Warm Up

Solve the following system of equations?

$$3x + y = 5$$
$$2x + 3y = 8$$

Equivalent Expressions

$3x + y = 5 \Rightarrow y = 5 - 3x$

$2x + 3y = 8$

$3y = -2x + 8$

$y = -\frac{2}{3}x + \frac{8}{3}$

$3\left[5 - 3x = -\frac{2}{3}x + \frac{8}{3}\right]$

$15 - 9x = -2x + 8$

$15 = 7x + 8$

$7 = 7x$

$1 = x$

$3x + y = 5$

$3(1) + y = 5$

$3 + y = 5$

$y = 2$

$(1, 2)$

Substitution

$3x + y = 5 \Rightarrow y = 5 - 3x$

$2x + 3y = 8$

$2x + 3(5 - 3x) = 8$

$2x + 15 - 9x = 8$

$-7x + 15 = 8$

$-7x = -7$

$x = 1$

$3x + y = 5$

$3(1) + y = 5$

$\vdots$

$y = 2$

Homework Questions?

Solve.

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

2. $x + y = 5$
   $x = y + 7$
   $(6, -1)$

3. $x - y = 1$
   $2x + y = 8$
   $(3, 2)$

4. $3x - y = 9$
   $y = x + 5$
   $(7, 12)$

5. $3x + 4y = 26$
   $-2x + y = 1$
   $(2, 5)$

6. $y = 2x + 3$
   $y = 4x + 4$
   $(-\frac{1}{2}, 2)$

7. $2x + 7y = 8$
   $x + 5y = 7$
   $(-3, 2)$

8. $y = 4x + 4$
   $y = 2x + 8$
   $(2, 12)$

9. $x + 3y = 17$
   $2x + 3y = 22$
   $(5, 4)$

10. $4x - 7y = 9$
    $y = x - 3$
    $(4, 1)$

11. $8x - 5y = 9$
    $y = 2x - 4$
    $(\frac{11}{2}, 7)$

12. $2x + 4y = -2$
    $3x + y = 7$
    $(3, -2)$

13. $3x + y = 5$
    $2x + 3y = 8$
    $(1, 2)$

14. $2x + 6y = 24$
    $x - 4y = -2$
    $(6, 2)$

Substitution

- Find which equation has a coefficient of 1 or –1 for either x or y.
- Isolate that variable using properties of equality.
- Substitute the expression that is equal to either the x or y you isolated into the other equation and solve.

11. $8x - 5y = 9$

$y = 2x - 4$

$8x - 5(2x - 4) = 9$

$8x - 10x + 20 = 9$

$-2x + 20 = 9$

$-20 \quad -20$

$-2x = -11$

$x = \frac{11}{2}$

$y = 2\left(\frac{11}{2}\right) - 4$

$y = 11 - 4$

$y = 7$

$\left(\frac{11}{2}, 7\right)$

12. $2x + 4y = -2$

$3x + y = 7$

$-3x \quad -3x$

$y = 7 - 3x$

$2x + 4(7 - 3x) = -2$

13. $3x + y = 5$

$2x + 3y = 8$

$3x + y = 5$

$-3x \quad -3x$

$y = 5 - 3x$ Isolate y

$2x + 3(5 - 3x) = 8$

14. $2x + 6y = 24$

$x - 4y = -2$

$x - 4y = -2$

$+4y \quad +4y$

$x = 4y - 2$

$2(4y - 2) + 6y = 24$

How about this one?

Come up with a strategy in your group, and solve.

$$\begin{cases} 2x + 6y = 24 \\ 3x - 2y = 14 \end{cases}$$

No variables have 1 or -1 as a coefficient :(

Rewrite $\frac{2x}{2} + \frac{6y}{2} = \frac{24}{2}$

$x + 3y = 12$

$-3y \quad -3y$

$x = -3y + 12$

coefficient of 1

$3(-3y + 12) - 2y = 14$

$-9y + 36 - 2y = 14$

$-11y + 36 = 14$

$-36 \quad -36$

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

$y = 2$

$2x + 6(2) = 24$

$2x + 12 = 24$

$-12 \quad -12$

$2x = 12 \rightarrow x = 6$

(6, 2)

Two Options

#1

Complete front side of sheet

#2

Complete 6-8 on the front, & word problems on back

Classwork

Kuta Software - Infinite Algebra 1 Name_____

Solving Systems of Equations by Substitution

Date_____ Period____

Solve each system by substitution.

1) $x + 3y = 1$
$-3x - 3y = -15$

2) $-3x - 8y = 20$
$-5x + y = 19$

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

4) $-3x + 3y = 3$
$-5x + y = 13$

5) $6x + 6y = -6$
$5x + y = -13$

6) $2x + y = 20$
$6x - 5y = 12$

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

8) $-2x + 6y = 6$
$-7x + 8y = -5$

Write the equations and solve. Define the variables

9) My neighbor has both chickens and roosters. He has a total of 31 birds. The number of chickens is ten more than twice the number of roosters. How many chickens does he have?

10) Alfred is four years older than Tina. Together they are 36 years old. How old is Alfred?

11) Jonas has three more nickels than dimes. He has 41 coins in all. How many are dimes?

12) The number of nails in the bucket is 50 less than twice the number of screws. Together, there are 400 nails and screws in the bucket. How many of each are there?

13) Pippi sold ten more cups of lemonade than cups of iced tea. She sold 120 cups in all. How many cups of lemonade did she sell?

Homework

Finish classwork