



Solving Systems of Equations

SOLVE THE SYSTEM OF EQUATIONS

$$\begin{aligned}x + y &= 5 \\ -2x + y &= -4\end{aligned}$$

1) BY GRAPHING

In each equation, find the x and y intercepts.

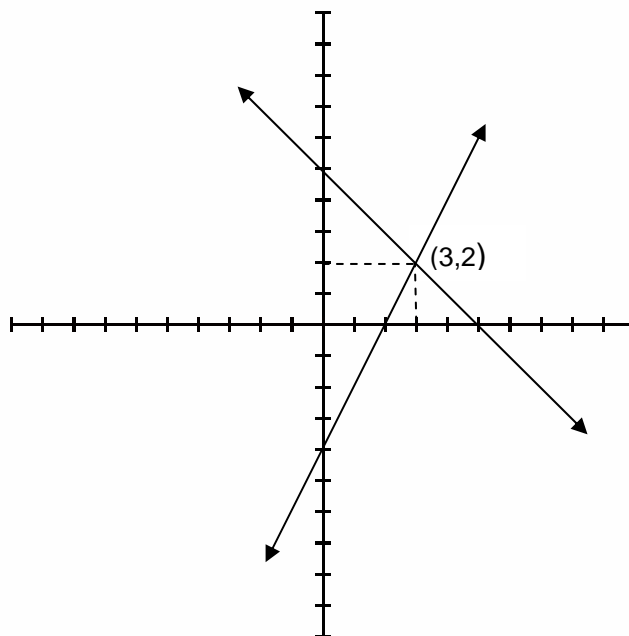
$$\begin{aligned}x + y &= 5 && \text{let } y = 0 \\ x + 0 &= 5 \\ x &= 5 && \text{x intercept } \quad (5,0)\end{aligned}$$

$$\begin{aligned}-2x + y &= -4 && \text{let } y = 0 \\ -2x + 0 &= -4 \\ x &= 2 && \text{x intercept } \quad (2,0)\end{aligned}$$

$$\begin{aligned}x + y &= 5 && \text{let } x = 0 \\ 0 + y &= 5 \\ y &= 5 && \text{y intercept } \quad (0,5)\end{aligned}$$

$$\begin{aligned}-2x + y &= -4 && \text{let } x = 0 \\ 0 + y &= -4 \\ y &= -4 && \text{y intercept } \quad (0,-4)\end{aligned}$$

Plot the x and y intercepts for both equations.



The solution occurs where the lines intersect on the graph.

$$\text{Result: } x = 3 \quad y = 2$$



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2) BY ELIMINATION

$$x + y = 5$$

$$-2x + y = -4$$

Multiply both sides of the first equation by 2.

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

$$2x + 2y = 10$$

Add the two equations together to eliminate x .

$$\begin{array}{r} 2x + 2y = 10 \\ + -2x + y = -4 \\ \hline 3y = 6 \\ y = 2 \end{array}$$

Insert 2 into either equation for y to solve for x .

$$\begin{array}{r} x + y = 5 \\ y + 2 = 5 \\ x = 3 \end{array}$$

$$\text{Result: } x = 3 \quad y = 2$$

3) BY SUBSTITUTION

$$x + y = 5$$

$$-2x + y = -4 \quad \text{Solve for } y \text{ in one equation.} \quad y = 2x - 4$$

Substitute the result $(2x - 4)$ for y in the other equation.

$$\begin{array}{r} x + y = 5 \\ x + (2x - 4) = 5 \\ 3x - 4 = 5 \\ 3x = 9 \\ x = 3 \end{array}$$

Insert 3 into one equation for x and solve for y .

$$\begin{array}{r} x + y = 5 \\ 3 + y = 5 \\ y = 2 \end{array}$$

$$\text{Result: } x = 3 \quad y = 2$$