

Second method: canceling one term Simultaneous equations can also be solved by multiplying both sides of one of the equations by a value that will make either the x value or the y value in that equation equal to and opposite the corresponding value in the second equation. When the two equations are added together, that unknown value drops out and only one of the unknown values remains. This unknown can be found through algebraic manipulations and then can be used to determine the other unknown.

Example

Solve the following two simultaneous equations:

1. $3x + y = -6$
2. $-4x - 2y = 6$

Solution

First, multiply each term of one of the equations by a factor that will make either the x or the y values cancel when the two equations are added together. In this case, we can multiply each term in equation 1 by the factor 2. The positive $2y$ in equation 1 will then cancel the negative $2y$ in equation 2.

1. $3x + y = -6$
 $(2)(3x) + (2)(y) = -(2)(6)$
 $6x + 2y = -12$

Next, add the two equations together and solve for x .

2. $-4x - 2y = 6$
1. $6x + 2y = -12$
 $2x = -6$

$x = -3$

Then, substitute this value of x into either equation to find y .

1. $3x + y = -6$
 $y = -6 - 3x = -6 - (3)(-3) = -6 + 9$

$y = 3$

In this example, we multiplied both sides of equation 1 by 2 so that the y terms would cancel when the two equations were added together. As with substitution, this is only one of many possible ways to solve the equations. For example, we could have multiplied both sides of equation 2 by $\frac{3}{4}$ so that the x terms would cancel when the two equations were added together.