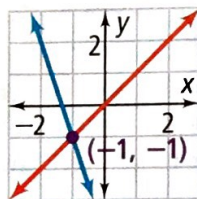


6

Chapter Review

Connecting **BIG** ideas and Answering the Essential Questions**1 Solving Equations and Inequalities**

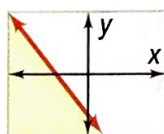
There are several ways to solve systems of equations and inequalities, including graphing and using equivalent forms of equations and inequalities within the system. The number of solutions depends on the type of system.

Solving Systems of Equations
(Lessons 6-1, 6-2, and 6-3)

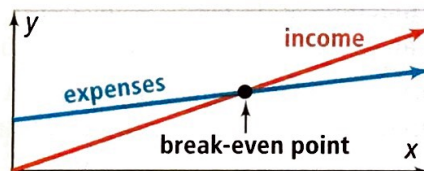
$$y = x$$

$$y = -3x - 4$$

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

Linear Inequalities (Lessons 6-5 and 6-6)**2 Modeling**

You can represent many real-world mathematical problems algebraically. When you need to find two unknowns, you may be able to write and solve a system of equations.

Applying Linear Systems
(Lesson 6-4)

Chapter Vocabulary

- consistent (p. 365)
- dependent (p. 365)
- elimination method (p. 378)
- inconsistent (p. 365)
- independent (p. 365)

- linear inequality (p. 394)
- solution of an inequality (p. 394)
- solution of a system of linear equations (p. 364)
- solution of a system of linear inequalities (p. 400)

- substitution method (p. 372)
- system of linear equations (p. 364)
- system of linear inequalities (p. 400)

Choose the correct term to complete each sentence.

1. A system of equations that has no solution is said to be ?.
2. You can solve a system of equations by adding or subtracting the equations in such a way that one variable drops out. This is called the ? method.
3. Two or more linear equations together form a(n) ?.

6-1 Solving Systems by Graphing

Quick Review

One way to solve a system of linear equations is by graphing each equation and finding the intersection point of the graph, if one exists.

Example

What is the solution of the system? $y = -2x + 2$
 $y = 0.5x - 3$

$y = -2x + 2$ Slope is -2 ; y-intercept is 2 .

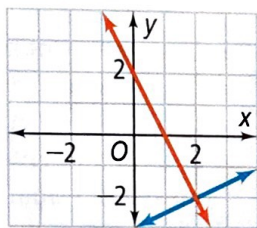
$y = 0.5x - 3$ Slope is 0.5 ; y-intercept is -3 .

The lines appear to intersect at $(2, -2)$. Check if $(2, -2)$ makes both equations true.

$-2 = -2(2) + 2$ ✓

$-2 = 0.5(2) - 3$ ✓

So, the solution is $(2, -2)$.



Exercises

Solve each system by graphing. Check your answer.

4. $y = 3x + 13$
 $y = x - 3$

5. $y = -x + 4$
 $y = 3x + 12$

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

7. $y = 1.5x + 2$
 $4.5x - 3y = -9$

8. $y = -2x - 21$
 $y = x - 7$

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

10. **Songwriting** Jay has written 24 songs to date. He writes an average of 6 songs per year. Jenna started writing songs this year and expects to write about 12 songs per year. How many years from now will Jenna have written as many songs as Jay? Write and graph a system of equations to find your answer.

11. **Reasoning** Describe the graph of a system of equations that has no solution.

6-2 Solving Systems Using Substitution

Quick Review

You can solve a system of equations by solving one equation for one variable and then substituting the expression for that variable into the other equation.

Example

What is the solution of the system? $y = -\frac{1}{3}x$
 $3x + 3y = -18$

$3x + 3y = -18$ Write the second equation.

$3x + 3(-\frac{1}{3}x) = -18$ Substitute $-\frac{1}{3}x$ for y .

$2x = -18$ Simplify.

$x = -9$ Solve for x .

$y = -\frac{1}{3}(-9)$ Substitute -9 for x in the first equation.

$y = 3$

The solution is $(-9, 3)$.

Exercises

Solve each system using substitution. Tell whether the system has *one solution*, *infinitely many solutions*, or *no solution*.

12. $y = 2x - 1$
 $2x + 2y = 22$

13. $-x + y = -13$
 $3x - y = 19$

14. $2x + y = -12$
 $-4x - 2y = 30$

15. $\frac{1}{3}y = \frac{7}{3}x + \frac{5}{3}$
 $x - 3y = 5$

16. $y = x - 7$
 $3x - 3y = 21$

17. $3x + y = -13$
 $-2x + 5y = -54$

18. **Business** The owner of a hair salon charges \$20 more per haircut than the assistant. Yesterday the assistant gave 12 haircuts. The owner gave 6 haircuts. The total earnings from haircuts were \$750. How much does the owner charge for a haircut? Solve by writing and solving a system of equations.

6-3 and 6-4 Solving Systems Using Elimination; Applications of Systems

Quick Review

You can add or subtract equations in a system to eliminate a variable. Before you add or subtract, you may have to multiply one or both equations by a constant to make eliminating a variable possible.

Example

What is the solution of the system?

$$\begin{array}{r} 3x + 2y = 41 \\ 5x - 3y = 24 \end{array}$$

$$\begin{array}{r} 3x + 2y = 41 \\ 10x - 6y = 48 \\ \hline 19x + 0 = 171 \\ x = 9 \end{array}$$

$3x + 2y = 41$ Write the first equation.
 $3(9) + 2y = 41$ Substitute 9 for x .
 $y = 7$ Solve for y .

The solution is (9, 7).

Exercises

Solve each system using elimination. Tell whether the system has *one solution*, *infinitely many solutions*, or *no solution*.

19. $x + 2y = 23$
 $5x + 10y = 55$
20. $7x + y = 6$
 $5x + 3y = 34$
21. $5x + 4y = -83$
 $3x - 3y = -12$
22. $9x + \frac{1}{2}y = 51$
 $7x + \frac{1}{3}y = 39$
23. $4x + y = 21$
 $-2x + 6y = 9$
24. $y = 3x - 27$
 $x - \frac{1}{3}y = 9$

25. **Flower Arranging** It takes a florist 3 h 15 min to make 3 small centerpieces and 3 large centerpieces. It takes 6 h 20 min to make 4 small centerpieces and 7 large centerpieces. How long does it take to make each small centerpiece and each large centerpiece? Write and solve a system of equations to find your answer.

6-5 and 6-6 Linear Inequalities and Systems of Inequalities

Quick Review

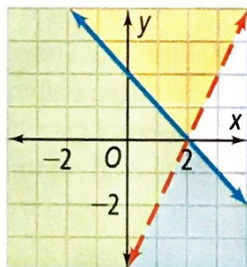
A **linear inequality** describes a region of the coordinate plane with a boundary line. Two or more inequalities form a **system of inequalities**. The system's solutions lie where the graphs of the inequalities overlap.

Example

What is the graph of the system?

$$\begin{array}{l} y > 2x - 4 \\ y \leq -x + 2 \end{array}$$

Graph the boundary lines $y = 2x - 4$ and $y = -x + 2$. For $y > 2x - 4$, use a dashed boundary line and shade above it. For $y \leq -x + 2$, use a solid boundary line and shade below. The green region of overlap contains the system's solutions.



Exercises

Solve each system of inequalities by graphing.

26. $y \geq x + 4$
 $y < 2x - 1$
27. $4y < -3x$
 $y < -\frac{3}{4}x$
28. $2x - y > 0$
 $3x + 2y \leq -14$
29. $x + 0.5y \geq 5.5$
 $0.5x + y < 6.5$
30. $y < 10x$
 $y > x - 5$
31. $4x + 4 > 2y$
 $3x - 4y \geq 1$
32. **Downloads** You have 60 megabytes (MB) of space left on your portable media player. You can choose to download song files that use 3.5 MB or video files that use 8 MB. You want to download at least 12 files. What is a graph showing the numbers of song and video files you can download?