

Solving Systems of Equations by Elimination

Solve each system by elimination.

1)
$$\begin{aligned} -4x - 2y &= -12 \\ 4x + 8y &= -24 \end{aligned}$$

2)
$$\begin{aligned} 4x + 8y &= 20 \\ -4x + 2y &= -30 \end{aligned}$$

3)
$$\begin{aligned} x - y &= 11 \\ 2x + y &= 19 \end{aligned}$$

4)
$$\begin{aligned} -6x + 5y &= 1 \\ 6x + 4y &= -10 \end{aligned}$$

5)
$$\begin{aligned} -2x - 9y &= -25 \\ -4x - 9y &= -23 \end{aligned}$$

6)
$$\begin{aligned} 8x + y &= -16 \\ -3x + y &= -5 \end{aligned}$$

7)
$$\begin{aligned} -6x + 6y &= 6 \\ -6x + 3y &= -12 \end{aligned}$$

8)
$$\begin{aligned} 7x + 2y &= 24 \\ 8x + 2y &= 30 \end{aligned}$$

9)
$$\begin{aligned} 5x + y &= 9 \\ 10x - 7y &= -18 \end{aligned}$$

10)
$$\begin{aligned} -4x + 9y &= 9 \\ x - 3y &= -6 \end{aligned}$$

11)
$$\begin{aligned} -3x + 7y &= -16 \\ -9x + 5y &= 16 \end{aligned}$$

12)
$$\begin{aligned} -7x + y &= -19 \\ -2x + 3y &= -19 \end{aligned}$$

$$\begin{aligned} 13) \quad & 16x - 10y = 10 \\ & -8x - 6y = 6 \end{aligned}$$

$$\begin{aligned} 14) \quad & 8x + 14y = 4 \\ & -6x - 7y = -10 \end{aligned}$$

$$\begin{aligned} 15) \quad & -4x - 15y = -17 \\ & -x + 5y = -13 \end{aligned}$$

$$\begin{aligned} 16) \quad & -x - 7y = 14 \\ & -4x - 14y = 28 \end{aligned}$$

$$\begin{aligned} 17) \quad & -7x - 8y = 9 \\ & -4x + 9y = -22 \end{aligned}$$

$$\begin{aligned} 18) \quad & 5x + 4y = -30 \\ & 3x - 9y = -18 \end{aligned}$$

$$\begin{aligned} 19) \quad & -4x - 2y = 14 \\ & -10x + 7y = -25 \end{aligned}$$

$$\begin{aligned} 20) \quad & 3x - 2y = 2 \\ & 5x - 5y = 10 \end{aligned}$$

$$\begin{aligned} 21) \quad & 5x + 4y = -14 \\ & 3x + 6y = 6 \end{aligned}$$

$$\begin{aligned} 22) \quad & 2x + 8y = 6 \\ & -5x - 20y = -15 \end{aligned}$$

$$\begin{aligned} 23) \quad & -14 = -20y - 7x \\ & 10y + 4 = 2x \end{aligned}$$

$$\begin{aligned} 24) \quad & 3 + 2x - y = 0 \\ & -3 - 7y = 10x \end{aligned}$$

Solving Systems of Equations by Elimination

Solve each system by elimination.

$$\begin{array}{r} 1) \quad -4x - 2y = -12 \\ + \quad 4x + 8y = -24 \\ \hline 6y = -36 \\ y = -6 \end{array} \quad \begin{array}{r} -4x - 2(-6) = -12 \\ -4x + 12 = -12 \\ -4x = -24 \\ x = 6 \end{array}$$

(6, -6)

$$\begin{array}{r} 2) \quad 4x + 8y = 20 \\ + \quad -4x + 2y = -30 \\ \hline 10y = -10 \\ y = -1 \end{array} \quad \begin{array}{r} 4x + 8(1) = 20 \\ 4x + 8 = 20 \\ 4x = 12 \\ x = 3 \end{array}$$

(3, -1)

$$\begin{array}{r} 3) \quad x - y = 11 \\ + \quad 2x + y = 19 \\ \hline 3x = 30 \\ x = 10 \end{array} \quad \begin{array}{r} 10 - y = 11 \\ -y = 1 \\ y = -1 \end{array}$$

(10, -1)

$$\begin{array}{r} 4) \quad -6x + 5y = 1 \\ + \quad 6x + 4y = -10 \\ \hline 9y = -9 \\ y = -1 \end{array} \quad \begin{array}{r} -6x + 5(-1) = 1 \\ -6x - 5 = 1 \\ -6x = 6 \\ x = -1 \end{array}$$

(-1, -1)

$$\begin{array}{r} 5) \quad -2x - 9y = -25 \\ -1[-4x - 9y = -23] + 4x + 9y = 23 \\ \hline -2(-1) - 9y = -25 \\ 2 - 9y = -25 \\ -9y = -27 \\ y = 3 \end{array} \quad \begin{array}{r} -2x - 9(3) = -25 \\ -2x - 27 = -25 \\ -2x = -2 \\ x = -1 \end{array}$$

(-1, 3)

$$\begin{array}{r} 6) \quad 8x + y = -16 \\ [-3x + y = -5] - 1 + 3x - y = 5 \\ \hline 8(-1) + y = -16 \\ -8 + y = -16 \\ y = -8 \end{array} \quad \begin{array}{r} 8x + y = -16 \\ 8x - 1 = -16 \\ 8x = -15 \\ x = -1 \end{array}$$

(-1, -8)

$$\begin{array}{r} 7) \quad -6x + 6y = 6 \\ -1[-6x + 3y = -12] \\ \hline -6x + 6(6) = 6 \\ -6x + 36 = 6 \\ -6x = -30 \\ x = 5 \end{array} \quad \begin{array}{r} -6x + 6y = 6 \\ + 6x - 3y = 12 \\ \hline 3y = 18 \\ y = 6 \end{array}$$

(5, 6)

$$\begin{array}{r} 8) \quad [7x + 2y = 24] - 1 \\ 8x + 2y = 30 \\ \hline 8(6) + 2y = 30 \\ 48 + 2y = 30 \\ 2y = -18 \\ y = -9 \end{array} \quad \begin{array}{r} -7x - 2y = -24 \\ + 8x + 2y = 30 \\ \hline x = 6 \end{array}$$

(6, -9)

$$\begin{array}{r} 9) \quad [5x + y = 9] \cdot 7 \\ 10x - 7y = -18 \\ \hline 10(1) - 7y = -18 \\ 10 - 7y = -18 \\ -7y = -28 \\ y = 4 \end{array} \quad \begin{array}{r} 35x + 7y = 63 \\ + 10x - 7y = -18 \\ \hline 45x = 45 \\ x = 1 \end{array}$$

(1, 4)

$$\begin{array}{r} 10) \quad -4x + 9y = 9 \\ [x - 3y = -6] \cdot 4 \\ \hline -4x + 9(5) = 9 \\ -4x + 45 = 9 \\ -4x = -36 \\ x = 9 \end{array} \quad \begin{array}{r} -4x + 9y = 9 \\ + 4x - 12y = -24 \\ \hline -3y = -15 \\ y = 5 \end{array}$$

(9, 5)

$$\begin{array}{r} 11) \quad [-3x + 7y = -16] \cdot -3 \\ -9x + 5y = 16 \\ \hline -9x + 5(-4) = 16 \\ -9x - 20 = 16 \\ -9x = 36 \\ x = -4 \end{array} \quad \begin{array}{r} 9x - 21y = 48 \\ + -9x + 5y = 16 \\ \hline -16y = 64 \\ y = -4 \end{array}$$

(-4, -4)

$$\begin{array}{r} 12) \quad [-7x + y = -19] \cdot -3 \\ -2x + 3y = -19 \\ \hline -2(2) + 3y = -19 \\ -4 + 3y = -19 \\ 3y = -15 \\ y = -5 \end{array} \quad \begin{array}{r} 21x - 3y = 57 \\ + -2x + 3y = -19 \\ \hline 19x = 38 \\ x = 2 \end{array}$$

(2, -5)

$$\begin{array}{r}
 13) \quad 16x - 10y = 10 \\
 \quad [-8x - 6y = 6] \cdot 2 \\
 \hline
 16x - (10)(-1) = 10 \\
 16x + 10 = 10 \\
 16x = 0 \\
 x = 0
 \end{array}$$

$$\begin{array}{r}
 16x - 10y = 10 \\
 + \quad -16x - 12y = 12 \\
 \hline
 -22y = 22 \\
 y = -1
 \end{array}$$

(0, -1)

$$\begin{array}{r}
 14) \quad 8x + 14y = 4 \\
 \quad [-6x - 7y = -10] \cdot 2 \\
 \hline
 8(4) + 14y = 4 \\
 32 + 14y = 4 \\
 14y = -28 \\
 y = -2
 \end{array}$$

$$\begin{array}{r}
 8x + 14y = 4 \\
 + \quad -12x - 14y = -20 \\
 \hline
 -4x = -16 \\
 x = 4
 \end{array}$$

(4, -2)

$$\begin{array}{r}
 15) \quad -4x - 15y = -17 \\
 \quad [-x + 5y = -13] \cdot 3 \\
 \hline
 -4(8) - 15y = -17 \\
 -32 - 15y = -17 \\
 -15y = 15 \\
 y = -1
 \end{array}$$

$$\begin{array}{r}
 -4x - 15y = -17 \\
 + \quad -3x + 15y = -39 \\
 \hline
 -7x = -56 \\
 x = 8
 \end{array}$$

(8, -1)

$$\begin{array}{r}
 16) \quad [-x - 7y = 14] \cdot 2 \\
 \quad -4x - 14y = 28 \\
 \hline
 -4(0) - 14y = 28 \\
 -14y = 28 \\
 y = -2
 \end{array}$$

$$\begin{array}{r}
 2x + 14y = -28 \\
 + \quad -4x - 14y = 28 \\
 \hline
 -2x = 0 \\
 x = 0
 \end{array}$$

(0, -2)

$$\begin{array}{r}
 17) \quad [-7x - 8y = 9] \cdot 4 \\
 \quad [-4x + 9y = -22] \cdot -7 \\
 \hline
 -28x - 32y = 36 \\
 + \quad 28x - 63y = 154 \\
 \hline
 -95y = 190 \\
 y = -2
 \end{array}$$

$$\begin{array}{r}
 -7x - 8(-2) = 9 \\
 -7x + 16 = 9 \\
 -7x = -7 \\
 x = 1
 \end{array}$$

(1, -2)

$$\begin{array}{r}
 18) \quad [5x + 4y = -30] \cdot 3 \\
 \quad [3x - 9y = -18] \cdot -5 \\
 \hline
 15x + 12y = -90 \\
 + \quad -15x + 45y = 90 \\
 \hline
 57y = 0 \\
 y = 0
 \end{array}$$

$$\begin{array}{r}
 5x + 4(0) = -30 \\
 5x = -30 \\
 x = -6
 \end{array}$$

(-6, 0)

$$\begin{array}{r}
 19) \quad [-4x - 2y = 14] \cdot 7 \\
 \quad [-10x + 7y = -25] \cdot 2 \\
 \hline
 -28x - 14y = 98 \\
 + \quad -20x + 14y = 50 \\
 \hline
 -48x = 48 \\
 x = -1
 \end{array}$$

$$\begin{array}{r}
 -4(-1) - 2y = 14 \\
 4 - 2y = 14 \\
 -2y = 10 \\
 y = -5
 \end{array}$$

(-1, -5)

$$\begin{array}{r}
 20) \quad [3x - 2y = 2] \cdot 5 \\
 \quad [5x - 5y = 10] \cdot -2 \\
 \hline
 15x - 10y = 10 \\
 + \quad -10x + 10y = -20 \\
 \hline
 5x = -10 \\
 x = -2
 \end{array}$$

$$\begin{array}{r}
 3(-2) - 2y = 2 \\
 -6 - 2y = 2 \\
 -2y = 8 \\
 y = -4
 \end{array}$$

(-2, -4)

$$\begin{array}{r}
 21) \quad [5x + 4y = -14] \cdot 3 \\
 \quad [3x + 6y = 6] \cdot -5 \\
 \hline
 15x + 12y = -42 \\
 + \quad -15x - 30y = -30 \\
 \hline
 -18y = -72 \\
 y = 4
 \end{array}$$

$$\begin{array}{r}
 5x + 4(4) = -14 \\
 5x + 16 = -14 \\
 5x = -30 \\
 x = -6
 \end{array}$$

(-6, 4)

$$\begin{array}{r}
 22) \quad [2x + 8y = 6] \cdot 5 \\
 \quad [-5x - 20y = -15] \cdot 2 \\
 \hline
 10x + 40y = 30 \\
 -10x - 40y = -30 \\
 \hline
 0 = 0
 \end{array}$$

Infinitely Many Solutions

$$\begin{array}{r}
 23) \quad -14 = -20y - 7x \\
 \quad 10y + 4 = 2x \\
 \hline
 -14 = -20y - 7x \\
 -2[4 = -10y + 2x] \\
 -8 = 20y - 4x \\
 -22 = -11x \\
 2 = x
 \end{array}$$

$$\begin{array}{r}
 10y + 4 = 2(2) \\
 10y + 4 = 4 \\
 10y = 0 \\
 y = 0
 \end{array}$$

(2, 0)

$$\begin{array}{r}
 24) \quad 3 + 2x - y = 0 \\
 \quad -3 - 7y = 10x \\
 \hline
 [2x - y = -3] \cdot -5 \\
 10x + 7y = -3 \\
 -19x + 5y = 15 \\
 \hline
 12y = 12 \\
 y = 1
 \end{array}$$

$$\begin{array}{r}
 3 + 2x - 1 = 0 \\
 2 + 2x = 0 \\
 2x = -2 \\
 x = -1
 \end{array}$$

(-1, 1)