



## UNDERSTAND

**12. Mathematical Connections** How is the graph of a linear-quadratic system of equations different from the graph of a linear system of equations? How are the graphs similar?

**13. Look for Relationships** What does the graph of the system of equations tell you about its solution?

$$y = 3x^2 - 4x + 2$$

$$y = 8x - 10$$

**14. Higher Order Thinking** Given the equation  $y = x^2 + 3x + 2$ , write an equation for a line that intersects the parabola the given number of times.

a. 0

b. 1

c. 2

**15. Error Analysis** Describe and correct the error a student made in solving the system of equations.

$$y = 2x^2 + 3$$

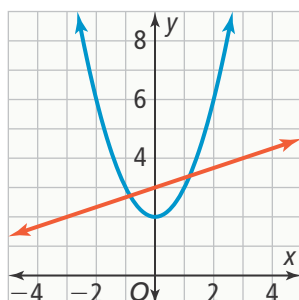
$$y = 3x + 1$$

$$\begin{array}{r} y = 2x^2 + 3 \\ - (y = 3x + 1) \\ \hline 0 = -x^2 + 2 \\ x^2 = 2 \\ x = \pm\sqrt{2} \approx \pm 1.41 \end{array}$$

X

**16. Use Appropriate Tools** How do you select the appropriate method for solving a linear-quadratic system? Describe when you would use graphing, elimination, and substitution.

**17. Use Structure** Write the linear-quadratic system of equations that is represented by the graph.



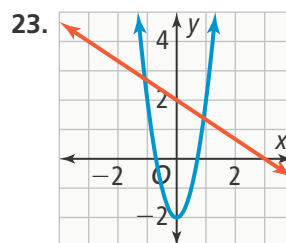
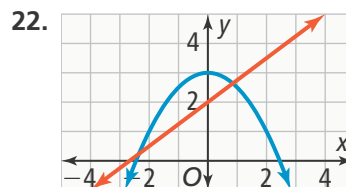
## PRACTICE

Rewrite each equation as a system of equations, and then use a graph to solve.. SEE EXAMPLES 1 AND 2

18.  $\frac{1}{3}x^2 + 2 = -x + 8$       19.  $2x^2 - 3x = -2x + 1$

20.  $5x^2 = 3x - 7$       21.  $x^2 - 2x = 2x - 4$

Each graph shows a linear-quadratic system of equations. Which equation could be used to solve this system of equations? Find the solutions of the equation. SEE EXAMPLE 2



Find the solution of each system of equations.

SEE EXAMPLES 1-4

24.  $y = x^2 + 3x - 2$   
 $y = 2x$

25.  $y = -4x^2 + x + 1$   
 $y = -7x + 1$

26.  $y = 0.5x^2 - 8x - 1$   
 $y = x + 3$

27.  $y = 7x^2 + 12$   
 $y = 14x + 5$

28.  $y = -x^2 - 2x + 9$   
 $y = 3x + 20$

29.  $y = -5x^2 + 6x - 3$   
 $y = -4x - 3$

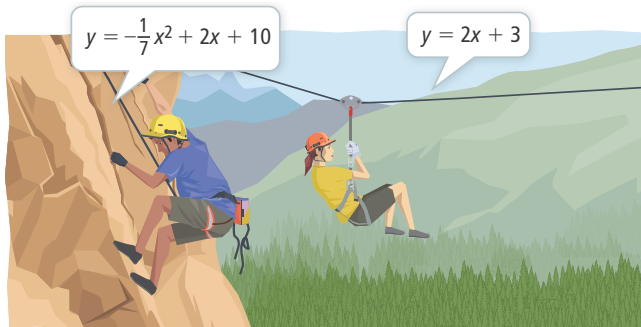
30.  $y = 0.75x^2 + 4x - 5$   
 $y = 4x - 5$

31.  $y = -x^2 + 11x + 12$   
 $y = 15 - x$

**32.** A ropes course facility offers two types of courses, a low ropes course and a high ropes course. The price of a high ropes adventure is five times as much as a low ropes adventure. Eight members of the high school adventure club choose to participate in the low ropes course, and 15 members choose the high ropes course. The total cost is \$1,411. What is the price of each type of ropes course adventure?

**APPLY**

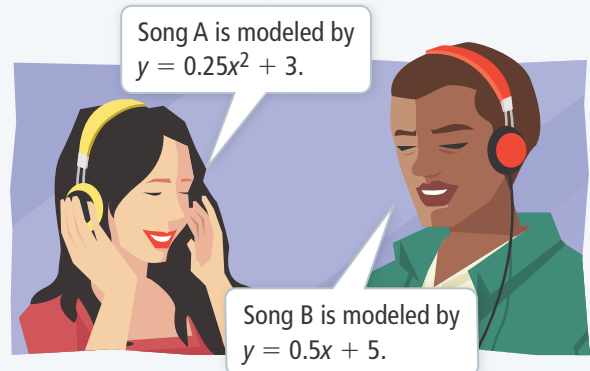
- 33. Make Sense and Persevere** An equation that models the height of an object dropped from the top of a building is  $y = -16x^2 + 30$  where  $x$  is time in sec. Another equation  $y = 14$  models the path of a bird flying in the air. Write a system of equations and then solve to find how many seconds the object is in the air before it crosses the bird's path.
- 34. Reason** A car accelerates after being completely stopped at a stop sign and enters the highway. The distance the car has traveled in miles after  $x$  minutes is represented by  $y = 0.5x^2$ . A truck is traveling in the same direction at a constant speed so that its distance in miles from the same stop sign after  $x$  minutes is represented by  $y = x + 4$ . After how many minutes will the car pass the truck? Explain.
- 35. Model With Mathematics** At the beginning of a month, the number of people rock climbing increases and then decreases by the end of the month. The number of people zip-lining steadily increases throughout the same month. The models show the number of people  $y$  for each type of activity based on the number of days  $x$  since the beginning of the month.



- Write a system of equations that represents this situation.
- On what day or days were the same number of people rock climbing and zip-lining?
- How many people were participating in each activity on that day or days?

**ASSESSMENT PRACTICE**

- 36.** What is the solution of the system of equations?  
 $y = x^2 - 5x - 8$   
 $y = -2x - 4$
- 37. SAT/ACT** What is the solution of the system of equations?  
 $y = 6x^2 + 3x - 11$   
 $y = 3x - 5$   
 Ⓐ (1, -2), (-1, -8)  
 Ⓑ (1, -1)  
 Ⓒ (-2, 1), (-8, -1)  
 Ⓓ (-1, -8)
- 38. Performance Task** A music streaming service tracks the number of times songs are played. Two different songs are released on the same day. The functions model the number of times  $y$ , in thousands, each song is played  $x$  days following their release.



- Part A** Write and solve a system of equations to find the number of days since the release when both songs are played the same number of times.
- Part B** How many solutions are there? Explain.
- Part C** A third song is released on the same day as the other two. The number of times this song is played is modeled by  $y = 0.5x + 2$ . Is there a day when the same number of people listen to the third song and the first song? Explain.