A. Bay
Algebra 1

Name: __Key__

Date: _____

Solving Equations with the Variables on Both Sides
1.3a

Steps for Solving Equations:
1. Use the Distributive Property to remove the grouping symbols.
2. Simply the expressions on each side of the equal sign.
3. Use Addition/Subtraction to collect the variables on one side of the equal sign and the constant terms (numbers without variables) on the other side (move the smaller variable).
4. Simplify the expressions on each side of the equal sign.
5. Use Multiplication/Division to solve.

Example 1: Solve the following equations.

(a) $8 + 5s = 7s - 2$

$$\underline{-5s \quad -5s}$$

$$8 = 2s - 2$$
$$\underline{+2 \qquad +2}$$
$$\frac{10}{2} = \frac{2s}{2}$$

$$\boxed{s = 5}$$

(b) $\frac{1}{3}(18 + 12q) = 6(2q - 7)$

$$6 + 4q = 12q - 42$$
$$\underline{-4q \qquad -4q}$$
$$6 = 8q - 42$$
$$\underline{+42 \qquad\quad +42}$$
$$\frac{48}{8} = \frac{8q}{8}$$

$$\boxed{q = 6}$$

(c) $8(5c - 2) = 10(32 + 4c)$

$$40c - 16 = 320 + 40c$$
$$\underline{-40c \qquad\qquad -40c}$$
$$-16 = 320$$

This is a **false** statement!

$$\boxed{\text{No Solution}}$$

(d) $4(t + 20) = \frac{1}{5}(20t + 400)$

$$4t + 80 = 4t + 80$$
$$\underline{-4t \qquad\quad -4t}$$
$$80 = 80$$

This is a **true** statement

$$\boxed{\text{identity}}$$
$$\boxed{\text{ALL Numbers}}$$
$$\boxed{t = \mathbb{R}}$$

infinitely many solutions

(e) $-2(4y + 1) = -8y - 2$

$-8y - 2 = -8y - 2$
$+8y \qquad +8y$

$-2 = -2$

true statement

$\boxed{\text{infinitely many solutions}}$

$y = \mathbb{R}$

(f) A boat travels upstream on the Mississippi River for 3.5 hours. The return trip only takes 2.5 hours because the boat travels 2 miles per hour faster downstream due to the current. How far does the boat travel upstream?

$x + 2 \qquad\qquad\qquad\qquad x$

upstream distance = downstream distance

$x(3.5) = (x + 2)(2.5)$

$3.5x = 2.5x + 5$
$-2.5x \quad -2.5x$

$\boxed{x = 5}$

The boat travelled 5 miles upstream

(g) Two times the greater of two consecutive integers is 9 less than three times the lesser integer. What are the integers?

$x, \quad x + 1$

$2(x + 1) = 3x - 9$

$2x + 2 = 3x - 9$
$-2x \qquad -2x$

$2 = x - 9$
$+9 \qquad +9$

$\boxed{x = 11}$

$\{11 \, \& \, 12\}$

$2(12) = 3(11) - 9$
$24 = 33 - 9$
$24 = 24 \quad \checkmark$

Homework: pg 25: 3-7 odd, 13-23 odd, 27, 29, 33