Name: _____ Date: Dec 12 Hour: ___Alg 1___

Unit 4 Day 10: Solving a system using substitution

*Focus Question: Do I really have to solve for y (or x) in **both** equations?*

A. $f(x) = g(x)$ is one way to solve using substitution. When you isolate both equations for y, you cannot tell which y you are substituting because you are actually doing the transitive property (if a = b and b = c then a = c). To truly substitute, you only **isolate y in one of the equations** and **substitute it USING PARENTHESIS into the other equation**.

Step 1: First isolate EITHER x or y in **one** of the equations. Pick the easiest one to isolate (usually the one with a coefficient of 1 or the coefficient that will divide as an integer into the other one)

Step 2: Substitute the result from Step 1 into the other equation.

Step 3: Solve the equation to find one variable.

Step 4: Use that answer to substitute and solve for the other variable.

Step 5: Write the solution as an ordered pair.

B. EXAMPLES: Solve using substitution.

1. Isolate x $x + 3y = 6$

$-3y \quad -3y$

$x = -3y + 6$

$4x + y = 2$

$4(-3y+6)+y=2$

$-12y+24+y=2$

$-11y+24=2$

$-24 \quad -24$

$\frac{-11y}{-11} = \frac{-22}{-11}$

$y = 2$

$x = -3(2)+6$

$x = -6+6$

$x = 0$

Solution $(0, 2)$

2. y isolated

$y = -2x + 3$

$8x + 4y = 4$

$8x+4(-2x+3)=4$

$8x-8x+12=4$

$0+12=4$

$12=4$ False

$\emptyset$

Solution $\emptyset$

these lines are parallel

3. $x + 2y = 2$ isolate x

$-2y \quad -2y$

$x = -2y + 2$

$3x + 6y = 6$

$3(-2y+2) + 6y = 6$

$-6y + 6 \quad +6y = 6$

$0 + 6 = 6$

$6 = 6$ True

Solution ∞

These lines Coincide

C. Word Problems: Remember to identify your variables. (tell me the letters)

1. Hannah and Jordan are selling flower bulbs for a school fundraiser. Customers can buy bags of wildflower bulbs and bags of daffodil bulbs. Hannah sold 12 bags of wildflower bulbs and 6 bags of daffodil bulbs for a total of $180. Jordan sold 3 bags of wildflower bulbs and 3 bags of daffodil bulbs for a total of $57. What is the cost each of one bag of wildflower bulbs and one bag of daffodil bulbs?

Variables

W: cost of wildflower: $11

d: cost of daffodil: $8

$12w + 6d = 180$

$12(-d + 19) + 6d = 180$

$-12d + 228 \quad +6d = 180$

$-228 \qquad -228$

$-6d = -48$

$-6 \qquad -6$

$d = 8$

$3w + 3d = 57$ isolate w

$-3d \quad -3d$

$\frac{3w}{3} = \frac{-3d}{3} + \frac{57}{3}$

$w = -d + 19$

$w = -8 + 19$

$w = 11$

2. Barbara's school is selling tickets to a spring musical. On the first day of ticket sales the school sold 9 child tickets and 3 adult tickets for a total of $81. The school took in $74 on the second day by selling 10 child tickets and 2 adult tickets. What is the price each of one adult ticket and one child ticket?

Variables

C: cost of child ticket: $5

a: cost of adult ticket: $12

$9c + 3a = 81$

$9c + 3(-5c + 37) = 81$

$9c - 15c + 111 = 81$

$-111 \quad -111$

$\frac{-6c}{-6} = \frac{-30}{-6}$

$c = 5$

$10c + 2a = 74$ isolate a

$-10c \qquad -10c$

$\frac{2a}{2} = \frac{-10c}{2} + \frac{74}{2}$

$a = -5c + 37$

$a = -5(5) + 37$

$a = -25 + 37$

$a = 12$

3. Roland has 21 coins consisting of dimes and quarters. The number of dimes is 3 more than twice the number of quarters. Write and solve a system of equations to determine the number of dimes and the number of quarters.

Variables

d: # of dimes: 15

q: # of quarters: 6

$d + q = 21$

$3 + 2q + q = 21$

$3 + 3q = 21$

$-3 \qquad -3$

$\frac{3q}{3} = \frac{18}{3}$

$q = 6$

$d = 3 + 2q$ isolated

$d = 3 + 2(6)$

$d = 3 + 12$

$d = 15$