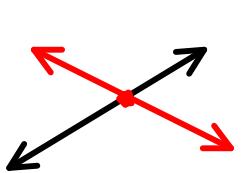
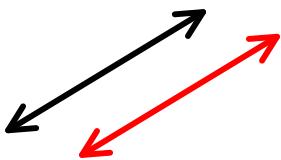


Solving Systems of Equations by Elimination/Addition



Intersecting Lines

One Solution
Consistent
Independent



Parallel Lines

No Solution
Inconsistent



Coinciding Lines

Infinite Solutions
Consistent
Dependent

Step 1: Eliminate one of the variables using "opposites".

$$-x, -x \quad 2y, -2y \quad x, -x$$

Step 2: Add the equations and solve for the variables.

Step 3: Check your answer.

Directions: Solve each system of equations by the elimination/addition method.

1. $-x + 2y = 12$
 $x + 6y = 20$

$$\begin{array}{r} -x + 2y = 12 \\ \cancel{x} + 6y = 20 \\ \hline 8y = 32 \\ 8 \qquad 8 \\ y = 4 \end{array}$$

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

Check

$$\boxed{x = -4 \quad y = 4}$$

$$\begin{array}{l} x + 6y = 20 \\ -4 + 6(4) = 20 \\ -4 + 24 = 20 \\ 20 = 20 \checkmark \end{array}$$

$$\boxed{(-4, 4)}$$

$$2. \begin{aligned} 5x + 3y &= 14 \\ 2x + y &= 6 \end{aligned}$$

$$\begin{array}{rcl} 5x + 3y & = & 14 \\ -3(2x + y = 6) & \rightarrow & -6x - 3y = -18 \\ \hline -1x & = & -4 \\ -1 & & -1 \\ x & = & 4 \end{array}$$

$$\begin{aligned} 5x + 3y &= 14 \\ 5(4) + 3y &= 14 \\ 20 + 3y &= 14 \\ -20 & & -20 \\ \frac{3y}{3} &= \frac{-6}{3} \\ y &= -2 \end{aligned}$$

$$\begin{aligned} \underline{\text{check}} \\ 2x + y &= 6 \\ 2(4) + (-2) &= 6 \\ 8 + -2 &= 6 \\ 6 &= 6 \checkmark \end{aligned}$$

(4, -2)

$$\begin{array}{rcl} 3. \begin{aligned} 7x &= 5 - 2y \\ 3y &= 16 - 2x \end{aligned} & \rightarrow & \begin{aligned} 3(7x + 2y &= 5) \\ -2(2x + 3y &= 16) \end{aligned} \\ \hline 21x + 6y &= 15 \\ -4x - 6y &= -32 \\ \hline 17x &= -17 \\ \frac{17}{17} & & \frac{17}{17} \\ x &= -1 \end{array}$$

$$\begin{aligned} 7x &= 5 - 2y \\ 7(-1) &= 5 - 2y \\ -7 &= 5 - 2y \\ -5 & \cancel{-5} \\ \frac{-12}{-2} &= \frac{-2y}{-2} \\ y &= 6 \end{aligned}$$

$$\begin{aligned} \underline{\text{check}} \\ 3y &= 16 - 2x \\ 3(6) &= 16 - 2(-1) \\ 18 &= 16 + 2 \\ 18 &= 18 \checkmark \end{aligned}$$

(-1, 6)

$$4. \begin{aligned} \frac{1}{3}x + \frac{1}{4}y &= 10 \\ -\frac{2}{3}x - \frac{1}{2}y &= 4 \end{aligned}$$

$$\begin{array}{l} \frac{4-x}{4 \cdot 3} + \frac{y \cdot 3}{4 \cdot 3} = \frac{10 \cdot 12}{1 \cdot 12} \quad \text{LCD} = 12 \quad \frac{-2x}{3 \cdot 2} - \frac{y \cdot 3}{2 \cdot 3} = \frac{4 \cdot 6}{1 \cdot 6} \\ \frac{4x}{12} + \frac{3y}{12} = \frac{120}{12} \quad \text{LCD} = 6 \quad \frac{-4x}{6} - \frac{3y}{6} = \frac{24}{6} \\ 4x + 3y = 120 \quad -4x - 3y = 24 \end{array}$$

$$\begin{array}{rcl} 4x + 3y &= 120 \\ -4x - 3y &= 24 \\ \hline 0 &\neq & 144 \end{array}$$

NO solution
INCONSISTENT

$$5. \begin{array}{l} 0.03x - 0.06y = 9 \\ x - 2y = 300 \end{array} \rightarrow -3 \left(\begin{array}{l} 3x - 6y = 900 \\ x - 2y = 300 \end{array} \right) \rightarrow \begin{array}{l} 3x - 6y = 900 \\ -3x + 6y = -900 \end{array} \rightarrow 0 = 0$$

infinitely many solutions
consistent &
dependent