

6-2

Solving Systems
Using Substitution

Vocabulary

● Review

1. Cross out the expression that does NOT include a *variable*.

$y + 9$

$a - b$

$23 + 9$

$3x + 4y + 12$

2. Circle the equation in which the *variable* is isolated.

$8k = 16$

$m + 3 = -2$

$a = 7 - 3$

$12 = z + 4$

● Vocabulary Builder

substitution (noun) sub stuh too shun

Related Words: substitute (verb or adjective)

Definition: A **substitution** is something taking the place of something else.

Example: A **substitution** of 4 for x and 8 for y in $x + y$ gives $4 + 8$, or 12.

● Use Your Vocabulary

Complete each statement with the appropriate form of the word *substitution*.

3. ADJECTIVE We had a ? teacher in social studies class today.

4. NOUN The coach made a ? of one player for another.

5. VERB To evaluate the expression $x + 6$, you can ? a number for x .

6. Write a combination of coins that you could *substitute* for each dollar amount.

\$1.00

\$2.00

\$5.00

You can solve linear systems by solving one of the equations for one of the variables. Then substitute the expression for the variable into the other equation. This is called the **substitution method**.



Problem 1 Using Substitution

Got It? What is the solution of the system? Use substitution. $y = 2x + 7$
Check your answer. $y = x - 1$

7. Circle the equation that shows a substitution from one equation into the other.

$2x + 7 = x - 1$ $y = x - 1$ $y = 2x + 7$ $2y + 7 = y - 1$

8. Now find the value of x .

9. Use the value of x to find the value of y .

10. The solution is (,).

11. Check your answer by substituting the values for x and y in both equations.

$$y = 2x + 7$$

$\stackrel{?}{=} 2 \cdot$ () $+ 7$

$\stackrel{?}{=} \text{ } + 7$

$= \text{ }$

$$y = x - 1$$

$\stackrel{?}{=} \text{ } - 1$

$= \text{ }$



Problem 2 Solving for a Variable and Using Substitution

Got It? What is the solution of the system? Use substitution. $6y + 5x = 8$
 $x + 3y = -7$

12. Complete the reasoning model below.

Think	Write
I need to solve one of the equations for one of the variables. Solving the second equation for x is quickest.	$x + 3y = -7$ $x = -7 - \text{ } \square$
Next I substitute into the other equation. Then I solve the equation for y .	$6y + 5x = 8$ $6y + 5(\text{ } \square) = 8$ $6y + \text{ } \square = 8$ $\text{ } \square = \text{ } \square$ $\text{ } \square \approx \text{ } \square$
Now I substitute the y -value into either original equation and solve for x .	$x + 3y = -7$ $x + 3(\text{ } \square) = -7$ $x \approx \text{ } \square$

13. The solution is about (,).



Problem 3 Using Systems of Equations

Got It? You pay \$22 to rent 6 video games. The store charges \$4 for new games and \$2 for older games. How many new games did you rent?

14. Define the variables.

Let x = the number of \$4 games.

Let y = _____.

15. Complete the models below.

Relate total games is number of \$4 games plus number of \$2 games

Write 6 = x +

Relate total cost is cost of \$4 games plus cost of \$2 games

Write 22 = 4 · +

16. Solve the first equation for y .

17. Substitute your answer from Exercise 16 to find the x -value.

18. The student rented new (\$4) games.

If you get an identity, such as $2 = 2$, when you solve a system of equations, then the system has infinitely many solutions. If you get a false statement, such as $8 = 2$, then the system has no solution.



Problem 4 Systems with Infinitely Many Solutions or No Solution

Got It? How many solutions does the system have?

$$6y + 5x = 8$$

$$2.5x + 3y = 4$$

19. Use substitution to solve the system of equations.

20. I obtained an identity / a false statement, so this system of equations has infinitely many / no solutions.



Lesson Check • Do you UNDERSTAND?

For the system, tell which equation you would first use to solve for a variable in the first step of the substitution method. Explain your choice.

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

$$4x + 2y = 12$$

21. Each of the equations has been solved for a variable. Explain which variable you would choose to solve for and why.

Equation 1

solved for x :

$$x = \frac{1}{2} - \frac{1}{2}y$$

solved for y :

$$y = 2x - 1$$

Equation 2

solved for x :

$$x = 3 - \frac{2}{3}y$$

solved for y :

$$y = 6 - 2x$$



Math Success

Check off the vocabulary words that you understand.

substitution

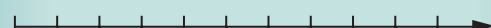
system of equations

solution of a system

Rate how well you can *solve systems using substitution*.

Need to review

0 2 4 6 8 10



Now I get it!