Solving a simple system using the method of substitution.

Example:
Eq1.: $y=4x$
Eq2.: $x+y=10$

1) In Eq2., replace y with the $4x$ because that is how it's defined in Eq1.

$x+(4x)=10$ Replace y with $4x$

$x + 4x=10$ Drop the parenthesis.

$5x=10$ Add $1x$ and $4x$ to get $5x$ on the left

$x=2$ Divide both sides by 5 to get $x=2$

2) Now we can use Eq1., which is $y=4x$, to find the value of y.

$y=4(2)=8$ Replace x with 2 to get that $y=8$

3) This means that point $(2,8)$ solves the system.
   Check:
   Eq1.: $y=4x$
   Eq2.: $x+y=10$

   Let's confirm that the point $(2,8)$ solves the system.

   1) Check the first equation.
       $8=2\cdot4$
       $8=8$

   2) Check the second equation.
       $2+8=10$
       $10=10$

   So this confirms that the point (2,8) solves the system.

Solving a simple system using the method of substitution.

Example:

Eq1.: $y = x + 1$

Eq2.: $x + 2y = 10$

1) Replace y in the second equation with the expression $x+1$

    1a) $x + 2(x+1) = 10$ This is the step of substitution

    1b) $x + 2x + 2 = 10$ Distribute the 2 into the parenthesis on the left.

    1c) $3x + 2 = 10$ Combine like terms on the left side.

    1d) $3x = 10\text{-}2$ Subtract 2 from both sides

         $3x = 8$

    1e) $x = \dfrac{8}{3}$ Divide both sides by 3 to get the final result for x.

2) Now we can use Eq1. to find the corresponding value of y.

    2a) $y = \dfrac{8}{3} + 1$ Replace x with $\dfrac{8}{3}$ in Eq1.

    $= \dfrac{8}{3} + \dfrac{3}{3}$ Change the number 1 into $\dfrac{3}{3}$ so you can add easily

    $= \dfrac{11}{3}$

3) So now we can say that the point $\left(\dfrac{8}{3}, \dfrac{11}{3} \right)$ solves the system

Example:

Eq1.: $x+y=2$

Eq2.: $2x+y=10$

1) Solve Eq1. for x or y. It doesn't matter. So we choose x.
   1a) $x+y=2$ Original equation
   1b) $x=2-y$ Subtract y from both sides

2) In Eq2., replace x with the expression $2-y$.
   2a) $2(2-y)+y=10$ This is the step of substitution.
   2b) $4-2y+y=10$ Distribute the 2 into the parenthesis
   2c) $4-y=10$ Combine like terms on the left side
   2d) $-y=6$ Subtract 4 from both sides
   2e) $y=-6$ Divide both sides by -1 to get $y=-6$

3) Now that we know y, we have to solve for x. We can do
   this by making use of equation 1b), which says $x=2-y$
   $x=2-(-6)=2+6=8$ Replace y with -2 and simplify to get x

4) At this point, we can say the point $(8,-6)$ solves the system.