

I Can: Solve Equations through Substitution and Elimination

3.2

solve by substitution

$$2x + y = 6$$

$$y = -2x + 6$$

$$3x + 4y = 4$$

$$3x + 4(-2x + 6) = 4$$

$$3x - 8x + 24 = 4$$

$$-5x + 24 = 4$$

$$-5x = -20$$

$$x = 4$$

$$x = 4$$

$$y = -2(4) + 6$$

$$y = -8 + 6$$

$$y = -2$$

$$(4, -2)$$

Steps for Substitution:

1. Get one variable by itself (by solving for that variable)
2. Substitute for that variable in the other equation using parentheses
3. Solve the equation that you substituted into
4. Substitute THAT answer INTO the other equation and solve for the OTHER variable
5. Form an ordered pair

Solve by Substitution

$$4p - 2q = 16$$

$$\begin{array}{r} \cancel{2q} + 2q \\ \hline 4p = 2q + 16 \\ \hline \cancel{2} \quad \quad \quad \cancel{2} \end{array}$$

$$p = \frac{1}{2}q + 4$$

BW

$$\frac{5}{2} + \frac{7 \cdot 2}{1 \cdot 2}$$

$$\frac{5 + 14}{2} = \frac{19}{2}$$

$$p = \frac{1}{2} \cdot 2 + 4$$

$$p = -3$$

$$(-3, -2)$$

$$5p + 7q = 1$$

$$5\left(\frac{1}{2}q + 4\right) + 7q = 1$$

$$\frac{5}{2}q + 20 + 7q = 1$$

$$\frac{19}{2}q + 20 = 1$$

$$\frac{19}{2}q - 20 = 1 - 20$$

$$\frac{19}{2}q = -19 \cdot \frac{2}{19}$$

$$q = -2$$

#### Steps for Elimination

1. Write both equations in standard form
2. Multiply both sides of one or both equations by a constant (if necessary) so that the coefficients of one of the variables are opposites
3. Add the left sides and the right sides of the resulting equations (ONE variable should ELIMINATE)
4. Solve for the remaining variable
5. Substitute the value of the second variable in any of the equations and solve for the other variable
6. Form an ordered pair

Solve by Elimination

$$\begin{aligned} 7(2x + 3y = 17) \\ -3(5x + 7y = 29) \end{aligned}$$

$$\begin{aligned} +2(-32) + 3y &= 17 \\ -64 + 3y &= 17 \\ +64 \quad +64 & \\ \hline 3y &= 81 \\ \frac{3y}{3} &= \frac{81}{3} \end{aligned}$$

$$y = 27$$

$$\begin{aligned} 14x + 2y &= 119 \\ -15x - 2y &= -87 \\ \hline \end{aligned}$$

$$\begin{aligned} -x &= 32 \\ \frac{-x}{-1} &= \frac{32}{-1} \\ x &= -32 \end{aligned}$$

$$(-32, 27)$$

Solve by Elimination

$$2x - 3y = 0$$

$$-4x + 3y = -1$$

Solve by Elimination

$$x/2 + y/3 = 7/6$$

$$2x/3 + 3y/4 = 5/4$$