Name Answer Key Date _____

Teacher _____ Period _____ **Solving Equations with Variables on Both Sides of the Equal Sign**

Station 1 - Find the Mistake

Directions: Each equation below has been solved incorrectly. Your task is to identify the mistake and then to solve the equation correctly. After you have solved the equation correctly, check your solution.

1) $5(2x-4)-11=4+3x$

$$5(2x-4)-11=4+3x$$

$$10x-4-11=4+3x$$

$$10x-15=4+3x$$
$$-3x \qquad -3x$$

$$7x-15=4$$
$$+15 \quad +15$$

$$\frac{7x}{7}=\frac{19}{7}$$

$$x=\frac{19}{7}$$

Mistake: Did not distribute completely

Solve	Check
$5(2x-4)-11=4+3x$ $10x-20-11=4+3x$ $10x-31=4+3x$ $-3x \qquad -3x$ $7x-31=4$ $+31 \quad +31$ $\frac{7x}{7}=\frac{35}{7}$ $\boxed{x=5}$	$5(2x-4)-11=4+3x$ $5(2(5)-4)-11=4+3(5)$ $5(10-4)-11=4+15$ $5(6)-11=4+15$ $30-11=19$ $19=19$ ✓

2) $-11-2x=6x+5(x+3)$

$$-11-2x=6x+5(x+3)$$

$$-11-2x=6x+5x+15$$

$$-11-2x=11x+15$$

$-2x-11x$

$\checkmark$

$\boxed{-13x}$

$$-11-9x=15$$

$$+11 \qquad +11$$

$$\frac{-9}{-9}x=\frac{26}{-9}$$

$$x=-\frac{26}{9}$$

Mistake: Did not subtract correctly: $-2x-11x=-13x$

Solve	Check
$-11-2x=6x+5(x+3)$	$-11-2x=6x+5(x+3)$
$-11-2x=6x+5x+15$	$-11-2(-2)=6(-2)+5((-2)+3)$
$-11-2x=11x+15$	$-11+4=-12+5(1)$
$+2x \quad +2x$	$-7=-12+5$
$-11=13x+15$	$-7=-7\checkmark$
$-15 \quad -15$	
$\frac{-26}{13}=\frac{13x}{13}$	
$-2=x$	
$\boxed{x=-2}$	

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Station 2 – Translate

Directions: Translate the following into a linear equation with one variable. Solve the equation that you write to represent each real-world situation and then check your solution.

1) Celia and Ryan are starting a nutrition program. Celia currently consumes 1200 calories a day and will increase that number by 100 calories each day. Ryan currently consumes 3230 calories a day and will decrease that number by 190 each day. They will continue this pattern until they are both consuming the same number of calories per day. In how many days will they be consuming the same number of calories?

d = number of days

$$1200 + 100d = 3230 - 190d$$
$$+190d \qquad\qquad +190d$$

$$1200 + 290d = 3230$$
$$-1200 \qquad\qquad -1200$$

$$\frac{290d}{290} = \frac{2030}{290}$$

$$\boxed{d = 7}$$

They will be consuming the same number of calories in 7 days.

Check: $1200 + 100d = 3230 - 190d$

$1200 + 100(7) = 3230 - 190(7)$

$1200 + 700 = 3230 - 1330$

$1900 = 1900$ ✓

2) A salesperson in a stereo store is given a choice of two different compensation plans. One plan offers a weekly salary of $240 plus a commission of $25 for each stereo sold. The other plan offers no salary but pays $55 commission on each stereo sold. How many stereos must the sales person sell to make the same amount of money under both plans?

x = number of stereos sold

$$240 + 25x = 55x$$
$$-25x \quad -25x$$

$$\frac{240}{30} = \frac{30x}{30}$$

$$8 = x$$

$$\boxed{x = 8}$$

The salesperson must sell 8 stereos.

check:

$$240 + 25x = 55x$$
$$240 + 25(8) = 55(8)$$
$$240 + 200 = 440$$
$$440 = 440 \checkmark$$

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Station 3 – Fill in the Missing Steps and Properties

Directions: The following equations have been solved partially for you. Several of the steps necessary to solve the equations are missing and several of the properties used to justify the some of the steps are missing. Fill in all of the missing steps and properties. Then, check the solution to the equation.

1) $-5x - 7 = -9x + 5$

$-5x - 7 = -9x + 5$	**Original Equation**
$-5x - 7 + 9x = -9x + 5 + 9x$	Addition Property of Equality
$4x - 7 = 5$	**Simplify**
$4x - 7 + 7 = 5 + 7$	**Addition Property of Equality**
$4x + 0 = 5 + 7$	Inverse Property of Addition
$4x = 5 + 7$	**Identity Property of Addition**
$4x = 12$	**Simplify**
$\frac{4x}{4} = \frac{12}{4}$	Division Property of Equality
$\boxed{x = 3}$	Simplify

Check: $-5x - 7 = -9x + 5$

$-5(3) - 7 = -9(3) + 5$

$-15 - 7 = -27 + 5$

$-22 = -22$ ✓

2) $8x - 3 = 2\left(x - \frac{1}{2}\right)$

$8x - 3 = 2\left(x - \frac{1}{2}\right)$	Original Equation
$8x - 3 = 2x - 1$	**Distributive Property**
$8x - 3 - 2x = 2x - 1 - 2x$	**Subtraction Property of Equality**
$6x - 3 = -1$	Simplify
$6x - 3 + 3 = -1 + 3$	**Addition Property of Equality**
$6x + 0 = -1 + 3$	Inverse Property of Addition
$6x = -1 + 3$	**Identity Property of Addition**
$6x = 2$	Simplify
$\frac{6x}{6} = \frac{2}{6}$	Division Property of Equality
$x = \frac{2}{6}$	Simplify
$\boxed{x = \frac{1}{3}}$	Simplify

Check:

$8x - 3 = 2(x - \frac{1}{2})$

$8(\frac{1}{3}) - 3 = 2(\frac{1}{3} - \frac{1}{2})$

$\frac{8}{3} - 3 = 2(-\frac{1}{6})$

$-\frac{1}{3} = -\frac{1}{3}$ ✓