

Aim: How do we solve a System of Equations?

Do Now: Substitute and solve for x :

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

$$2x + 3(4) = 10$$

$$\begin{array}{r}2x + 12 = 10 \\ -12 \quad -12 \\ \hline\end{array}$$

$$\boxed{(-1, 4)}$$

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

$$\boxed{x = -1}$$

Vocabulary

Substitution Method - solving one equation for a variable and then substituting that variable into the other equation.

Steps:

1. Solve one equation for one variable, if it is not already given to you.
2. Substitute the expression from Step 1 into the other equation. Solve.
3. Plug the value that you found back into one of the original equations to find the other variable.

Solve the following by substitution:

Ex1:

$$3x - 5y = 15$$

$$y = 2x + 4$$

$$3x - 5(2x + 4) = 15$$

$$3x - 10x - 20 = 15$$

$$-7x - 20 = 15$$

$$+20 \quad +20$$

$$-7x = 35$$

$$\frac{-7x}{-7} = \frac{35}{-7}$$

$$x = -5$$

Solve for y:

$$y = 2x + 4$$

$$y = 2(-5) + 4$$

$$y = -10 + 4$$

$$y = -6$$

$$(-5, -6)$$

Ex2: $2x + 3y = 12$

$$x + y = 5$$

$$-y - y$$

$$x = 5 - y$$

$$2(5 - y) + 3y = 12$$

$$10 - 2y + 3y = 12$$

$$10 + y = 12$$

$$-10 \quad -10$$

$$y = 2$$

Solve for x:

$$x + y = 5$$

$$x + 2 = 5$$

$$x = 3$$

$$(2, 3)$$