7-2 Solving Systems by Substitution

metimes, the Regents exam will tell you that you have to solve a system of equations **algebraically** or without the use of a graph. An **algebraic method** for solving systems of equations is the **substitution method**.

Examples:

1. $y = x - 4$
   $y = 4x + 8$

$x - 4 = 4x + 8$
$+4 \quad\quad +4$
$x = 4x + 12$
$-4x \quad -4x$
$-3x = 12$

$\frac{-3x}{-3} = \frac{12}{-3}$

$x = -4$

Substitute

$y = x - 4$

$y = -4 - 4$

$y = -8$

$*(-4, -8)*$

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

$2(4x) + 6 = 2x$
$8x + 6 = 2x$
$-8x \quad -8x$
$6 = -6x$

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

$x = -1$

Substitute

$y = 4x$

$y = 4(-1)$

$y = -4$

$*(-1, -4)*$

Check

$2y + 6 = 2x$

$2(-4) + 6 = 2(-1)$

$-8 + 6 = -2$

$-2 = -2$ ✓

3. $x = 2y$
   $7x + y = 15$

$7(2y) + y = 15$

$14y + y = 15$

$\frac{15y}{15} = \frac{15}{15}$

$y = 1$

Substitute

$x = 2y$

$x = 2(1)$

$x = 2$

$(2, 1)$

4. $x = 4y - 4$

$-3x + 5y = -2$

$-3(4y - 4) + 5y = -2$

$-12y + 12 + 5y = -2$

$-7y + 12 = -2$

$-12 \quad -12$

$\frac{-7y}{-7} = \frac{-14}{-7}$

$y = 2$

$x = 4(2) - 4$

$x = 8 - 4$

$x = 4$

* (4, 2) *

Let's Try a Word Problem

5. A farmer grown only pumpkins and corn on her 420-acre farm. This year she wants to plant 250 more acres of corn than pumpkins. How many acres of each crop does the farmer need to plant?

$P + C = 420$

$C = 250 + P$

P = Acres of Pumpkins

C = Acres of Corn

$P + 250 + P = 420$

$2P + 250 = 420$

$-250 \quad -250$

$2P = 170$

$P = 85$ acres

$C = 250 + P$

$C = 250 + 85$

$C = 335$ acres

Practice 7-2 Name _____

Use the Substitution Method to solve each system of equations.

1. $y = 6x - 4$
   $y = -2x + 28$

2. $y = 2x$
   $6x - y = 8$

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