, determine whether the system of linear equations has *one solution*, *infinitely many solutions*, or *no solution*. Explain your reasoning.

5. $y = 5x - 9$
 $y = 5x + 9$

6. $y = 6x + 2$
 $y = 3x + 1$

7. $y = 8x - 2$
 $y - 8x = -2$

Solve the system of linear equations. Check your solution.

① 8. $y = 2x - 2$
 $y = 2x + 9$

9. $y = 3x + 1$
 $-x + 2y = -3$

10. $y = \frac{\pi}{3}x + \pi$
 $-\pi x + 3y = -6\pi$

② 11. $y = -\frac{1}{6}x + 5$
 $x + 6y = 30$

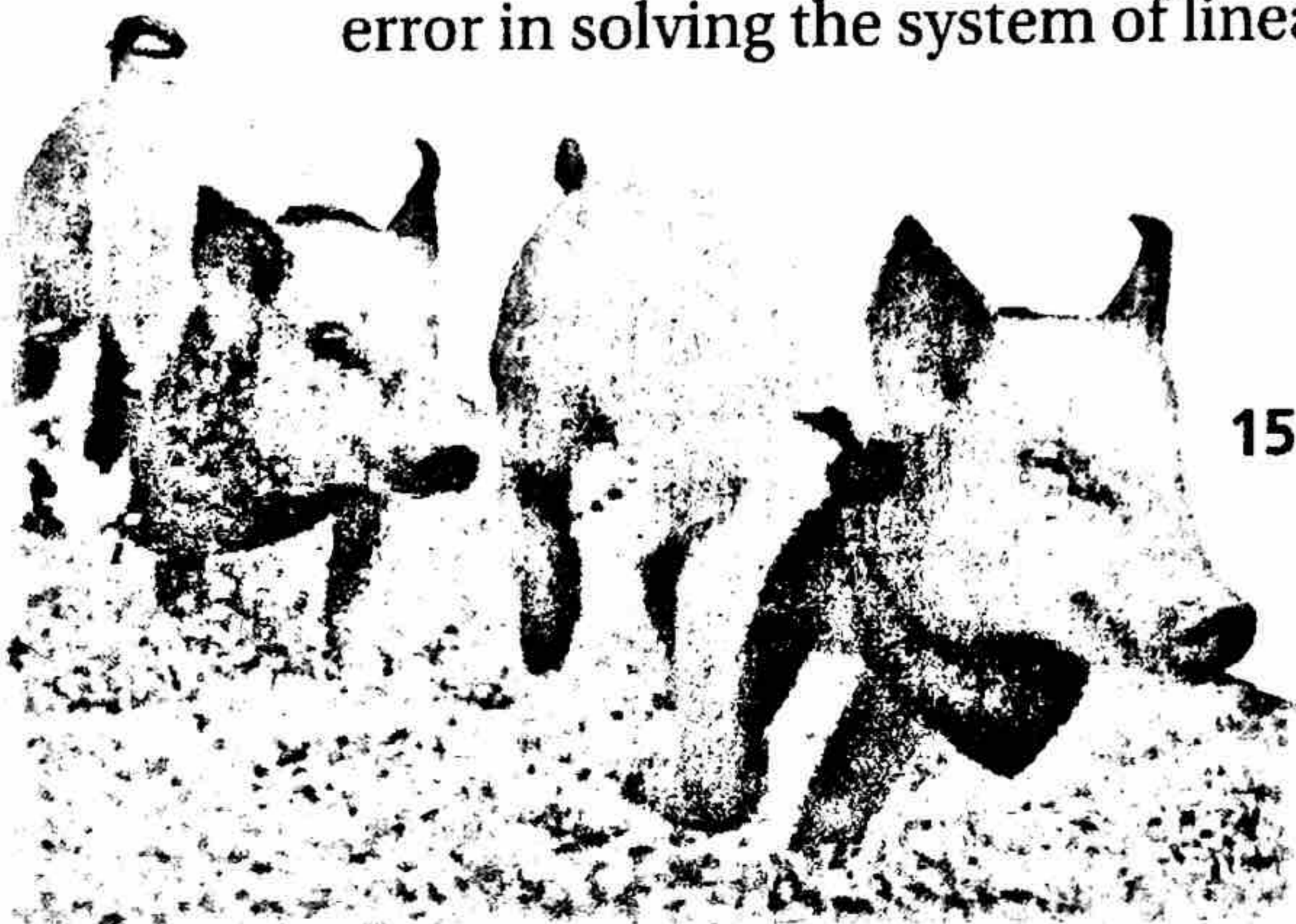
12. $\frac{1}{3}x + y = 1$
 $2x + 6y = 6$

13. $-2x + y = 1.3$
 $2(0.5x - y) = 4.6$

14. **ERROR ANALYSIS** Describe and correct the error in solving the system of linear equations.

X $y = -2x + 4$
 $y = -2x + 6$

The lines have the same slope, so, there are infinitely many solutions.

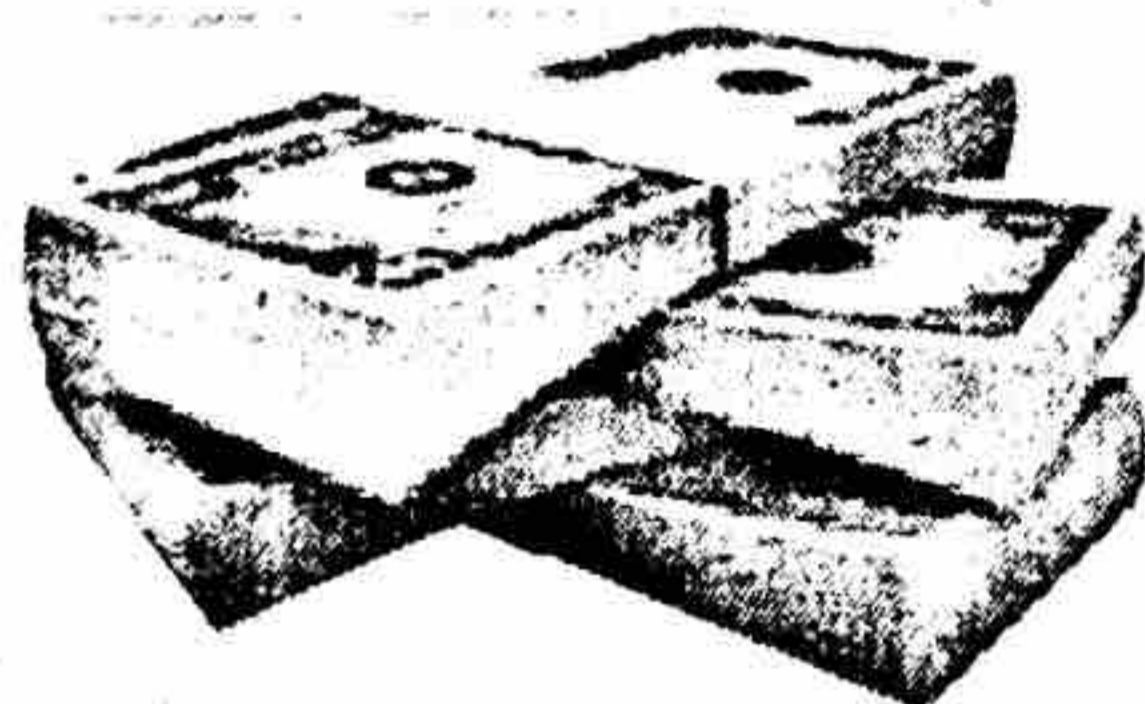


15. **PIG RACE** In a pig race, your pig gets a head start of 3 feet and is running at a rate of 2 feet per second. Your friend's pig is also running at a rate of 2 feet per second. A system of linear equations that represents this situation is $y = 2x + 3$ and $y = 2x$. Will your friend's pig catch up to your pig? Explain.

16. **REASONING** One equation in a system of linear equations has a slope of -3 . The other equation has a slope of 4 . How many solutions does the system have? Explain.

17. **LOGIC** How can you use the slopes and the y -intercepts of equations in a system of linear equations to determine whether the system has *one solution*, *infinitely many solutions*, or *no solution*? Explain your reasoning.

$$\begin{aligned} 4x + 8y &= 64 \\ 8x + 16y &= 128 \end{aligned}$$



18. **MONEY** You and a friend both work two different jobs. The system of linear equations represents the total earnings for x hours worked at the first job and y hours worked at the second job. Your friend earns twice as much as you.

- One week, both of you work 4 hours at the first job. How many hours do you and your friend work at the second job?
- Both of you work the same number of hours at the second job. Compare the number of hours each of you works at the first job.

19. **DOWNLOADS** You download a digital album for \$10. Then you and your friend download the same number of individual songs for \$0.99 each. Write a system of linear equations that represents this situation. Will you and your friend spend the same amount of money? Explain.

20. **REASONING** Does the system shown *always*, *sometimes*, or *never* have no solution when $a = b$? $a \geq b$? $a < b$? Explain your reasoning.

$$\begin{aligned} y &= ax + 1 \\ y &= bx + 4 \end{aligned}$$

21. **SKIING** The table shows the number of lift tickets and ski rentals sold to two different groups. Is it possible to determine how much each lift ticket costs? Justify your answer.

Group	1	2
Number of Lift Tickets	36	24
Number of Ski Rentals	18	12
Total Cost (dollars)	684	456

22. **Precision** Find the values of a and b so the system shown has the solution $(2, 3)$. Does the system have any other solutions? Explain.

$$\begin{aligned} 12x - 2by &= 12 \\ 3ax - by &= 6 \end{aligned}$$



Fair Game Review

what you learned in previous grades & lessons

Write an equation of the line that passes through the given points. (Section 4.7)

23. $(0, 0), (2, 6)$

24. $(0, -3), (3, 3)$

25. $(-6, 5), (0, 2)$

26. **MULTIPLE CHOICE** What is the solution of $-2(y + 5) \leq 16$? (Skills Review Handbook)

(A) $y \leq -13$

(B) $y \geq -13$

(C) $y \leq -3$

(D) $y \geq -3$