4 Chapter Review

Review Key Vocabulary

system of linear equations,
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solution of a system of linear
equations, *p. 156*

system of linear inequalities,
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solution of a system of linear
inequalities, *p. 186*

graph of a system of linear
inequalities, *p. 186*

Review Examples and Exercises

4.1 Solving Systems of Linear Equations by Graphing (pp. 154–159)
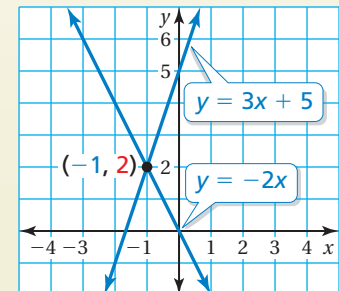
Solve the system by graphing.　　$y = -2x$　　Equation 1

　　　　　　　　　　　　　　　　$y = 3x + 5$　　Equation 2

Step 1: Graph each equation.

Step 2: Estimate the point of intersection. The
graphs appear to intersect at $(-1, 2)$.

Step 3: Check the point from Step 2.

$y = -2x$　　　　　$y = 3x + 5$

$2 \overset{?}{=} -2(-1)$　　$2 \overset{?}{=} 3(-1) + 5$

$2 = 2$ ✓　　　　$2 = 2$ ✓

∴ The solution is $(-1, 2)$.

Exercises

Solve the system of linear equations by graphing.

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

2. $y = -x + 4$
$x + 3y = 0$

3. $x - y = -2$
$2x - 3y = -2$

4.2 Solving Systems of Linear Equations by Substitution (pp. 160–165)

Solve the system by substitution.　　$x = 1 + y$　　Equation 1

　　　　　　　　　　　　　　　　　　$x + 3y = 13$　　Equation 2

Step 1: Equation 1 is already solved for x.

Step 2: Substitute $1 + y$ for x in Equation 2.

　　　　　$1 + y + 3y = 13$　　　　Substitute $1 + y$ for x.

　　　　　　　　　$y = 3$　　　　Solve for y.

Step 3: Substituting 3 for y in Equation 1 gives $x = 4$.

∴ The solution is $(4, 3)$.

Exercises

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

4. $y = -3x - 7$

$y = x + 9$

5. $\frac{1}{2}x + y = -4$

$y = 2x + 16$

6. $-x + 5y = 28$

$x + 3y = 20$

4.3 **Solving Systems of Linear Equations by Elimination** *(pp. 168–175)*

You have a total of 5 quarters and dimes in your pocket. The value of the coins is $0.80. Write and solve a system of linear equations to find the number x of dimes and the number y of quarters in your pocket.

Use a verbal model to write a system of linear equations.

$$\boxed{\text{Number of dimes, } x} + \boxed{\text{Number of quarters, } y} = \boxed{\text{Number of coins}}$$

$$\boxed{\text{Value of a dime}} \cdot \boxed{\text{Number of dimes, } x} + \boxed{\text{Value of a quarter}} \cdot \boxed{\text{Number of quarters, } y} = \boxed{\text{Total value}}$$

The system is $x + y = 5$ and $0.1x + 0.25y = 0.8$.

Step 1: Multiply Equation 2 by 10.

$x + y = 5$ $x + y = 5$ Equation 1

$0.1x + 0.25y = 0.8$ **Multiply by 10.** $x + 2.5y = 8$ Revised Equation 2

Step 2: Subtract the equations.

$$
\begin{array}{ll}
x + y = 5 & \text{Equation 1} \\
\underline{x + 2.5y = 8} & \text{Revised Equation 2} \\
 -1.5y = -3 & \text{Subtract the equations.}
\end{array}
$$

Step 3: Solving the equation $-1.5y = -3$ gives $y = 2$.

Step 4: Substitute 2 for y in one of the original equations and solve for x.

$$
\begin{array}{ll}
x + y = 5 & \text{Equation 1} \\
x + 2 = 5 & \text{Substitute 2 for } y. \\
 x = 3 & \text{Subtract 2 from each side.}
\end{array}
$$

∴ So, you have 3 dimes and 2 quarters in your pocket.

Exercises

7. GIFT BASKET A gift basket that contains jars of jam and packages of bread mix costs $45. There are 8 items in the basket. Jars of jam cost $6 each and packages of bread mix cost $5 each. Write and solve a system of linear equations to find the number of jars of jam and the number of packages of bread mix in the gift basket.

Solving Special Systems of Linear Equations *(pp. 176–183)*

Solve the system. $y = -5x - 8$ Equation 1

$y = -5x + 4$ Equation 2

Solve by substitution. Substitute $-5x + 4$ for y in Equation 1.

$$y = -5x - 8 \qquad \text{Equation 1}$$

$$-5x + 4 = -5x - 8 \qquad \text{Substitute } -5x + 4 \text{ for } y.$$

$$4 \neq -8 \; ✗ \qquad \text{Add } 5x \text{ to each side.}$$

∴ The equation $4 = -8$ is never true. So, the system of linear equations has no solution.

Exercises

Solve the system of linear equations. Check your solution.

8. $x + 2y = -5$
$x - 2y = -5$

9. $3x - 2y = 1$
$9x - 6y = 3$

10. $8x - 2y = 16$
$-4x + y = 8$

11. Use a graph to solve $2x - 9 = 7x + 11$. Check your solution.

Systems of Linear Inequalities *(pp. 184–191)*

Graph the system. $y < x - 2$ Inequality 1

$y \geq 2x - 4$ Inequality 2

Check

Verify that $(0, -3)$ is a solution of each inequality.

Inequality 1

$y < x - 2$
$-3 \overset{?}{<} 0 - 2$
$-3 < -2 \; ✓$

Inequality 2

$y \geq 2x - 4$
$-3 \overset{?}{\geq} 2(0) - 4$
$-3 \geq -4 \; ✓$

Step 1: Graph each inequality.

Step 2: Find the intersection of the half-planes. One solution is $(0, -3)$.
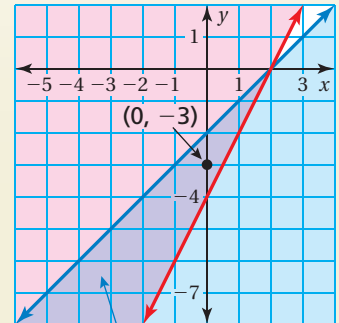
The solution is the purple shaded region.

Exercises

Graph the system of linear inequalities.

12. $y \leq x - 3$
$y \geq x + 1$

13. $y > -2x + 3$
$y \geq \dfrac{1}{4}x - 1$

14. $x + 2y > 4$
$2x + y < 4$