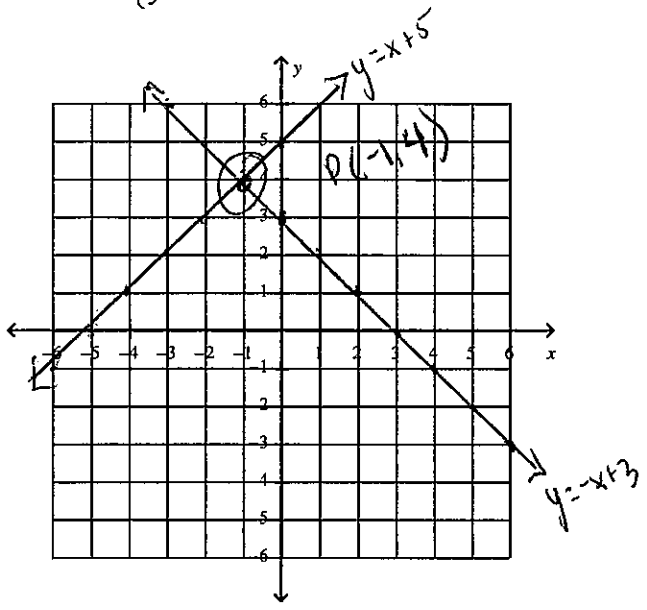
Name: Key Class: _____

M8-U5: Notes #3 – Solving Systems Algebraically – set them equal

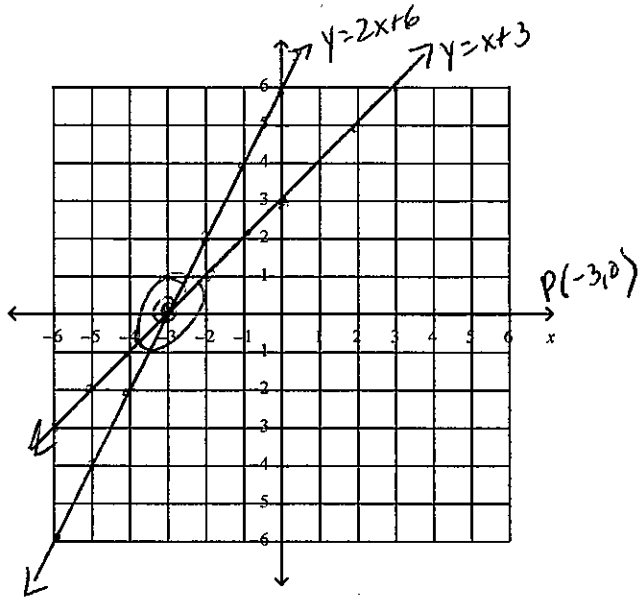
Date: _____

Graph the following system of equations, find the solution.

1. $\begin{cases} y = -x + 3 \\ y = x + 5 \end{cases}$



2. $\begin{cases} y = 2x + 6 \\ y = x + 3 \end{cases}$



Now let's look at the algebra of setting the two equations equal to each other.

1. $\begin{cases} y = -x + 3 \\ y = x + 5 \end{cases}$

$-x+3 = x+5$
$+x \quad -5 \quad +x \quad -5$
$-2 = 2x$
$\frac{-2}{2} = \frac{2x}{2}$
$-1 = x$

$y = -(-1) + 3$
$y = 1 + 3$
$y = 4$

P(-1,4)

CK $y = (1) + 5$
$y = 4$ ✓

2. $\begin{cases} y = 2x + 6 \\ y = x + 3 \end{cases}$

$2x + 6 = x + 3$
$-x \quad -6 \quad -x \quad -6$
$x = -3$

$y = 2(-3) + 6$
$= -6 + 6$
$y = 0$

P(-3,0)

CK $y = (-3) + 3$
$= 0$ ✓

Try It!

a. $\begin{cases} y = 3x - 30 \\ y = -x + 14 \end{cases}$

$3x - 30 = -x + 14$
$+x \quad +30 \quad +x \quad +30$
$\frac{4x}{4} = \frac{44}{4}$
$x = 11$

$y = 3(11) - 30$
$= 33 - 30$
$y = 3$

P(11, 3)

CK $y = -(11) + 14$
$= 3$ ✓

b. $\begin{cases} y = 7x + 4 \\ y = 9x - 6 \end{cases}$

$7x + 4 = 9x - 6$
$-7x \quad +6 \quad -7x \quad +6$
$\frac{10}{2} = \frac{2x}{2}$
$5 = x$

$y = 7(5) + 4$
$= 35 + 4$
$y = 39$

P(5, 39)

CK $y = 9(5) - 6$
$= 45 - 6$
$= 39$ ✓

Word Problems

Example 3: Deborah has two paintings in her portfolio and paints three more each week. Kai has twelve paintings in her portfolio and paints two more each week. After how many weeks will Deborah and Kai have the same number of paintings?

Let: p = # of painting = 32
w = # of weeks = 10

$\begin{cases} p = 2 + 3w \\ p = 12 + 2w \end{cases}$

$2 + 3w = 12 + 2w$
$-2 \quad -2w \quad -2 \quad -2w$
$w = 10$

$p = 2 + 3(10)$
$= 32$

P(10, 32)

CK $p = 12 + 2(10)$
$= 32$ ✓

Try It!

Trey's online music club charges a monthly rate of $20 plus $0.80 per song download. Deb's online music club charges a monthly rate of $21 plus $0.60 per song download. For what number of songs will the monthly charge be the same for both clubs? How much will it cost?

let: s = # of songs = 5
C = cost in dollars = $24

$$\begin{cases} C = .80s + 20 \\ C = .60s + 21 \end{cases}$$

$C = .80(5) + 20$
$= \$24$

$.80s + 20 = .60s + 21$
$-.60s - 20 \quad -.60s - 20$

$\frac{.20s}{.20} = \frac{1}{.20}$

$s = 5$

$C = .60(5) + 21$
$= \$24$ ✓

Practice:

1. $\begin{cases} y = 22x + 4 \\ y = 14x + 36 \end{cases}$

$22x + 4 = 14x + 36$
$-14x - 4 \quad -14x - 4$

$\frac{8x}{8} = \frac{32}{8}$

$x = 4$

$y = 22(4) + 4$
$= 88 + 4$
$= 92$

P(4, 92)

CK $y = 14(4) + 36$
$= 56 + 36$
$= 92$ ✓

2. $\begin{cases} y = -x + 16 \\ y = -7x - 8 \end{cases}$

$-x + 16 = -7x - 8$
$+7x - 16 \quad +7x - 16$

$\frac{6x}{6} = \frac{-24}{6}$

$x = -4$

$y = -(-4) + 16$
$y = 20$

P(-4, 20)

CK $y = -7(-4) - 8$
$= 28 - 8$
$= 20$ ✓