Consider the following linear system. What happens when you add the equations? What happens when you subtract? Did either method help you eliminate a variable?

Linear System:	
$3x + 4y = 11$ ① $2x + y = 4$ ②	
Add the equations:	**Subtract the equations:**
$5x + 5y = 15$	$x + 3y = 7$

So we need to modify our elimination method to help in these sorts of cases. It sure would be nice if there was some way you could change the equations to make the variables match....

KEY IDEA: You can multiply any equation by a number, and NOT change the solution.

Linear System:	Multiply...	New Linear System:
$3x + 4y = 11$ ① $4\,(2x + y = 4$ ②$)$	② by 4	$3x + 4y = 11$ ① $8x + 4y = 16$ ②

Do the Addition/Subtraction:	Sub into equation ① or ②
$-5x = -5$ $\frac{-5x}{-5} = \frac{-5}{-5}$ $\boxed{x = 1}$	$2(1) + y = 4$ $2 + y = 4$ $\boxed{y = 2}$
	Solution: (1 , 2)

Elimination Part 2 | MFM2P

Linear System:

$4(x + 3y = 9)$ ①
$4x + 5y = 22$ ②

Multiply...

① by 4

New Linear System:

$4x + 12y = 36$ ①
$4x + 5y = 22$ ②

Do the Addition/Subtraction:

$7y = 14$

$\boxed{y = 2}$

Sub into equation ① or ②

$x + 3(2) = 9$

$x + 6 = 9$

$\boxed{x = 3}$

Solution: (3 , 2)

Linear System:

$3x + 3y = 9$ ①
$3(5x - y = 9)$ ②

Multiply...

② × 3

New Linear System:

$3x + 3y = 9$ ①
$15x - 3y = 27$ ②

Do the Addition/Subtraction:

$18x = 36$

$\boxed{x = 2}$

Sub into equation ① or ②

$3(2) + 3y = 9$

$6 + 3y = 9$
$-6 \qquad\quad -6$

$3y = 3$

$\boxed{y = 1}$

Solution: (2 , 1)