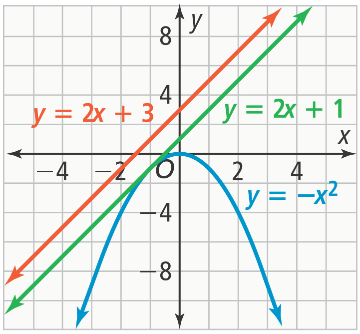
PRACTICE & PROBLEM SOLVING

UNDERSTAND

7. Construct Arguments Nora and William are asked to solve the system of equations $\begin{cases} y - 1 = 3x \\ y = 2x^2 - 4x + 9 \end{cases}$ without graphing.

Nora wants to use substitution, inserting $2x^2 - 4x + 9$ in place of y in the upper equation and solving. William wants to rewrite $y - 1 = 3x$ as $y = 3x + 1$ and begin by setting $3x + 1$ equal to $2x^2 - 4x + 9$, and then solving. Which student is correct, and why?

8. Error Analysis Chris was given the system of equations $\begin{cases} y = -x^2 \\ y = 2x + b \end{cases}$ and asked to use graphing to test the number of solutions of the system for different values of b. He graphed the system as shown, and concluded that the system could have one solution or no solutions depending on the value of b. What was Chris's error?



9. Reason You are given the following system of equations: $\begin{cases} y = x^2 \\ y = -1 \end{cases}$. Without graphing or performing any substitutions, can you see how many solutions the system must have? Describe your reasoning.

10. Construct Arguments Can a system of equations with one linear and one quadratic equation have more than two solutions? Give at least two arguments for your answer.

PRACTICE

Determine how many solutions each system of equations has by graphing them. SEE EXAMPLE 1

11. $\begin{cases} y = 3 \\ y = x^2 - 4x + 7 \end{cases}$

12. $\begin{cases} y = 3x^2 - 2x + 7 \\ y + 5 = \frac{1}{2}x \end{cases}$

Consider the system of equations $\begin{cases} y = x^2 \\ y = mx + b \end{cases}$.
SEE EXAMPLE 1

13. Find values for m and b so that the system has two solutions.

14. Find values for m and b so that the system has no solutions.

15. Find values for m and b so that the system has one solution.

Use substitution to solve the system of equations.
SEE EXAMPLE 2

16. $\begin{cases} y = 5 \\ y = 2x^2 - 16x + 29 \end{cases}$

17. $\begin{cases} y = 3x^2 - 4x \\ 27 + y = 14x \end{cases}$

18. LaToya throws a ball from the top of a bridge. Her throw is modeled by the equation $y = -0.5x^2 + 3x + 10$, and the bridge is modeled by the equation $y = -0.2x + 7$. About how far does the ball travel horizontally before its first bounce? SEE EXAMPLE 3

Solve each system of inequalities using shading.
SEE EXAMPLE 4

19. $\begin{cases} y > x^2 \\ 5 > y \end{cases}$

20. $\begin{cases} -5 < y - x \\ y < -3x^2 + 6x + 1 \end{cases}$

Solve each equation by writing a linear-quadratic system and solving using the intersection feature of a graphing calculator. SEE EXAMPLE 5

21. $6x^2 - 15x + 8 = 17 - 4x$

22. $7x^2 - 28x + 32 = 4$

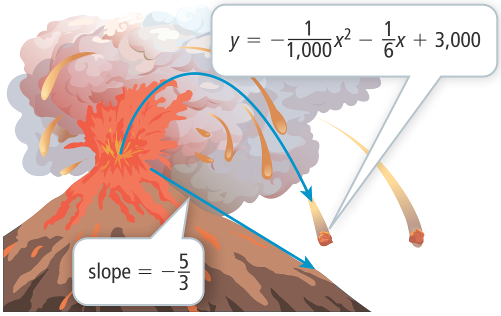
23. $-\frac{5}{2}x - 10 = -2x^2 - x - 3$

PRACTICE & PROBLEM SOLVING

Practice Tutorial
Mixed Review Available Online

APPLY

24. Model With Mathematics A boulder is flung out of the top of a 3,000 m tall volcano. The boulder's height, y, in feet, is a function of the horizontal distance it travels, x, in feet. The slope of the line representing the volcano's hillside is $-\frac{5}{3}$. At what height above the ground will the boulder strike the hillside? How far will it have traveled horizontally when it crashes?

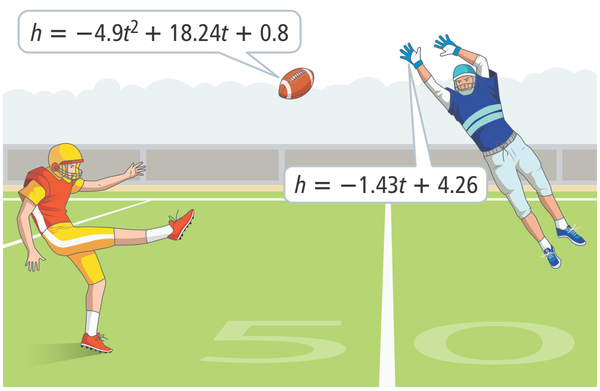


25. Use Structure You are given the system of equations:

$$\begin{cases} y = x + 1 \\ y + x^2 = 25 \end{cases}$$

Solve the system using any of the methods you have learned in this lesson. Explain why you selected the method you used.

26. Reason A football player punts the football, whose path is modeled by the equation $h = -4.9t^2 + 18.24t + 0.8$ for h, in meters, and t, in seconds. The height of a blocker's hands for the same time, t, is modeled as $h = -1.43t + 4.26$. Is it possible for the blocker to knock down the ball? What else would you have to know to be sure?



ASSESSMENT PRACTICE

27. Classify each function as having *exactly one* or *no* points of intersection with the function $y = x^2 + 8x + 11$.

a. $y = 2x - 12$

b. $y = 12x + 7$

c. $y = -5$

d. $y = 11 + 8x$

e. $y = -4$

28. SAT/ACT How many solutions does the following system of equations have?

$$\begin{cases} y = 16x - 19 \\ y = 3x^2 + 4x - 7 \end{cases}$$

Ⓐ two solutions

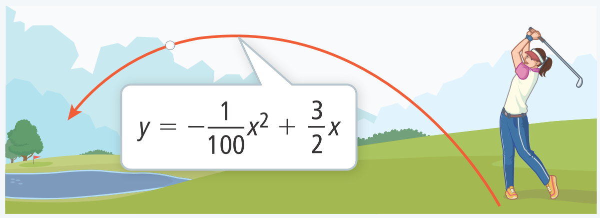
Ⓑ no solutions

Ⓒ an infinite number of solutions

Ⓓ one solution

Ⓔ The number of solutions cannot be determined.

29. Performance Task A golfer accidentally hits a ball toward a water hazard that is downhill from her current position on the fairway. The hill can be modeled by a line through the origin with slope $-\frac{1}{8}$. The path of the ball can be modeled by the function $y = -\frac{1}{100}x^2 + \frac{3}{2}x$.



Part A If the golfer stands at the origin, and the water hazard is 180 yd away, will the golfer's ball bounce or splash?

Part B How far did the ball land from the edge of the water hazard?

Part C Does it matter whether you measure the 180 yd horizontally or along the hill? Explain.