

### Solving Systems of Equations by Elimination

**Step 1:** Write the system so that "like terms" are aligned.

**Step 2:** Multiply one or both equations by a constant to get opposite coefficients.

**Step 3:** Add to eliminate one of the variables and solve for the other variable.

**Step 4:** Substitute the value of the variable into one of the original equations to solve for the other variable.

**Step 5:** Write the solution as an ordered pair.

Solve by Elimination. Check your solution algebraically.

1.) 
$$\begin{array}{r} -x + y = 5 \\ x - 5y = -9 \end{array}$$

$$\frac{-4y = -4}{-4 \quad -4}$$

$$\boxed{y = 1}$$

$$\begin{array}{r} x - 5y = -9 \\ x - 5(1) = -9 \\ x - 5 = -9 \\ +5 \quad +5 \\ \hline \boxed{x = -4} \end{array}$$

3.) 
$$\begin{array}{r} 3x + 4y = 18 \\ -1(-2x + 4y = 8) \end{array}$$

$$\frac{2x - 4y = -8}{+ 3x + 4y = 18}$$

$$\frac{5x = 10}{5 \quad 5}$$

$$\boxed{x = 2}$$

$$\begin{array}{r} 3x + 4y = 18 \\ 3(2) + 4y = 18 \\ 6 + 4y = 18 \\ -6 \quad -6 \\ \hline \frac{4y = 12}{4 \quad 4} \end{array}$$

$$\boxed{y = 3}$$

2.) 
$$\begin{array}{r} x - 2y = -19 \\ 5x + 2y = 1 \end{array}$$

$$\frac{6x = -18}{6 \quad 6}$$

$$\boxed{x = -3}$$

$$\begin{array}{r} 5x + 2y = 1 \\ 5(-3) + 2y = 1 \\ -15 + 2y = 1 \\ +15 \quad +15 \\ \hline \frac{2y = 16}{2 \quad 2} \end{array}$$

$$\boxed{y = 8}$$

4.) 
$$\begin{array}{r} 3x + 3y = 15 \\ -1(-2x + 3y = -5) \end{array}$$

$$\frac{2x - 3y = 5}{+ 3x + 3y = 15}$$

$$\frac{5x = 20}{5 \quad 5}$$

$$\boxed{x = 4}$$

$$\begin{array}{r} 3x + 3y = 15 \\ 3(4) + 3y = 15 \\ 12 + 3y = 15 \\ -12 \quad -12 \\ \hline \frac{3y = 3}{3 \quad 3} \end{array}$$

$$\boxed{y = 1}$$

5.) 
$$\begin{aligned} 2x + y &= 3 \\ -x + 3y &= -12 \end{aligned}$$
  $(3, -3)$

$$\begin{aligned} -2x + 6y &= -24 \\ 2x + y &= 3 \end{aligned}$$

$$\frac{7y}{7} = \frac{-21}{7}$$

$$y = -3$$

$$\begin{aligned} 2x + y &= 3 \\ 2x - 3 &= 3 \\ \hline +3 & +3 \end{aligned}$$

$$\frac{2x}{2} = \frac{6}{2}$$

$$x = 3$$

7.) 
$$\begin{aligned} y + 3x &= -2 \\ 2y - 3x &= 14 \end{aligned}$$
  $(-2, 4)$

$$\frac{3y}{3} = \frac{12}{3}$$

$$y = 4$$

$$\begin{aligned} 4 + 3x &= -2 \\ -4 & -4 \end{aligned}$$

$$\frac{3x}{3} = \frac{-6}{3}$$

$$x = -2$$

6.) 
$$\begin{aligned} 3(x + 2y) &= 11 \\ -3x + y &= -5 \end{aligned}$$
  $(3, 4)$

$$\begin{aligned} 3x + 6y &= 33 \\ -3x + y &= -5 \end{aligned}$$

$$\frac{7y}{7} = \frac{28}{7}$$

$$y = 4$$

$$x + 2y = 11$$

$$x + 2(4) = 11$$

$$\begin{aligned} x + 8 &= 11 \\ -8 & -8 \end{aligned}$$

$$x = 3$$

8.) 
$$\begin{aligned} 3x + 2y &= 6 \\ -x + y &= -2 \end{aligned}$$
  $(2, 0)$

$$\begin{aligned} -3x + 3y &= -6 \\ 3x + 2y &= 6 \end{aligned}$$

$$\frac{5y}{5} = \frac{0}{5}$$

$$y = 0$$

$$-x + y = -2$$

$$-x + 0 = -2$$

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

$$x = 2$$