

Algebra 2 Course, Unit 2 –  
Worksheet 16 –  
Solving Systems of Linear  
Equations by Substitution, Part  
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Algebra 2 Course, Unit 2 – Worksheet 16 – Solving Systems of Linear Equations by Substitution, Part 1

1. Solve the system of equations below using the substitution method.

$$\begin{cases} y = 4x - 9 \\ x - y = 3 \end{cases}$$

2. Solve the system of equations below using the substitution method.

$$\begin{cases} x = -7y \\ 2x - 8y = 22 \end{cases}$$

3. Solve the system of equations below using the substitution method.

$$\begin{cases} 4x + 2y = 10 \\ x = y + 13 \end{cases}$$

4. Solve the system of equations below using the substitution method.

$$\begin{cases} 6x + 8y = -22 \\ x = 3 \end{cases}$$

5. Solve the system of equations below using the substitution method.

$$\begin{cases} y = -5 \\ 5x + 4y = -20 \end{cases}$$

6. Solve the system of equations below using the substitution method.

$$\begin{cases} y = 6x - 11 \\ 2x + 3y = 7 \end{cases}$$

7. Solve the system of equations below using the substitution method.

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

8. Solve the system of equations below using the substitution method.

$$\begin{cases} 3x - 5y = 17 \\ x = 14 \end{cases}$$

9. Solve the system of equations below using the substitution method.

$$\begin{cases} 7x - 4y = -24 \\ 5x - 5y = 0 \end{cases}$$

10. Solve the system of equations below using the substitution method.

$$\begin{cases} 4x - y = 20 \\ -6x - 6y = 30 \end{cases}$$

11. Solve the system of equations below using the substitution method.

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

12. Solve the system of equations below using the substitution method.

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

Answers – Algebra 2 Course, Unit 2 – Worksheet 16 – Solving Systems of Linear Equations by Substitution, Part 1

1. Solve the system of equations below using the substitution method.

$$\begin{cases} y = 4x - 9 \\ x - y = 3 \end{cases}$$

The variable  $y$  is isolated in the first equation. Substitute  $y = 4x - 9$  into the second equation and solve for  $x$ .

$$x - (4x - 9) = 3; x - 4x + 9 = 3$$

$$-3x + 9 = 3; -3x = -6; x = 2$$

Now use  $x = 2$  to solve for  $y$  in the second equation.

$$2 - y = 3; -y = 1; y = -1$$

**Answer:**  $(2, -1)$

2. Solve the system of equations below using the substitution method.

$$\begin{cases} x = -7y \\ 2x - 8y = 22 \end{cases}$$

The variable  $x$  is isolated in the first equation. Substitute  $x = -7y$  into the second equation and solve for  $y$ .

$$2(-7y) - 8y = 22; -14y - 8y = 22$$

$$-22y = 22; y = -1$$

Now use  $y = -1$  to solve for  $x$  in the first equation.

$$x = -7(-1); x = 7$$

**Answer:**  $(7, -1)$

3. Solve the system of equations below using the substitution method.

$$\begin{cases} 4x + 2y = 10 \\ x = y + 13 \end{cases}$$

The variable  $x$  is isolated in the second equation. Substitute  $x = y + 13$  into the first equation and solve for  $y$ .

$$4(y + 13) + 2y = 10; 4y + 52 + 2y = 10$$

$$6y + 52 = 10; 6y = -42$$

$$y = -7$$

Now use  $y = -7$  to solve for  $x$  in the second equation.

$$x = -7 + 13; x = 6$$

**Answer:**  $(6, -7)$

4. Solve the system of equations below using the substitution method.

$$\begin{cases} 6x + 8y = -22 \\ x = 3 \end{cases}$$

The second equation gives the value of  $x$ . Substitute  $x = 3$  into the first equation and solve for  $y$ .

$$6(3) + 8y = -22; 18 + 8y = -22$$

$$8y = -40; y = -5$$

**Answer:**  $(3, -5)$

5. Solve the system of equations below using the substitution method.

$$\begin{cases} y = -5 \\ 5x + 4y = -20 \end{cases}$$

The first equation gives the value for  $y$ . Substitute  $y = -5$  into the second equation and solve for  $x$ .

$$5x + 4(-5) = -20; 5x - 20 = -20$$

$$5x = 0; x = 0$$

**Answer:**  $(0, -5)$

6. Solve the system of equations below using the substitution method.

$$\begin{cases} y = 6x - 11 \\ 2x + 3y = 7 \end{cases}$$

The variable  $y$  is isolated in the first equation. Substitute  $y = 6x - 11$  into the second equation and solve for  $x$ .

$$2x + 3(6x - 11) = 7; 2x + 18x - 33 = 7$$

$$20x - 33 = 7; 20x = 40; x = 2$$

Use  $x = 2$  to solve for  $y$  in the first equation.

$$y = 6(2) - 11; y = 12 - 11; y = 1$$

**Answer:**  $(2, 1)$



7. Solve the system of equations below using the substitution method.

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

The variable  $y$  is isolated in the second equation. Substitute  $y = x - 1$  into the first equation and solve for  $x$ .

$$2x - 3(x - 1) = -1; 2x - 3x + 3 = -1$$

$$-x + 3 = -1; -x = -4; x = 4$$

Use  $x = 4$  to solve for  $y$  in the second equation.

$$y = 4 - 1; y = 3$$

**Answer:** (4,3)

8. Solve the system of equations below using the substitution method.

$$\begin{cases} 3x - 5y = 17 \\ x = 14 \end{cases}$$

The second equation gives the value for  $x$ . Substitute  $x = 14$  into the first equation and solve for  $y$ .

$$3(14) - 5y = 17; 42 - 5y = 17$$

$$-5y = -25; y = 5$$

**Answer:** (14,5)

9. Solve the system of equations below using the substitution method.

$$\begin{cases} 7x - 4y = -24 \\ 5x - 5y = 0 \end{cases}$$

In the second equation, isolate the variable  $x$ .

$$5x - 5y = 0; \quad 5x - 5y + 5y = 0 + 5y$$

$$5x = 5y; \quad \frac{5x}{5} = \frac{5y}{5}; \quad x = y$$

Now, substitute  $x = y$  into the first equation and solve for  $y$ .

$$7y - 4y = -24; \quad 3y = -24; \quad y = -8$$

Next, substitute  $y = -8$  into the equation  $x = y$  and solve for  $x$ .

$$x = -8$$

**Answer:**  $(-8, -8)$

10. Solve the system of equations below using the substitution method.

$$\begin{cases} 4x - y = 20 \\ -6x - 6y = 30 \end{cases}$$

Isolate the variable  $y$  in the first equation.

$$4x - y = 20; 4x - y - 4x = 20 - 4x$$

$$-y = -4x + 20; y = 4x - 20$$

Now, we will first simplify the second equation and then substitute  $4x - 20$  into the simplified equation for  $y$ .

$$\frac{-6x - 6y}{6} = \frac{30}{6}; -x - y = 5$$

$$-x - (4x - 20) = 5$$

$$-x - 4x + 20 = 5; -5x + 20 = 5$$

$$-5x + 20 - 20 = 5 - 20; -5x = -15; x = 3$$

Next, substitute  $x = 3$  into the first equation and solve for  $y$ .

$$4x - y = 20; 4(3) - y = 20$$

$$12 - y = 20; -y = 8; y = -8$$

**Answer:**  $(3, -8)$

11. Solve the system of equations below using the substitution method.

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

The variable  $y$  is isolated in the first equation. Substitute  $y = -3x + 5$  into the second equation and solve for  $x$ .

$$5x - 4y = -3; 5x - 4(-3x + 5) = -3$$

$$5x + 12x - 20 = -3; 17x - 20 = -3$$

$$17x - 20 + 20 = -3 + 20; 17x = 17; x = 1$$

Next, substitute  $x = 1$  into the first equation and solve for  $y$ .

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

**Answer:** (1,2)

12. Solve the system of equations below using the substitution method.

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

The variable  $y$  is isolated in the second equation. We will simplify the first equation and then substitute  $-5x - 17$  into the simplified equation for  $y$ .

$$\frac{3x}{3} + \frac{3y}{3} = \frac{-3}{3}; x + y = -1$$

$$x + y = -1; x + (-5x - 17) = -1$$

$$x - 5x - 17 = -1; -4x - 17 = -1$$

$$-4x = 16; x = -4$$

Next, substitute  $x = -4$  into the second equation and solve for  $y$ .

$$y = -5(-4) - 17; y = 20 - 17; y = 3$$

**Answer:** (-4,3)