Problem Solving 9-9 The Quadratic Formula and the Discriminant

Write the correct answer.

1. Theo's flying disc got stuck in a tree 14 feet from the ground. Theo threw his shoe up at the disc to dislodge it. The height in feet *h* of the shoe is given by the equation $h = -16t^2 + 25t + 6$, where *t* is the time in seconds. Determine whether the shoe hit the disc. Use the discriminant to explain your answer.

3. The manager of a park enclosed an

area for small dogs to play. He made the

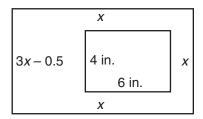
length 15 feet longer than the width and

enclosed an area covering 1350 square

feet. What are the dimensions of the

dogs' play area?

2. A picture frame holds a 4-in. by 6-in. photograph. The frame adds a border x inches wide around three sides of the photo. On the fourth side the frame forms a border that is 3x - 0.5 in. wide.



The combined area of the photograph and the frame is 80.5 in^2 . Write a quadratic equation for the combined area. Then use the quadratic formula to find *x*.

The equation $-5x^2 + 72x + 378$ models the number of students enrolled in a school where x is the number of years since the school first opened in 1990. Select the best answer.

- 4. How many students did the school have when it opened?
 - **A** 68
 - **B** 72
 - **C** 378
 - **D** 445
- 6. In which year were 502 students enrolled?
 - **A** 1992 **C** 1998
 - **B** 1996 **D** 2002

- 5. Which equation can be used to find the year in which 502 students were enrolled?
 - $\mathbf{F} \ -5x^2 + 72x + 502 = 0$
 - **G** $-5x^2 + 72x 124 = 0$
 - **H** $-5x^2 + 72x 502 = 0$
 - **J** $-5x^2 + 72x + 124 = 0$
- 7. In which year were 598 students enrolled?
 - F
 1995
 H
 2000

 G
 1998
 J
 2010

- 8. Which statement is true?
 - A Enrollment exceeded 650 students at one point.
 - **B** Enrollment never exceeded 650 students.
 - **C** The highest enrollment of any year was exactly 650 students.
 - **D** There were two years where 650 students were enrolled.

12 Using Algebra	ic Methods to Solve	e Linear Systems
	hod to solve a system of line	ear equations:
 Solve one equation for or Substitute this expression 		
3. Solve for the other variab	ble.	
 Substitute the value of th Solve for the other variat 	e known variable in the equa	ation in Step 1.
 Check the values in both 		Use this equation.
	y = x + 2	It is solved for <i>y</i> .
	$\int 2x + y = 17$	
Use the substitution	2x + y = 17	
method when the coefficient of one of the	2x + (x + 2) = 17	Substitute $x + 2$ for y.
variables is 1 or -1.	3x + 2 = 17	Simplify and solve for x.
	3 <i>x</i> = 15	
	<i>x</i> = 5	
Substitute $x = 5$ into $y = x + 3$	- 2 and solve for y: $y = x + 2$	2
	y = 5 + 2	2
	<i>y</i> = 7	
The solution of the system is	the ordered pair (5, 7).	
Check using both equations:	$y = x + 2;$ 7 $\stackrel{?}{=}$ (5) + 2; 7 = 7 √
	2x + y = 17; 2(5)	+ 7 ≟ 17; 17 = 17✓
se substitution to solve ea		
1. $\begin{cases} y = 2x - 5 \\ 3x + y = 10 \end{cases}$	2. $\begin{cases} 3x \\ x - \end{cases}$	+ 2y = 1 y = 2
Use $y = 2x - 5$.	,	e for x: $x - y = 2$.
3 <i>x</i> + = 10	x = _	
	3() + 2 <i>y</i> = 1
Ordered pair solution:	Orde	red pair solution:

 Name
 Date
 Class

Reteach LESSON **3-2** Using Algebraic Methods to Solve Linear Systems (continued) To use the **elimination method** to solve a system of linear equations: 1. Add or subtract the equations to eliminate one variable. 2. Solve the resulting equation for the other variable. 3. Substitute the value for the known variable into one of the original equations. 4. Solve for the other variable. 5. Check the values in both equations. The y terms have (3x + 2y = 7)opposite coefficients, Use the elimination 5x - 2y = 1so add. method when the 3x + 2y = 7Add the equations. coefficients of one of +5x - 2y = 1the variables are the same or opposite. 8*x* = 8 Solve for x. x = 1Substitute x = 1 into 3x + 2y = 7 and solve for y: 3x + 2y = 73(1) + 2v = 72y = 4y = 2The solution to the system is the ordered pair (1, 2). 3x + 2y = 75x - 2y = 1Check using both equations: $3(1) + 2(2) \stackrel{?}{=} 7 \qquad 5(1) - 2(2) \stackrel{?}{=} 1$ 7 = 7✓ 1 = 1

Use elimination to solve each system of equations.

3. $\begin{cases} 2x + y = 1 \\ -2x - 3y = 5 \end{cases}$	4. $\begin{cases} 3x + 4y = 13 \\ 5x - 4y = -21 \end{cases}$	
2x + y = 1 $+(-2x - 3y = 5)$	3x + 4y = 13 $+ 5x - 4y = -21$	
-2 <i>y</i> =		
<i>y</i> =	x =	
Ordered pair solution:	Ordered pair solution:	

Use substitution to solve e	aic Methods to Solve Li ach system of equations	inear Systems	Use substitution to solve ea	ic Methods to Solve I	Linear Systems
1. $\begin{cases} y = x - 3 \\ x + 2y = 6 \end{cases}$	ach system of equations.				(3x - 4y = 20)
(x + 2y = 0			1. $\begin{cases} x = 7y - 4 \\ 2x - 3y = 14 \end{cases}$	2. $\begin{cases} y - 3x = 5\\ 2x = 3y + 6 \end{cases}$	$3. \begin{cases} 3x - 4y = 20\\ y - 2x = 0 \end{cases}$
a. Substitute x – 3 for y	in $x + 2y = 6$. Then solve the equation $x + 2y = 6$.	uation for x.	(10.0)		(4 0)
	x = 4		(10, 2)	(-3, -4)	(-4, -8)
b. Substitute your value	for x in $y = x - 3$ and solve for y .		Use elimination to solve eac		
	y = 1	(4, 1)	4. $\begin{cases} x + 6y = 1 \\ 3x + 5y = -10 \end{cases}$	5. $\begin{cases} 3x + 4y = 6 \\ 2x + 3y = 3 \end{cases}$	6. $\begin{cases} 3x - 5y = 1 \\ 2x + 3y = -12 \end{cases}$
c. Write the solution as a $x = 5 - y$			(3x + 3y = 10	(2x + 5y - 5)	(2x + 3y - 12)
2. $\begin{cases} x - 5 & y \\ 2x + 5y = 16 \end{cases}$	3. $\begin{cases} y = 3x + 2\\ 2x + 3y = 17 \end{cases}$	4. $\begin{cases} y = 4x + 1 \end{cases}$	(-5, 1)	(6, -3)	(-3, -2)
(3, 2)	(1, 5)	(-1, -3)	lles substitution or climinati	ion to solve each system of e	
lies elimination to only on	ab evotem of equations			•	•
Use elimination to solve ea 4x - 5y = 7	ich system of equations.		7. $\begin{cases} 2x - 3y = 1 \end{cases}$	8. $\begin{cases} 9x + 2y = 5\\ 3x - y = -10 \end{cases}$	9. $\begin{cases} 2x + y = 1 \\ x = 5 + y \end{cases}$
3x - 4y = 6			(0 5)		(0 0)
a. Multiply the first equat	tion by -3 and the second equation $(-12x + 15y) = -3$		(8, 5)	$-\frac{(-1,7)}{11. \begin{cases} 2x+4y=12\\ -3x+3y=63 \end{cases}}$	(2, -3)
	12x + 15y = -12x	21	10. $\begin{cases} x = -8y \\ x + y = 14 \end{cases}$	11. $\begin{cases} 2x + 4y = 12 \\ -3x + 3y = 63 \end{cases}$	12. $\begin{cases} 5x - 2y = -1 \\ 3x - y = -2 \end{cases}$
b. Add the two equations	s, which eliminates x. Solve for y.		(16, -2)	(-12, 9)	(-3, -7)
	•		Solve.		
	y = -3			lakayla's house riding his bicyc	le at 8 miles
	for y into the first equation. Solve			e, Makayla leaves her house he	
Write the solution as a $(5x + x - 10)$	an ordered pair. 7. $\begin{cases} -x + 3y = 12\\ 6x - y = -21 \end{cases}$	$\frac{(-2, -3)}{(2x+2)(-4)}$	-	ations to represent the distance	, <i>d</i> , each is from
6. $\begin{cases} 5x + y = 19 \\ -2x - y = -7 \end{cases}$	7. $\begin{cases} -x + 3y = 12 \\ 6x - y = -21 \end{cases}$	8. $\begin{cases} 2x + 3y = 4 \\ 4x - 2y = -8 \end{cases}$		nours. They live 8.25 miles apar	
				d = 8.25 - d = 3h	8h
(4, -1)	(-3, 3)	(-1, 2)		a = 5n	
	(0,0)	(1,2)	b. Solve the system to de	etermine how long they travel be	efore meeting.
				0.75 h or 45 min	
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LESSON Practice C			LESSON Reteach		
3-2 Using Algebra	aic Methods to Solve L	-		ic Methods to Solve I	Linear Systems
3-2 Using Algebra Use substitution or elimina	tion to solve each system of eq	quations.	3-2 Using Algebra To use the substitution met	hod to solve a system of linear	•
3-2 Using Algebra Use substitution or elimina	tion to solve each system of eq	quations.	3-2 Using Algebra To use the substitution met 1. Solve one equation for or 2. Substitute this expression	hod to solve a system of linear ne variable. n into the other equation.	•
3-2 Using Algebra Use substitution or elimina		quations.	3-2 Using Algebra To use the substitution met 1. Solve one equation for or 2. Substitute this expression 3. Solve for the other variab 4. Substitute the value of th	hod to solve a system of linear ne variable. n into the other equation. ble. e known variable in the equatic	equations:
3-2 Using Algebra Use substitution or elimina 1. $\begin{vmatrix} x = y - 5.2 \\ 2x + 3y = 9.6 \end{vmatrix}$	tion to solve each system of eq 2. $\begin{cases} 3x - 4y = 5\\ x = y + \frac{1}{2} \end{cases}$	autions. 3. $ \begin{cases} x + 4y = \frac{1}{4} \\ 4x - 3y = 39 \end{cases} $	3.2 Using Algebra To use the substitution met 1. Solve one equation for or 2. Substitute this expression 3. Solve for the other variab 4. Substitute the value of th 5. Solve for the other variab	hod to solve a system of linear ne variable. n into the other equation. e. e known variable in the equatio e.	equations:
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3-2 Using Algebra Use substitution or elimina 1. $\begin{cases} x = y - 5.2 \\ 2x + 3y = 9.6 \end{cases}$ (-1.2, 4)	tion to solve each system of eq 2. $\begin{cases} 3x - 4y = 5\\ x = y + \frac{1}{2} \end{cases}$	autions. 3. $ \begin{cases} x + 4y = \frac{1}{4} \\ 4x - 3y = 39 \end{cases} $ $ \frac{\left(8\frac{1}{4}, -2\right)}{\left(8\frac{1}{4}, -2\right)} $	3.2 Using Algebra To use the substitution met 1. Solve one equation for or 2. Substitute this expression 3. Solve for the other variab 4. Substitute the value of th 5. Solve for the other variab	hod to solve a system of linear ne variable. n into the other equation. e. e known variable in the equatio e.	equations:
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3-2 Using Algebra Use substitution or elimina 1. $\begin{cases} x = y - 5.2 \\ 2x + 3y = 9.6 \end{cases}$ (-1.2, 4) 4. $\boxed{2x + 20y = 3} \\ 2x = -7y - 10$ $\boxed{-8\frac{1}{2}, 1}$ 7. $\boxed{\frac{34}{2}x + 3y = 42} \\ 5x = 4y}$	tion to solve each system of eq 2. $ \begin{bmatrix} 3x - 4y = 5 \\ x = y + \frac{1}{2} \end{bmatrix} $ 5. $ \begin{bmatrix} (-3, -3\frac{1}{2}) \\ (-$	equations. 3. $\begin{cases} x + 4y = \frac{1}{4} \\ 4x - 3y = 39 \end{cases}$ 6. $\begin{cases} \frac{81}{4}, -2 \\ 3x + 4y = 35 \\ 4x - 2y = 21 \end{cases}$ 9. $\begin{cases} 2x - 8y = 24 \\ x - 21 = 16y \end{cases}$	32 Using Algebra To use the substitution met 1. Solve one equation for or 2. Substitute this expression 3. Solve for the other variab 4. Substitute the value of th 5. Solve for the other variab 6. Check the values in both Use the substitution method when the coefficient of one of the variables is 1 or -1.	hod to solve a system of linear ne variable. in into the other equation. Je. e known variable in the equation Je. equations. $\begin{bmatrix} y = x + 2 \\ 2x + y = 17 \\ 2x + y = 17 \\ 2x + (x + 2) = 17 \\ 3x + 2 = 17 \\ 3x = 15 \\ x = 5 \\ 2 \text{ and solve for } y. y = x + 2 \\ y = 5 + 2 \end{bmatrix}$	equations: on in Step 1. Use this equation. It is solved for y . ubstitute $x + 2$ for y .
3-2 Using Algebra Use substitution or elimina 1. $\begin{cases} x = y - 5.2 \\ 2x + 3y = 9.6 \end{cases}$ 4. $\boxed{\begin{array}{c} (-1.2, 4) \\ 2x = -7y - 10 \\ \hline 2x = -7y - 10 \\ \hline (-8\frac{1}{2}, 1) \\ \hline 2x = 4y \\ \hline 5x = 4y \\ \hline 6, 7\frac{1}{2} \\ \hline \end{array}}$	tion to solve each system of eq 2. $ \begin{cases} 3x - 4y = 5 \\ x = y + \frac{1}{2} \end{cases} $ 5. $ \begin{cases} -3, -3\frac{1}{2} \\ x + y = 5 \\ 3x + 2y = 4 \end{cases} $ (-6, 11)	equations. 3. $\begin{cases} x + 4y = \frac{1}{4} \\ 4x - 3y = 39 \end{cases}$ 6. $\frac{\left(\frac{81}{4}, -2\right)}{\left(\frac{3x + 4y = 35}{4x - 2y = 21}\right)}$ $\left(\frac{7, 3\frac{1}{2}\right)$	32 Using Algebra To use the substitution met 1. Solve one equation for or 2. Substitute this expression 3. Solve for the other variab 4. Substitute the value of th 5. Solve for the other variab 6. Check the values in both Use the substitution method when the coefficient of one of the variables is 1 or -1. Substitute $x = 5$ into $y = x + 4$	hod to solve a system of linear ne variable. In into the other equation. Je. e known variable in the equation le. e quations. $\begin{bmatrix} y = x + 2 \\ 2x + y = 17 \\ 2x + y = 17 \\ 2x + (x + 2) = 17 \\ 3x + 2 = 17 \\ 3x = 15 \\ x = 5 \\ 2 \text{ and solve for } y \cdot y = x + 2 \\ y = 5 + 2 \\ y = 7 \end{bmatrix}$	equations: on in Step 1. Use this equation. It is solved for y . ubstitute $x + 2$ for y .
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3-2 Using Algebra Use substitution or elimina 1. $\begin{cases} x = y - 5.2 \\ 2x + 3y = 9.6 \end{cases}$ 4. $\begin{cases} (-1.2, 4) \\ 2x = -7y - 10 \end{cases}$ 7. $\begin{cases} 3\frac{1}{2}x + 3y = 42 \\ 5x = 4y \end{cases}$ Solve. 10. Cora bought 4 pounds of	tion to solve each system of eq 2. $ \begin{bmatrix} 3x - 4y = 5 \\ x = y + \frac{1}{2} \end{bmatrix} $ 5. $ \begin{bmatrix} (-3, -3\frac{1}{2}) \\ (-$	Putations. 3. $\begin{vmatrix} x + 4y = \frac{1}{4} \\ 4x - 3y = 39 \end{vmatrix}$ 6. $\begin{vmatrix} \frac{81}{4}, -2 \end{pmatrix}$ 6. $\begin{vmatrix} 3x + 4y = 35 \\ 4x - 2y = 21 \end{vmatrix}$ 9. $\begin{vmatrix} 2x - 8y = 24 \\ x - 21 = 16y \end{vmatrix}$ 9. $\begin{vmatrix} 2x - 8y = 24 \\ x - 21 = 16y \end{vmatrix}$ 23.50. Mark 0.	32 Using Algebra To use the substitution met 1. Solve one equation for or 2. Substitute this expression 3. Solve for the other variab 4. Substitute the value of th 5. Solve for the other variab 6. Check the values in both Use the substitution method when the coefficient of one of the variables is 1 or -1. Substitute $x = 5$ into $y = x + 4$	hod to solve a system of linear ne variable. In into the other equation. We known variable in the equation le. e variable in the equation le. (2x + y = 17) (2x + y = 17) (2x + y = 17) (2x + (x + 2) = 17) (3x + 2 = 17) (3x + 12) = 17 (3x + 12) = 17) (3x + 12) = 17 (3x + 12)	r equations: on in Step 1. Use this equation. It is solved for y. ubstitute $x + 2$ for y. implify and solve for x. $x + 2; \qquad 7 = 74$
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3-2 Using Algebra Use substitution or elimina 1. $\begin{cases} x = y - 5.2 \\ 2x + 3y = 9.6 \end{cases}$ (-1.2, 4) 4. $\begin{cases} 2x + 20y = 3 \\ 2x = -7y - 10 \end{cases}$ 7. $\begin{cases} 3\frac{1}{4}x + 3y = 42 \\ 5x = 4y \end{cases}$ 5. $\begin{cases} 0, 7\frac{1}{2} \end{cases}$ 5. $\begin{cases} 0, 7\frac{1}{2} \end{cases}$ 5. $\begin{cases} 0, 7\frac{1}{2} \end{cases}$ 5. $\begin{cases} 0, 7\frac{1}{2} \end{cases}$ 5. $\begin{cases} 0, 71\frac{1}{2} \end{bmatrix}$ 5. $\begin{cases} 0, 71\frac{1}{2} \end{bmatrix}$	tion to solve each system of eq 2. $ \begin{bmatrix} 3x - 4y = 5 \\ x = y + \frac{1}{2} \end{bmatrix} $ $ = \frac{(-3, -3\frac{1}{2})}{5 \cdot \left[\frac{x + y = 5}{3x + 2y = 4}\right]} $ 5. $ \begin{bmatrix} 5x - 5y = 6 \\ 4x + 7y = -4 \end{bmatrix} $ $ = \frac{(\frac{2}{5}, -\frac{4}{5})}{6 + \frac{1}{5}} $ If nuts and 2 pounds of raisins for \$18.55 tailons that represents the normal the price of the raisins, <i>r</i> with should a pound of aisins cost together?	puttions. 3. $\begin{bmatrix} x + 4y = \frac{1}{4} \\ 4x - 3y = 39 \end{bmatrix}$ 6. $\begin{bmatrix} \frac{3x + 4y = 35}{4x - 2y = 21} \\ \frac{(7, 3\frac{1}{2})}{9} \\ \frac{(2x - 8y = 24)}{(x - 21 = 16y)} \\ \frac{(9, -\frac{3}{4})}{2} \\ \frac{(9, -\frac{3}{4})}{2n + 4r = 18.5} \\ \frac{(7, 3\frac{1}{2})}{2n + 4r = 18.5} \\ \frac{(7, 3\frac{1}{2})}{2n$	32 Using Algebra To use the substitution met 1. Solve one equation for or 2. Substitute this expression 3. Solve for the other variab 4. Substitute the value of th 5. Solve for the other variab 6. Check the values in both wethod when the coefficient of one of the variables is 1 or -1. Substitute $x = 5$ into $y = x + 4$ The solution of the system is Check using both equations: Use substitution to solve ear 1. $\begin{bmatrix} y = 2x - 5 \\ 3x + y = 10 \end{bmatrix}$ Use $y = 2x - 5$. $3x + \frac{2x - 5}{2} = 10$ 5x - 5 = 10 x = 3	hod to solve a system of linear ne variable. in into the other equation. ble. e known variable in the equation le. equations. $\begin{bmatrix} y = x + 2 \\ 2x + y = 17 \\ 2x + y = 17 \\ 2x + (x + 2) = 17 \\ 3x = 15 \\ x = 5 \\ 2 \text{ and solve for } y. y = x + 2 \\ y = 5 + 2 \\ y = 7 \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 3x + 1; \\ 3x + $	equations: on in Step 1. Use this equation. It is solved for y. ubstitute x + 2 for y. implify and solve for x. $7 \stackrel{?}{=} 17; 17 = 17 \checkmark$ 2y = 1 = 2 or x. $x - y = 2$. y + 2 -2) + 2y = 1 y = -1
3-2 Using Algebra Use substitution or elimina 1. $\begin{cases} x = y - 5.2 \\ 2x + 3y = 9.6 \end{cases}$ (-1.2, 4) 4. $\begin{cases} 2x + 20y = 3 \\ 2x = -7y - 10 \end{cases}$ 7. $\begin{cases} 3\frac{1}{4}x + 3y = 42 \\ 5x = 4y \end{cases}$ 5. $\begin{cases} 0, 7\frac{1}{2} \end{cases}$ 5. $\begin{cases} 0, 7\frac{1}{2} \end{cases}$ 5. $\begin{cases} 0, 7\frac{1}{2} \end{cases}$ 5. $\begin{cases} 0, 7\frac{1}{2} \end{cases}$ 5. $\begin{cases} 0, 71\frac{1}{2} \end{bmatrix}$ 5. $\begin{cases} 0, 71\frac{1}{2} \end{bmatrix}$	tion to solve each system of eq 2. $ \begin{bmatrix} 3x - 4y = 5 \\ x = y + \frac{1}{2} \end{bmatrix} $ $ - \frac{(-3, -3\frac{1}{2})}{5 \cdot \left[\frac{x + y = 5}{3x + 2y = 4}\right]} $ 5. $ \begin{bmatrix} 5x - 5y = 6 \\ 4x + 7y = -4 \end{bmatrix} $ f nuts and 2 pounds of raisins for 3 and 4 pounds of raisins for \$18.5] ations that represents the not the price of the raisins, <i>r</i>	puttions. 3. $\begin{bmatrix} x + 4y = \frac{1}{4} \\ 4x - 3y = 39 \end{bmatrix}$ 6. $\begin{bmatrix} \frac{3x + 4y = 35}{4x - 2y = 21} \\ \frac{(7, 3\frac{1}{2})}{9} \\ \frac{(2x - 8y = 24)}{(x - 21 = 16y)} \\ \frac{(9, -\frac{3}{4})}{2} \\ \frac{(9, -\frac{3}{4})}{2n + 4r = 18.5} \\ \frac{(7, 3\frac{1}{2})}{2n + 4r = 18.5} \\ \frac{(7, 3\frac{1}{2})}{2n$	32 Using Algebra To use the substitution met 1. Solve one equation for or 2. Substitute this expression 3. Solve for the other variab 4. Substitute the value of th 5. Solve for the other variab 6. Check the values in both We the substitution method when the coefficient of one of the variables is 1 or -1. Substitute $x = 5$ into $y = x + 4$ The solution of the system is Check using both equations: Use substitution to solve ea 1. $\begin{bmatrix} y = 2x - 5 \\ 3x + y = 10 \end{bmatrix}$ Use $y = 2x - 5$. $3x + \frac{2x - 5}{2} = 10$ 5x - 5 = 10 x = 3 $y = 2(3) - \frac{1}{2}$	hod to solve a system of linear ne variable. in into the other equation. ble. e known variable in the equation le. equations. $\begin{bmatrix} y = x + 2 \\ 2x + y = 17 \\ 2x + y = 17 \\ 2x + (x + 2) = 17 \\ 3x = 15 \\ x = 5 \\ 2 \text{ and solve for } y. y = x + 2 \\ y = 5 + 2 \\ y = 7 \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 3x + 1; \\ 3x + $	requations: on in Step 1. Use this equation. It is solved for y. ubstitute $x + 2$ for y. implify and solve for x. $7 = 7\sqrt{7}$ $7 = 17$, $17 = 17\sqrt{7}$ 2y = 1 = 2 or x: $x - y = 2$. y + 2 = 2 y = -1 x = -1 + 2 = 1
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3-2 Using Algebra Use substitution or elimina 1. $\begin{cases} x = y - 5.2 \\ 2x + 3y = 9.6 \end{cases}$ (-1.2, 4) 4. $\begin{cases} 2x + 20y = 3 \\ 2x = -7y - 10 \end{cases}$ ($-8\frac{1}{2}$, 1) 7. $\begin{cases} 3\frac{1}{4}x + 3y = 42 \\ 5x = 4y \end{cases}$ 5. ($6, 7\frac{1}{2}$) 5. ($6, 7\frac{1}{2}$) 5. (712) 5. (11) Kate and Riley are reading price of the nuts, <i>n</i> , are b. Solve the system. How nuts and a pound of nuts and a pound of nuts and a pound so for the nuts, <i>n</i> , are b. Solve the system of equiprice of the nuts, <i>n</i> , are b. Solve the system of equiprice of the nuts, <i>n</i> , and b. Solve the system of equiprice of the nuts, <i>n</i> , and b. Solve the system of equiprice of the nuts, <i>n</i> , and b. Solve the system of equiprice of the nuts, <i>n</i> , and b. Solve the system of equiprice of the nuts, <i>n</i> , and b. Solve the system of equiprice of the nuts, <i>n</i> , and a nound of <i>n</i> .	tion to solve each system of eq 2. $ \begin{bmatrix} 3x - 4y = 5 \\ x = y + \frac{1}{2} \end{bmatrix} $ $ - \frac{(-3, -3\frac{1}{2})}{5 \cdot \left[\frac{x + y = 5}{3x + 2y = 4}\right]} $ 5. $ \begin{bmatrix} 5x - 5y = 6 \\ 4x + 7y = -4 \end{bmatrix} $ f nuts and 2 pounds of raisins for 3 and 4 pounds of raisins for \$18.5] ations that represents the not the price of the raisins, <i>r</i>	puttions. 3. $\begin{bmatrix} x + 4y = \frac{1}{4} \\ 4x - 3y = 39 \end{bmatrix}$ 6. $\begin{bmatrix} \frac{3x + 4y = 35}{4x - 2y = 21} \\ \frac{(7, 3\frac{1}{2})}{9} \\ \frac{(2x - 8y = 24)}{(x - 21 = 16y)} \\ \frac{(9, -\frac{3}{4})}{2} \\ \frac{(9, -\frac{3}{4})}{2n + 4r = 18.5} \\ \frac{(7, 3\frac{1}{2})}{2n + 4r = 18.5} \\ \frac{(7, 3\frac{1}{2})}{2n$	32 Using Algebra To use the substitution met 1. Solve one equation for or 2. Substitute this expression 3. Solve for the other variab 4. Substitute the value of th 5. Solve for the other variab 6. Check the values in both We the substitution method when the coefficient of one of the variables is 1 or -1. Substitute $x = 5$ into $y = x + 4$ The solution of the system is Check using both equations: Use substitution to solve ea 1. $\begin{bmatrix} y = 2x - 5 \\ 3x + y = 10 \end{bmatrix}$ Use $y = 2x - 5$. $3x + \frac{2x - 5}{2} = 10$ 5x - 5 = 10 x = 3 $y = 2(3) - \frac{1}{2}$	hod to solve a system of linear ne variable. in into the other equation. ble. e known variable in the equation le. equations. $\begin{bmatrix} y = x + 2 \\ 2x + y = 17 \\ 2x + y = 17 \\ 2x + (x + 2) = 17 \\ 3x = 15 \\ x = 5 \\ 2 \text{ and solve for } y. y = x + 2 \\ y = 5 + 2 \\ y = 7 \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 1 \text{ the ordered pair } (5, 7). \\ y = x + 2; 7 \stackrel{?}{=} (5) \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 2x + y = 17; 2(5) + \\ 3x + 1; \\ 3x + $	requations: on in Step 1. Use this equation. It is solved for y. ubstitute $x + 2$ for y. implify and solve for x. $7 = 7\sqrt{7}$ $7 = 17$, $17 = 17\sqrt{7}$ 2y = 1 = 2 or x: $x - y = 2$. y + 2 = 2 y = -1 x = -1 + 2 = 1

LESSON Reteach			
3-2 Using Algebraic Methods	to Solve Linear Systems	3-2 Using Linear Systems to	Find the Equation of a Line
(continued)		Linear systems of equations can be used to f Determine the equation of the line passing th	
To use the elimination method to solve a sys 1. Add or subtract the equations to eliminate		(2, 14) using $y = mx + b$. Substituting the x-	and y-coordinates for the
2. Solve the resulting equation for the other v	variable.	values of x and y in the slope-intercept form $a = -4m + b$	
 Substitute the value for the known variable Solve for the other variable. 	e into one of the original equations.	Solve this system to find the slope and <i>y</i> -inte	
5. Check the values in both equations.	The y terms have	through points (- 4, 2) and (2, 14). Finding	m = 2 and $b = 10$ from the
Use the elimination $3x + 2y = 5x - 2x -$	opposite coefficients,	table or the graph allows you to write the equ	ation of the line $y = 2x + 10$.
method when the $3x + 2y =$	00 444.		
coefficients of one of the variables are the $+5x - 2y =$			
same or opposite. 8x =	= 8 Solve for x.	2 = -4m + b 14 = 2m + b	
x =	= 1	$\frac{m}{0}$ $\frac{b}{2}$ $\frac{b}{14}$	6 / X
Substitute $x = 1$ into $3x + 2y = 7$ and solve f		1 6 12	
	3(1) + 2y = 7	2 10 10 3 14 8	
	2y = 4 $y = 2$	4 18 6	
The solution to the system is the ordered pair	,	Use a system of equations to find the equ	ation of the line passing
	2y = 7 $5x - 2y = 1$	through the given points.	ation of the line passing
3(1) + 2		1. (5, 7) and (1, 19)	y = -3x + 22
	$7 = 7\checkmark \qquad 1 = 1\checkmark$	2. (-2, 4) and (2, 8)	y = x + 6
Use elimination to solve each system of equ	uations.	3. (3,-5) and (5, 1)	y = 3x - 14
3. $\begin{cases} 2x + y = 1 \\ -2x - 3y = 5 \end{cases}$	4. $\begin{cases} 3x + 4y = 13 \\ 5x - 4y = -21 \end{cases}$	4. (1, 1) and (5, -9)	v = -2.5x + 3.5
2x + y = 1	3x + 4y = 13	5. $(-1, 8)$ and $(1, -8)$	y = -8x
+(-2x-3y=5)	+5x-4y=-21	5. $(-1, 6)$ and $(1, -6)$ The equation of a parabola in standard form	,
-2y = 6	8x = -8	$y = ax^2 + bx + c$. There are three constants	, a, b, h
v = -3	x = -1	and <i>c</i> . Three points not on a line will determin unique parabola.	
<i>y</i> = <u> </u>	X =		······ \
x = 2	y = 4	Find the equation of the nevel of a necessary	
Ordered pair solution: $(2, -3)$	Ordered pair solution: $(-1, 4)$	Find the equation of the parabola passing the given points.	-2 V
		6. (0, 1), (1, 0), and (2, 1)	$y = x^2 - 2x + 1$
		7. (1, 5), (2, 4), and (4, 8)	$y = x^2 - 4x + 8$
Copyright © by Holt, Rinehart and Winston. All rights reserved.	15 Holt Algebra 2	Copyright © by Holt, Rinehart and Winston. All rights reserved.	16 Holt Algebra 2
2. Shanae has 15 lb of Feed Y left. She want	8% protein. Feed Y is 10% ix to get 50 lb of feed that is 15% protein? $ \begin{bmatrix} 0.18x + 0.10y = (0.15)50 \\ x + y = 50 \end{bmatrix} $ ed i and 18.75 lb of Feed Y is to make a mixture that is 12% protein. She and how much of the mixture she can make. $ \begin{bmatrix} 0.18x + (0.10)(15) = (0.12)z \\ x + 15 = z \end{bmatrix} $ 5 lb of Feed X 20 lb of the mixture	There are two ways you can solve a system Substitution Use substitution when you can easily solv one equation for one variable. Memory tip: You can substitute salad for fries with your order. For the system $\begin{vmatrix} x - y = 4 \\ 2x - 3y = 7 \end{vmatrix}$ it is easy to solve $x - y = 4$ for x : $x = \boxed{4 + y}$ Then substitute for x in the second equation and solve for y: 2x - 3y = 7 $2(\boxed{4 + y}) = 3y = 7$ 8 + 2y - 3y = 7 -y = -1 or $y = 1Finally, solve for x:x = 4 + yx = 4 + 1 = 5$	Elimination Use elimination to add or subtract equations to remove one of the variables. Memory tip: The Tigers were <i>eliminated</i> from the basketball tournament. For the system $\begin{bmatrix} 5x - 2y = -9 \\ 3x + 2y = 1 \end{bmatrix}$ if you add the 2 equations together, the <i>y</i> - term is <i>eliminated</i> because $-2y + 2y = 0$.
B $32[12(0.18) + 20(0.10)] = c$ C $12(0.18) + 20(0.10) = c$ D $[12(0.18) + 20(0.10)]c = 32$ 5. Billie reorders Feed X and Feed Y. Feed X costs \$58 per 100 lb. Feed Y costs \$45 per 100 lb. The order comes to \$470 for 900 lb. How much of each did she order? A Feed X: 350 lb; Feed Y: 550 lb B Feed X: 400 lb; Feed Y: 550 lb C Feed X: 450 lb; Feed Y: 540 lb \bigcirc Feed X: 500 lb; Feed Y: 400 lb	A $(0.10 + 0.18)(x + y) = (0.12)25$ (B) $(0.18)x + (0.10)y = (0.12)25$ C $25(0.18 + 0.10) = (0.12)x$ D $10 + 18 = (0.12)25$ 6. Shanae earns \$8.00 per hour during the daytime and \$9.50 per hour in the evenings after 6 + <i>n</i> . Last week she earned \$314.00 for 37 hours. How many daytime and evening hours did she work? A 35 daytime; 2 evening B 30 daytime; 12 evening D 20 daytime; 17 evening	1. $\begin{cases} 2x + y = 3\\ 3x + 4y = 9 \end{cases}$ solve the find th	swer: substitution because I can easily rst equation for y swer: elimination because I can from the system by adding the two
		4. $ ^{3x-y=-1}$ eliminate y	from the system by multiplying the ation by 2, then adding the equations

Date Class

LESSON Reteach **12-7** Solving Rational Equations

A rational equation is an equation that contains one or more rational expressions. Some rational equations are proportions and can be solved using cross products. Solutions to all rational equations must be checked.

Solve $\frac{4}{x-3} = \frac{2}{x}$.		Solve $\frac{x-4}{x^2-4} = \frac{-2}{x-2}$.	
$\frac{4}{x-3}$		$\frac{x-4}{x^2-4} \sum \frac{-2}{x-2}$	
4(x) = 2(x - 3)	Multiply.	$(x-4)(x-2) = -2(x^2 -$	- 4)
4x = 2x - 6	Distribute.	$x^2 - 6x + 8 = -2x^2 + $	8
-2x $-2x$	Add $-2x$ to both sides.	$+2x^2$ $+2x^2$	_
2x = -6		$3x^2 - 6x + 8 = 8$	
$\frac{2x}{2} = \frac{-6}{2}$	Divide.	$\frac{-8}{3x^2 - 6x} = \frac{-8}{0}$	
<i>x</i> = -3	Simplify.	3x(x-2)=0	Zero Product
Check:		x = 0 or x = 2	Property

Check:

1

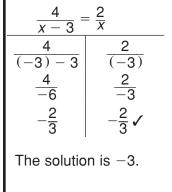
 $\frac{\frac{x-4}{x^2-4} = \frac{-2}{x-2}}{\frac{(0)-4}{(0)^2-4}} \qquad \frac{\frac{-2}{(0)-2}}{\frac{-2}{-2}} \qquad \frac{\frac{x-4}{x^2-4} = \frac{-2}{x-2}}{\frac{(2)-4}{(2)^2-4}} \\ \frac{\frac{-2}{(2)-2}}{\frac{-2}{0}} \qquad \frac{\frac{-2}{0}}{\frac{-2}{0}} \\ \frac{\frac{-2}{0}}{x} \\ \frac{-2}{0} \\ \frac{-2}{0$

undefined

1 🗸

The only solution is 0.

Check:



Solve. Check your answer.

1.
$$\frac{3}{x+2} = \frac{4}{x+1}$$

2. $\frac{x}{6} = \frac{x}{x+4}$
3. $\frac{5}{x+3} = \frac{6}{x+1}$
4. $\frac{2x}{6} = \frac{x}{x+1}$
5. $\frac{8}{x^2-64} = \frac{1}{x-8}$
6. $\frac{x+2}{x-2} = \frac{4}{x-4}$

Reteaching Linear Systems in Context

Example Problem:

A perfume is made from *t* ounces of 15% scented Thalia and *b* ounces of 40% Thalia. You want to make 60 oz of a perfume that has a 25% blend of the Thalia. How many ounces of each concentration of Thalia are needed to get 60 oz of perfume that is 25% strength of Thalia?

Write your systems of equations: $\begin{array}{l} 60(0.25) = 0.15t + 0.4b \\ 60 = t + b \end{array}$

Solve the system by using substitution:

60(0.25) = 0.15t + 0.4b	Solve the second equation for t and substitute in the first equation.
15 = 0.15(60 - b) + 0.4b	Substitute 60 $-b$ for t in the first equation.
15 = 9 - 0.15b + 0.4b	Distributive property
24 = b	Solve for b.

Substitute 24 for *b* in second equation to find that t = 36. The answer is (36, 24). The blend requires 36 oz of the 15% perfume and 24 oz of the 25% perfume.

Practice:

1. You have a coin bank that has 275 dimes and quarters that total \$51.50. How many of each type of coin do you have in the bank?

- **3.** You earn a fixed salary working as a sales clerk making \$11 per hour. You get a weekly bonus of \$100. Your expenses are \$60 per week for groceries and \$200 per week for rent and utilities. How many hours do you have to work in order to break even?
- 6. Multi-Step A skin care cream is made with vitamin C. How many ounces of a 30% vitamin C solution should be mixed with a 10% vitamin C solution to make 50 ounces of a 25% vitamin C solution?
 - Define the variables.
 - Make a table or drawing to help organize the information.