

6-3 Reteaching

Solving Systems Using Elimination

Elimination is one way to solve a system of equations. Think about what the word “eliminate” means. You can eliminate either variable, whichever is easiest.

Problem

Solve and check the following system of linear equations.

$$4x - 3y = -4$$

$$2x + 3y = 34$$

Solution The equations are already arranged so that like terms are in columns.

Notice how the coefficients of the y -variables have the opposite sign and the same value.

$$\begin{array}{r} 4x - 3y = -4 \\ 2x + 3y = 34 \\ \hline 6x = 30 \end{array}$$

$$x = 5$$

$$4(5) - 3y = -4$$

$$20 - 3y = -4$$

$$-3y = -24$$

$$y = 8$$

Add the equations to eliminate y .

Divide both sides by 6 to solve for x .

Substitute 5 for x in one of the original equations and solve for y .

The solution is $(5, 8)$.

Check

$$\begin{array}{r} 4x - 3y = -4 \\ 4(5) - 3(8) \stackrel{?}{=} -4 \\ 20 - 24 \stackrel{?}{=} -4 \\ -4 = -4 \quad \checkmark \end{array}$$

Substitute your solution into both of the original equations to check.

You can check the other equation.

Exercises

Solve and check each system.

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

2. $6x - 3y = -14$
 $6x - y = -2$

3. $3x - 2y = 10$
 $x - 2y = 6$

4. $4x + y = 8$
 $x + y = 5$

If none of the variables has the same coefficient, you have to multiply before you eliminate.

Problem

Solve the following system of linear equations.

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

$$5x + 4y = 6$$

Solution

$$5(-2x - 3y) = (-1)5$$

$$2(5x + 4y) = (6)2$$

$$-10x - 15y = -5$$

$$\begin{array}{r} 10x + 8y = 12 \\ \hline -7y = 7 \end{array}$$

$$y = -1$$

$$5x + 4(-1) = 6$$

$$5x - 4 = 6$$

$$5x = 10$$

$$x = 2$$

Multiply the first equation by 5 (all terms, both sides) and the second equation by 2. You can eliminate the x variable when you add the equations together.

Distribute, simplify and add.

Divide both sides by 7.

Substitute -1 in for y in the second equation to find the value of x .

Simplify.

Add 4 to both sides.

Divide by 5 to solve for x .

The solution is $(2, -1)$.

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

$$\begin{array}{r} -2(2) - 3(-1) = -1 \\ -4 + 3 = -1 \\ -1 = -1 \checkmark \end{array}$$

Substitute your solution into both original equations.

You can check the other equation.

Exercises

Solve and check each system.

5. $x - 3y = -3$

$$-2x + 7y = 10$$

6. $-2x - 6y = 0$

$$3x + 11y = 4$$

7. $3x + 10y = 5$

$$7x + 20y = 11$$

8. $4x + y = 8$

$$x + y = 5$$