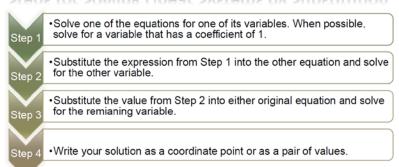We have learned how to solve linear systems by graphing. Now we will learn how to solve the linear systems by using a method called _____.

Steps for Solving Linear Systems by Substitution

Step 1	•Solve one of the equations for one of its variables. When possible, solve for a variable that has a coefficient of 1.
Step 2	•Substitute the expression from Step 1 into the other equation and solve for the other variable.
Step 3	•Substitute the value from Step 2 into either original equation and solve for the remianing variable.
Step 4	•Write your solution as a coordinate point or as a pair of values.

Example 1: Solve the linear system using substitution:

$$4x + 6y = 4$$
$$x = -6 + 2y$$

Step 1: Solve one of the equations for one of its variables.

Step 2: Now, substitute the expression from **Step 1** into the OTHER equation and solve.

Step 3: Next, substitute the value from **Step 2** into either of the original equations and solve for the last unknown variable.

Step 4: Write your solution as a coordinate point or as a pair of values.

More Examples:

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

3. $x = 2y + 5$
    $x = 10 - 3y$

4. $x - 1 = y$
    $2x - y = 5$

5. $x - y = 3$
    $2x - y = 5$

Practice 8.2 Systems of Equations (Substitution)

Show all of your work!

Solve each system by substitution.

1) $4x - 4y = -4$
   $y = -4x + 1$

2) $y = 2x - 7$
   $2x - 4y = 10$

3) $8x + 5y = -24$
   $y = 5x + 15$

4) $y = -4x - 5$
   $6x - 5y = -1$

5) $y = 4x - 24$
   $-3x - 5y = -18$

6) $y = 4x - 17$
   $4x + 4y = 12$

7) $x = -1 - 3y$
   $2x - 4y = -22$

8) $-x + 3y = 4$
   $x = 4y - 3$

9) $4x + y = -3$
   $-7x - 3y = 9$

10) $x = 5y - 11$
    $-9x - 7y = -5$

11) Is the point (-1, 3) a solution of the system of linear equations below?

   $x + y = 2$
   $y - x = 2$

12) Is the point (1, 7) a solution of the system of linear equations below?

   $2x - 4 = 5$
   $x = 1$

Application and Extension

1.	Solve the following system of equations using substitution. Write your answers as fractions, if necessary.

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

2.	In the March 1998 issue of **Great Goatee Magazine**, readers could vote online for their favorite goatee in the *Pitt-Brust Bonanza*. Readers could either vote for Brad Pitt or Mr. Brust. Brust's votes equaled 2 times the sum of Pitt's votes and 400. The total number of votes received was 2012.

	a.	Model the situation with a linear system.

Pitt?

Let B = # vote for Brust
Let P = # votes for Pitt

Total # of votes:	_____ + _____ = 2012

Brust vs Pitt:	_____ = 2 (_____ + _____)

Brust?

	b.	Now solve your system using substitution. By how many votes did Brust win the contest?

	c.	Explain why solving this by graphing wouldn't be ideal.