

Substitution is a very important technique and we want to be very good at it. It boils down to one of the most important properties of equality:

EQUALS MAY ALWAYS SUBSTITUTE FOR EQUALS!

Exercise #2: Solve the following systems of equations by substitution.

(a) $y = 2x + 5$

$y = -3x - 10$ → $(y) = 2x + 5$

★
★
★ **FINAL ANSWER** ★
★
★
 $(-3, -1)$

$$\begin{array}{r}
 -3x - 10 = 2x + 5 \\
 \quad \quad \quad +10 \quad \quad \quad +10 \\
 \hline
 -3x = 2x + 15 \\
 \quad \quad \quad -2x \quad \quad -2x \\
 \hline
 -5x = 15 \\
 \quad \quad \quad -5 \quad \quad -5 \\
 \hline
 x = -3
 \end{array}$$

We Need the y coordinate
 $y = 2x + 5$
 $y = 2(-3) + 5$
 $y = -6 + 5$
 $y = -1$



(b) $4x - 2y = 16$

$y = -5x + 13$ → $4x - 2(y) = 16$

$4x - 2(-5x + 13) = 16$
 NOW SOLVE LIKE USUAL 😊

$$\begin{array}{r}
 4x + 10x - 26 = 16 \\
 14x - 26 = 16 \\
 \quad \quad \quad +26 \quad +26 \\
 \hline
 14x = 42 \\
 \frac{14x}{14} = \frac{42}{14} \\
 x = 3
 \end{array}$$

WE NEED Y
 $y = -5x + 13$
 $y = -5(3) + 13$
 $y = -15 + 13$
 $y = -2$

$(3, -2)$

The algebra of systems allows us to solve all sorts of problems that almost seem like riddles.

Challenge Question: Max and his father Kirk are comparing their ages. They know that the sum of their ages is 52 and that Kirk is seven years older than four times Max's age.

- (a) If Max's age is represented by m and Kirk's age by k , write a system of equations that describes the two relationships from the problem.
- (b) Solve the system using substitution to find both of their ages.

Exercise #4: Two cell phone plans offer differing text packages. The two plans are outlined below:

Plan A: \$5.00 per month charge along with a charge of \$0.03 per text.

Plan B: No per month charge, but a charge of \$0.10 per text.

Is there a certain number of texts, when the two plans cost the same amount? Determine your answer by setting up a system of equations that model the two plans.

Name: _____

Date: _____

**SOLVING SYSTEMS BY SUBSTITUTION
HOMEWORK****HW**
FLUENCY

1. Solve each of the following system of equations by substitution.

(a) $y = x + 8$

$y = 4x - 1$

(b) $y = -3x + 5$

$2x + y = 6$

(c) $4x + 3y = 37$

$y = x - 4$

(d) $x - 5y = -49$

$y = -2x + 1$

2. Given the system shown below do the following:

$$y = \frac{1}{2}x - 2$$

$$y = -3x + 5$$

(a) Solve this system graphically using the grid shown.

(b) Solve this system by substitution. Show your work.

