Solving Systems of Equations

- You can solve a system of equations using different methods. The idea is to determine which method is easiest for that particular problem.
- These notes show how to solve the system algebraically using SUBSTITUTION.

Solving a system of equations by substitution

Step 1: Solve an equation for one variable.

Step 2: Substitute

Step 3: Solve the equation.

Step 4: Plug back in to find the other variable.

Step 5: Check your solution.

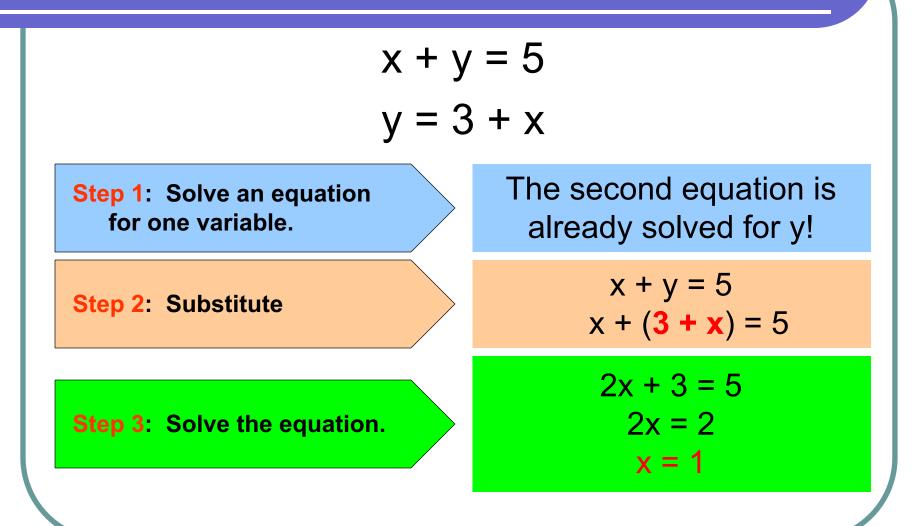
Pick the easier equation. The goal is to get y= ; x= ; a= ; etc.

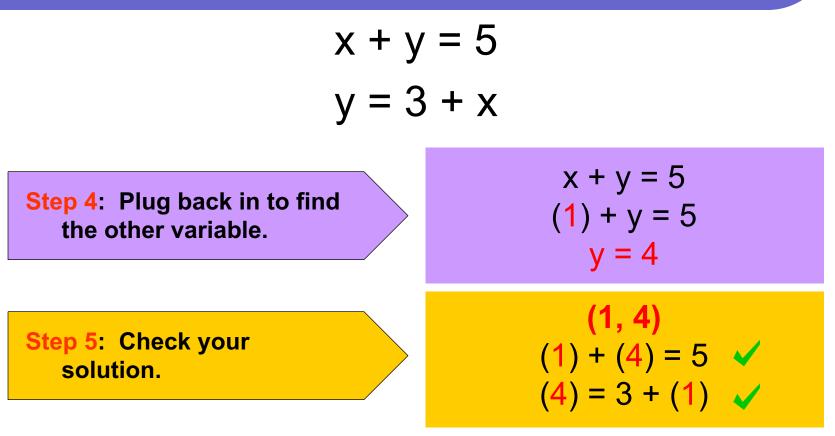
Put the equation solved in Step 1 into the other equation.

Get the variable by itself.

Substitute the value of the variable into the equation.

Substitute your ordered pair into BOTH equations.



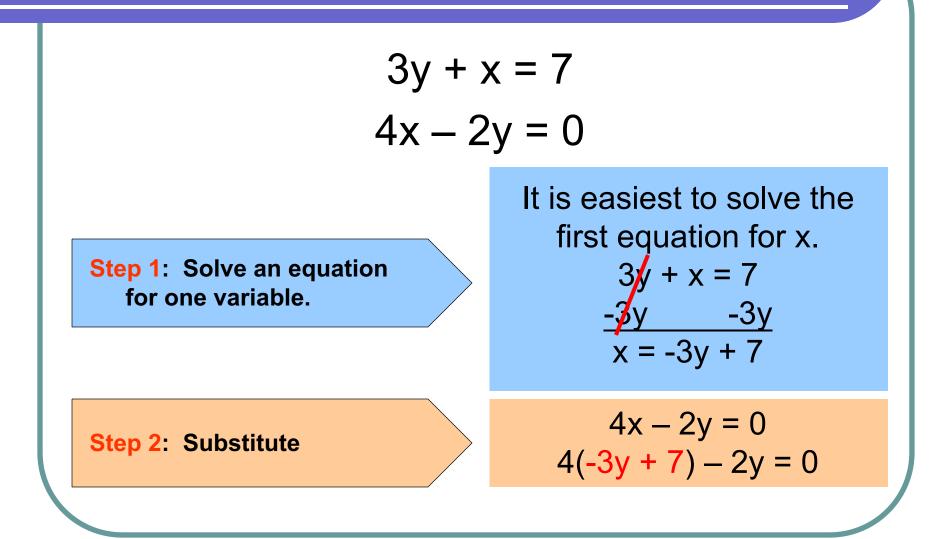


The solution is (1, 4). What do you think the answer would be if you graphed the two equations?

Which answer checks correctly?

$$3x - y = 4$$

 $x = 4y - 17$
1. (2, 2)
2. (5, 3)
3. (3, 5)
4. (3, -5)



$$3y + x = 7$$

$$4x - 2y = 0$$
Step 3: Solve the equation.
$$-12y + 28 - 2y = 0$$

$$-14y + 28 = 0$$

$$-14y = -28$$

$$y = 2$$

$$4x - 2y = 0$$

$$4x - 2(2) = 0$$

$$4x - 4 = 0$$

$$4x = 4$$

$$x = 1$$

$$3y + x = 7$$
$$4x - 2y = 0$$

Step 5: Check your solution.

$$(1, 2)$$

3(2) + (1) = 7 \checkmark
4(1) - 2(2) = 0 \checkmark

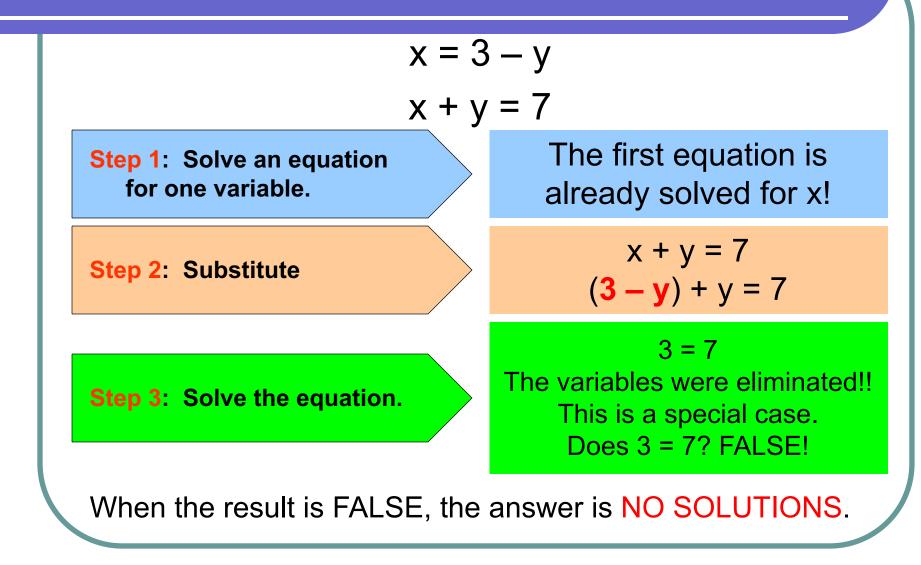
When is solving systems by substitution easier to do than graphing? When <u>only one</u> of the equations has a variable already isolated (like in example #1).

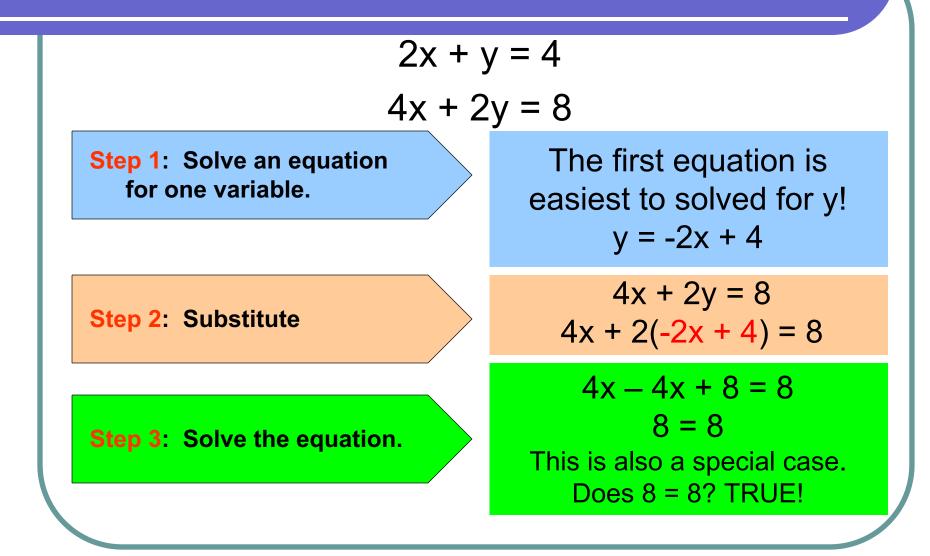
If you solved the first equation for x, what would be substituted into the bottom equation.

$$2x + 4y = 4$$

$$3x + 2y = 22$$

1. $-4y + 4$
2. $-2y + 2$
3. $-2x + 4$
4. $-2y + 22$





When the result is TRUE, the answer is **INFINITELY MANY SOLUTIONS**.

What does it mean if the result is "TRUE"?

- 1. The lines intersect
- 2. The lines are parallel
- **3.** The lines are coinciding
- 4. The lines reciprocate
- 5. I can spell my name