Unit 2, Lesson 2 Notes: Solving Equations with Variables on Both Sides

Name Key Block _____ Date _____

Essential Question:

Example $2(3x-1)=5(2x+3)-1$	**Steps**
$6x-2=10x+15-1$ $6x-2=10x+14$	Simplify both sides by combining like terms
$6x-2=10x+14$ $-6x \quad -6x$ $-2=4x+14$ $-14 \quad -14$ $-16=4x$	Get variables on one side of the = sign and constants on the other side of the = sign
$\frac{4x}{4}=\frac{-16}{4}$ $\boxed{x=-4}$	Solve for the variable
$2(-12-1)=5(-8+3)-1$ $-26=-26$ ✓	Check by plugging your answer back into the original equation

**NOTE: You may get "No Solution" or "Infinitely Many Solutions" as your final answer!

Example of a "No Solution" problem	Example of "Infinitely Many Solutions"
Final answer looks like this: $7 \neq 2$	Final answer looks like this: $7=7$

Let's try these together:

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

$4-2c+6=-4c-4+2c$

$10-2c=-2c-4$

$0c=-14$

$0 \neq -14$

no solution

2) $\frac{5}{2}b-2=b-\frac{1}{2}$

$2\left(\frac{5}{2}b-2\right)=2\left(b-\frac{1}{2}\right)$

$5b-4=2b-1$

$3b=3$

$\boxed{b=1}$

Fractions:
To clear fractions: x everything by the LCD!

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Practice: Solve each equation.

1) $11x + 7 = 10x - 8$

$x = -15$

2) $\frac{x}{3} + 5 = 2x$

$3\left(\frac{x}{3} + 5\right) = (2x)3$

$x + 15 = 6x$

$15 = 5x$

$x = 3$

3) $5(3x - 2) = 3(5x - 1)$

$15x - 10 = 15x - 3$

$0 \neq 7$

no solution

4) $\frac{1}{5}(y - 1) = 6 - 2(4 - y)$

$\frac{1}{5}y - \frac{1}{5} = 6 - 8 + 2y$

$5\left(\frac{1}{5}y - \frac{1}{5}\right) = (2y - 2)5$

$y - 1 = 10y - 10$

$9 = 9y$

$y = 1$

5) $\frac{m}{2} + \frac{8}{5} = 4 - \frac{3}{10}m$

$10\left(\frac{m}{2} + \frac{8}{5}\right) = \left(4 - \frac{3}{10}m\right)10$

$5m + 16 = 40 - 3m$

$8m = 24$

$m = 3$

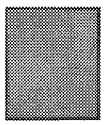
6) $1 - 8x = 8 - 7x$

$-7 = x$

$x = -7$

Find the perimeter of the square: (Hint: set sides equal to each other!)

1)



5x-8

3x

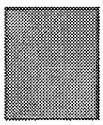
$3x = 5x - 8$

$-2x = -8$

$x = 4$

$3(4) = 12 \cdot 4 = 48$

2)



10x

6x+8

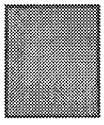
$6x + 8 = 10x$

$8 = 4x$

$x = 2$

$10(2) = 20 \cdot 4 = 80$

3)



7x - 15

2x

$2x = 7x - 15$

$-5x = -15$

$x = 3$

$2(3) = 6 \cdot 4 = 24$

Saving and Spending: Currently, you have $80 and your sister has $145. You decide to save $6 of your allowance each week, while your sister decides to spend her whole allowance plus $7 each week. How long will it be before you have as much money as your sister?

x = # of weeks

$80 + 6x = 145 - 7x$

$-80 \quad -80$

$6x = 65 - 7x$

$13x = 65$

$x = 5$

It will take 5 weeks before they have the same amount.