Name: KEY Hour: _____ Date: _____

NOTES: Sections 3.4 – Solving Equations with Variables on Both Sides

Goals: #1 – I can solve equations that have variables on both sides.



Homework: Section 3.3 – 3.4 Worksheet

Warm Up:

1. Solve the following equations.

a. $\frac{5(6+j)}{5} = \frac{45}{5}$

$6 + j = 9$

$-6 \quad -6$

$\boxed{j = 3}$

b. $5w + 2w - 7 = 70$

$7w - 7 = 70$

$+7 \quad +7$

$7w = 77$

$\boxed{w = 11}$

c. $\frac{4}{3}\left[\frac{1}{4}(x+6)\right] = \left[12\right]\frac{4}{3}$

$x + 6 = 16$

$-6 \quad -6$

$\boxed{x = 10}$

Exploration #1:

1. Combine all the like terms and simplify the expression:

a. $3x^2 + 4 - x - 2x + 5x^3$

$5x^3 + 3x^2 - 3x + 4$

b. $3(x+2) + 4x - x^2$

$3x + 6 + 4x - x^2$

$-x^2 + 7x + 6$

Notes:

Solving linear equations may requrie more than one step.

Some equations have variables on both sides. To solve these equations, we are going to combine all our variable terms on one side of the equation.

Linear equations have one solution, many solutions, OR no solution.

Example:

$x = 2$ ↑ ONE Solution

$6 = 6$ ↑ MANY Solutions (identity)

$2 = 6$ ↑ NO Solution

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Example #1: Solve the following equations.

1. $7x + 19 = -2x + 55$

$+2x \quad +2x$

$9x + 19 = 55$

$-19 \quad -19$

$\frac{9x}{9} = \frac{36}{9}$

$\boxed{x = 4}$

Check:

$7(4) + 19 \stackrel{?}{=} -2(4) + 55$

$28 + 19 \stackrel{?}{=} -8 + 55$

$47 = 47$ ✓

2. $80 - 9y = 6y$

$+9y \quad +9y$

$\frac{80}{15} = \frac{15y}{15}$

$\frac{80}{15} = y$

$\boxed{\frac{16}{3} = y}$

Check:

$80 - 9\left(\frac{16}{3}\right) \stackrel{?}{=} 6\left(\frac{16}{3}\right)$

$80 - 48 \stackrel{?}{=} 32$

$32 = 32$ ✓

You practice: Solve the following equations.

1. $5y - 2 = y + 10$

$-y \quad -y$

$4y - 2 = 10$

$+2 \quad +2$

$\frac{4y}{4} = \frac{12}{4}$

$\boxed{y = 3}$

2. $-6x + 4 = -8x$

$+6x \quad +6x$

$\frac{4}{-2} = \frac{-2x}{-2}$

$\boxed{-2 = x}$

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Example #2: Solve the following equations.

1. $3x - 10 + 4x = 5x - 7$

$7x - 10 = 5x - 7$
$-5x \quad -5x$
$2x - 10 = -7$
$+10 \quad +10$
$2x = 3$

$\frac{2x}{2} = \frac{3}{2}$

$\boxed{x = \frac{3}{2}}$

CHECK:
$3(\frac{3}{2}) - 10 + 4(\frac{3}{2}) \stackrel{?}{=} 5(\frac{3}{2}) - 7$
$\frac{9}{2} - 10 + 6 \stackrel{?}{=} \frac{15}{2} - 7$
$\frac{1}{2} = \frac{1}{2}$ ✓

2. $3(x + 2) = 3x + 6$

$3x + 6 = 3x + 6$
$-3x \quad -3x$
$6 = 6$
many solutions - identity

3. $3(x + 2) = 3x + 4$

$3x + 6 = 3x + 4$
$-3x \quad -3x$
$6 \neq 4$
NO solution

You practice: Solve the following equations.

1. $5x - 3x + 4 = 3x + 8$

$2x + 4 = 3x + 8$
$-2x \quad -2x$
$4 = x + 8$
$-8 \quad -8$
$\boxed{-4 = x}$

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

$2x + 8 = 2x - 8$
$-2x \quad -2x$
$8 \neq -8$
NO solution

CHALLENGE: Solve the equation: $7 - (-4t) = 4t - 14 - 21t$

$7 + 4t = 4t - 14 - 21t$
$7 + 4t = -17t - 14$
$+17t \quad +17t$
$7 + 21t = -14$

$\frac{21t}{21} = \frac{-21}{21}$

$\boxed{t = -1}$