

Example on Solving the equation by Substitution Method

The Example we are going to use is

$$7x + 2y = 47 \quad \text{--- (1)}$$

$$5x - 4y = 1 \quad \text{--- (2)}$$

Now we need to make a choice. We need to choose one of these equations and re-arrange it to obtain an expression for "y", or if we wish, for "x". Try to select the simple equation, i.e. let us choose the equation (2) and re-arrange it to find the expression for "x"

$$5x - 4y = 1$$

$$5x = 1 + 4y \quad (\text{by adding } 4y \text{ to each side})$$

$$\textcircled{3} \quad \longleftarrow x = \frac{1 + 4y}{5} \quad (\div \text{ing b.h.s by } 5)$$

Now we can by the value of $x = \frac{1 + 4y}{5}$ in eq (1)

$$7\left(\frac{1 + 4y}{5}\right) + 2y = 47$$

multiply b.h.s by 5 to get rid of the fraction

$$\cancel{5} \times 7\left(\frac{1 + 4y}{\cancel{5}}\right) + \cancel{5} \times 2y = 47 \times 5$$

$$7(1 + 4y) + 10y = 235$$

$$7 + 7 \times 4y + 10y = 235$$

$$7 + 28y + 10y = 235$$

$$7 + 38y = 235$$

$$38y = 235 - 7$$

$$38y = 228$$

$$y = \frac{228}{38}$$

$$y = 6$$

Put the value of "y" in eq (3)

$$x = \frac{1 + 4(6)}{5}$$

$$x = \frac{1 + 24}{5}$$

$$x = \frac{25}{5} \Rightarrow x = 5$$

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In order to check that^{our} solution is correct these values
i.e. $y = 6$ & $x = 5$ in both equations

Equation (1) is $7x + 2y = 47$

$$7(5) + 2(6) = 47$$

$$35 + 12 = 47$$

$$47 = 47$$

Also in Equation (2) $5x - 4y = 1$

$$5(5) - 4(6) = 1$$

$$25 - 24 = 1$$

$$1 = 1$$

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Solving the equation by Elimination Method

This is the second method to solve the simultaneous Linear equation.

$$7x + 2y = 47 \quad \text{--- (1)}$$

$$5x - 4y = 1 \quad \text{--- (2)}$$

We will multiply equation (1) by 2 to make the magnitude of the coefficients of "y" same in both equation.

$$2 \times 7x + 2 \times 2y = 47 \times 2$$

$$14x + 4y = 94 \quad \text{--- (3)}$$

Now we will add eq (2) & eq (3)

$$\begin{array}{r} 5x - 4y = 1 \\ + 14x + 4y = 94 \\ \hline 19x = 95 \end{array}$$

$$19x = 95$$

$$x = \frac{95}{19}$$

$$\Rightarrow \boxed{x = 5}$$

Now put the value of $x = 5$ in eq (2)

$$5x - 4y = 1$$

$$5(5) - 4y = 1$$

$$25 - 4y = 1$$

$$25 = 1 + 4y$$

$$25 - 1 = 4y$$

$$24 = 4y$$

$$4y = 24$$

$$y = \frac{24}{4}$$

$$\boxed{y = 6}$$

For Exercise Try to Solve the following
by Elimination Method

$$3x + 7y = 27$$

$$5x + 2y = 16$$

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