Unit 2 Study Guide: Addition and Subtraction Equations

Lesson 1: Addition and Subtraction Equations

Addition	Signs are the same, find the sum, keep the sign	Signs are different, find the difference, keep the sign of the larger number

Sum: the answer to an addition problem

Subtraction	Add the opposite	Follow addition rules

Difference: the answer to a subtraction problem

Opposite Number: change the sign. The opposite of 32 is -32.
The opposite of -45 is +45

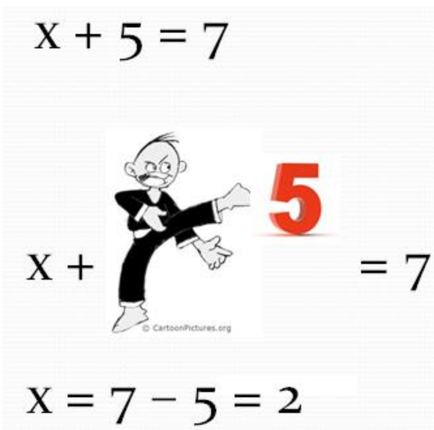
Practice:

Solving Equations: **GET THE LETTER (VARIABLE) BY ITSELF!!!!!**

Method 1: Send and Change

Send the number(s) to the other side of equation and change the sign

Example:	$c + 4 = 11$	
	$c = 11 – 4$	(+4 is sent to the other side and becomes -4)
	$c = 7$	



KICK THE 5 OUT OF THERE!!!

Method 2: Use Transformations

Get the letter (variable) by itself but doing the opposite operation

Example:	$c + 4 = 11$	4 is being added to c
	$c + 4 – 4 = 11 – 4$	Subtract 4 from both sides
	$c = 7$	

Transformation Steps

1. Look at the side of the equation that has the variable – what math operation do you see?
2. Do the opposite operation on BOTH sides
3. Simplify
4. Check by substituting answer into original equation

Practice Problems from Class:

Lesson 3 & 5: Multiplication and Division Equations

Multiplication	Signs are the same, answer is positive	Signs are different, answer is negative
Division	Signs are the same, answer is positive	Signs are different, answer is negative

Product: the answer to a multiplication problem

Quotient: the answer to a division problem

Transformation Steps

1. Look at the side of the equation that has the variable – what math operation do you see?
2. Do the opposite operation on BOTH sides
3. Simplify
4. Check by substituting answer into original equation

Multiplication Example:

$7g = 21$

$$\frac{\cancel{7}g}{\cancel{7}} = \frac{21}{7}$$

$g = 3$

1. I see multiplication on the side with the variable g
   7g means 7 times the variable g
2. The opposite of multiplication is division, so I divide both sides by 7
3. 7 ÷ 7 = 1, so the 7's cancel out on the left
   21 ÷ 7 = 3

Division Example:

$$\frac{y}{8} = 3$$

$$\frac{y}{\cancel{8}} \cdot \cancel{8} = 3 \cdot 8$$

$$y = 24$$

1. I see division on the side with the variable y
2. The opposite of division is multiplication so I multiply both sides by 8
3. The 8's cancel out on the left
4. 3 times 8 = 24

Class Examples:

Reciprocal: 1 over the number or just **FLIP IT**

Number	Reciprocal
5	$\frac{1}{5}$
$\frac{2}{3}$	$\frac{3}{2}$

Property of Reciprocals: when you multiply a number times its reciprocal, you get 1

Example: $5 \times \frac{1}{5} = 1$

$\frac{4}{7} \times \frac{7}{4} = 1$

Divide with Fractions: **SAME, CHANGE, FLIP!**

1. First fraction stays the **same**
2. **Change** the division sign to multiplication
3. **Flip** the 2nd fraction

***** You can put any number over 1 to make it a Fraction ******

Example:

$\frac{3}{4}x = 1$ Original equation

$\frac{\frac{3}{4}x}{\frac{3}{4}} = \frac{1}{\frac{3}{4}}$ Divide both sides by ¾

$x = 1 \cdot \frac{4}{3}$ Use the reciprocal and multiply: **SAME, CHANGE, FLIP!**

$x = \frac{4}{3}$

Practice

Lesson 6: Multiple Transformations

Equations with more than 1 operation, like this: $2x - 4 = 10$

Transformation Steps – Goal is to isolate the variable (get it alone on 1 side of the equation

1. Look at the side of the equation that has the variable – what math operation do you see?
2. If you see more than 1 math operation, remove each number one at a time. Start with the number that is FARTHEST away from the variable
3. Do the opposite operation on BOTH sides
4. Simplify
5. Check by substituting answer into original equation

Example:

$2x - 4 = 10$	1. I see subtraction and multiplication on the side with the variable x
$2x - 4 + 4 = 10 + 4$	2. 4 is farther away from the x, so start with that. Since I am subtracting 4, then add 4 to both sides
$2x = 14$	3. I see multiplication on the side with the variable x,
$\frac{2x}{2} = \frac{14}{2}$	so divide both sides by 2
$x = 7$	4. 2 ÷ 2 = 1, so the 2's cancel on the left

Practice Examples:

Lesson 8: Variables on Both Sides of an Equation

Step 1: Get the variables on 1 side of the equation and the numbers on the other side

Step 2: Use transformations to isolate the variable and solve the equation

Example:

$2m + 14 = 4m - 16$

$2m - 4m + 14 = 4m - 4m - 16$ Subtract 4m from both sides

$-2m + 14 = -16$

$-2m + 14 - 14 = -16 - 14$ Subtract 14 from both sides

$-2m = -30$

$\frac{-2m}{-2} = \frac{-30}{-2}$ Divide both sides by -2

$m = 15$

Examples from Class:

Lesson 9: Strange Solutions

Contradiction – an equation with no solution

Example: $3x - 2 = 3x + 4$

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

$-2 = 4$ **This is never true**, so this equation has no solution

Identity – an equation with infinitely many solutions

Example: $3x + 9 = 3(x + 3)$

$3x + 9 = 3x + 9$ **This is always true**, so ANY value for x will solve the equation

Notes and Examples from Class: