NAME

Module 10 Solving Systems of Linear Equations and Inequalities

Lesson 2 Solving Systems of Linear Equations by Elimination

Use elimination to find the solution to each system of equations.

1. $\begin{cases} x - y = 7 \\ x + y = 1 \end{cases}$

(4, –3)

2. $\begin{cases} x + y = -1 \\ -x + 3y = -3 \end{cases}$

(0, –1)

3. $\begin{cases} x - 2y = -13 \\ 5x + 2y = 1 \end{cases}$

$\left(-2, 5\frac{1}{2}\right)$

4. $\begin{cases} 5x - 4y = 0 \\ 3x + y = 17 \end{cases}$

(4, 5)

5. $\begin{cases} y = 3x + 20 \\ y = -3x + 12 \end{cases}$

$\left(-\frac{4}{3}, 16\right)$

6. $\begin{cases} 4x - 2y = 3 \\ 5x - 3y = 2 \end{cases}$

$\left(2\frac{1}{2}, 3\frac{1}{2}\right)$

7. $\begin{cases} 9y = 7x - 43 \\ 9y = 7x + 54 \end{cases}$

No solution

8. $\begin{cases} 3w - 2z = -7 \\ 2w + 7z = -63 \end{cases}$

(–7, –7)

9. $\begin{cases} 7y = 21x - 49 \\ y = 3x - 7 \end{cases}$

Infinitely many solutions

Write a system of equations, and solve the system using elimination.

10. The sum of two numbers is equal to 45. Their difference is 23. Find the numbers.

11 and 34

11. The sum of two consecutive integers is 97. Half the first plus three times the second is 171. Find the integers.

The integers are 48 and 49.

12. Carnations cost $23.75 per dozen, and roses cost $69.95 per dozen. The florist sold a combination of 12 dozen flowers on Saturday and took in $608.40. How many dozens of each kind of flower did the florist sell?

5 dozen carnations; 7 dozen roses

13. World series tickets are $35 for bleacher seats and $165 for stadium seats. 235,957 people attended the first game, and $16,094,505 was the total for ticket sales. How many people sat in the bleacher seats for the first game?

175,680 people sat in the bleachers.

14. When Sarah was born, her mother was 23. In three more years, Sarah's mother will be twice Sarah's age now. How old are they now?

Sarah is 26, and her mother is 49.

15. Kevin is six years older than his twin sisters. The sum of the three children's ages is the same as their 42-year-old dad's age. How old are the children?

Kevin is 18, and his sisters are 12.

16. The perimeter of a rectangle is 20 feet. The length is one foot more than twice the width. What are the dimensions of the rectangle?

The dimensions are 3 ft by 7 ft.

17. One of the acute angles in a right triangle is 10 degrees more than the other. Find the two angle measures.

One angle measure is 40 degrees and the other angle measures 50 degrees.

Journal

1. When using the elimination method, how do you know when there is no solution to the system of equations? Infinitely many solutions?
2. Is it possible for a dependent system to be inconsistent? Why or why not?
3. Do you prefer solving systems by graphing or elimination? Explain.
4. When is it necessary to multiply ***each*** equation by a different number?
5. Shane said to solve this system $\begin{cases} x + y = 7 \\ 12x - 3y = 15 \end{cases}$ the first step would be to multiply the top equation by 3, then add the two equations. Jacob said the first step is to multiply the top equation by –12, then add. Josh says they are both correct. Who is correct, and why?

Cumulative Review

Solve each equation.

1. $3x + 2 = 17$ **$x = 5$**
2. $2 - 5y = 32$ **$y = -6$**
3. $w - 3w + 7 = 3$ **$w = 2$**
4. $57 = 3t$ **$t = 19$**
5. $M + 5M = 3M - 21$ **$M = -7$**
6. $n - 37 + 2(n + 1) = -35$ **$n = 0$**
7. $3c^2 = 75$ **$c = \pm 5$**
8. $40 = v^2 - 9$ **$v = \pm 7$**
9. $|x| + 9 = 15$ **$x = \pm 6$**
10. $12 - |h| = 12$ **$h = 0$**

Possible Journal Responses

1. **When both variables are eliminated during the process of solving by elimination, and the resulting equation is FALSE, this means the system has no solution. When the variables are eliminated and the resulting equation is TRUE, the system is dependent and has infinitely many solutions.**
2. **No, a dependent system cannot be inconsistent. Whenever a system is dependent, the system has an infinite number of solutions. Inconsistent systems are those which have no solution. It is impossible for the same system to have no solution and an infinite number of solutions.**
3. **Answers will vary according to each student's own preferences. Check explanations.**
4. **It is necessary to multiply each equation in a system by a different number when there is no coefficient that is a multiple of the corresponding coefficient in the other equation. Anytime the coefficient of one variable is a multiple of the other, only one equation must be multiplied by the number.**
5. **Josh is correct. It doesn't matter which variable is eliminated first. Multiplying by 3 will eliminate the *y* variable, and the value of *x* would be found first. Multiplying by –12 would eliminate the *x* variable, and the value of *y* would be found first. Of course, a reasonable argument could be made for multiplying by 3 first so the arithmetic would be easier with the smaller quantities. In that case, Shane would be correct.**