

## Notes - Writing and Simplifying Expressions

### Key Vocabulary

\_\_\_\_\_ : A mathematical phrase that can include numbers, variables, and operation symbols (ex.  $3y + 7$ )

\_\_\_\_\_ : A number that is multiplied by a variable (ex.  $5x$ )

\_\_\_\_\_ : A value that does not change (ex. 4)

\_\_\_\_\_ : For every real number  $a$ ,  $b$ , and  $c$ :  $a(b + c) = ab + ac$  and  $a(b - c) = ab - ac$  (ex.  $4(x + 3) = 4x + 12$ )

\_\_\_\_\_ : Expressions that have the same value for all variables

\_\_\_\_\_ : Positive and negative whole numbers (ex. 22, -3)

\_\_\_\_\_ : Have identical variables; that is, they have the same variable to the same exponent. Constants are like terms as well. (ex.  $6x^2$  and  $99x^2$  are like terms)

\_\_\_\_\_ : Parenthesis, Exponents, Multiplying and Dividing (left to right), Adding and Subtracting (left to right) **PEMDAS!**

\_\_\_\_\_ : To write an expression in simplest form (combine all like terms)

\_\_\_\_\_ : To replace a letter with a number or algebraic expression

\_\_\_\_\_ : "parts" in an expression that are added or subtracted (ex.  $4x^2 + 3 \rightarrow 4x^2$  and 3 are terms)

\_\_\_\_\_ : a letter that represents an unknown number

### Writing Expressions

What are some key words that represent the following operations?

Addition	Subtraction	<u>Tips to remember</u>
Multiplication	Division	

## Writing Expressions

Write the following expressions in algebraic form.

1. 9 more than  $c$

2.  $b$  minus 4

3. the quotient of  $z$  and 9

4. the total of  $n$  and 40

5. the sum of 8 and  $m$

6.  $x$  divided by 5

7. the difference of  $h$  and 7

8. 23 less than  $p$

9. the product of  $g$  and 2

10. 77 plus twice  $v$

11. two times  $r$  increased by 12

12. 3 times  $j$  decreased by 12

## Simplifying Expressions

**Steps to Simplifying an Expression:**

1. Distribute to get rid of any parentheses
2. Combine like terms.....(like terms have the same Variable and same degree/exponent)
3. Always leave simplified expression in standard form with the exponents decreasing from left to right

**Simplify the following expressions:**

1.  $3(4x - 5)$

2.  $-4(x - 2)$

3.  $-(7y - 4)$

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

5.  $-5(-8g - 3) - (5g + 3)$

6.  $4(2a + b) - 3(3a - 4b)$

## Review: Evaluating Expressions with Integers

Evaluate each expression if  $a = 8$ ,  $b = -4$ , and  $c = -2$ .

7. $3(b - a) - c$	8. $4b + a$	9. $cb - a$
10. $\frac{a}{b} - c$	11. $\frac{2a}{4} - b$	12. $c^2$

Try some with your partner ☺

1.  $-18x + 9 - 23x$

2.  $15x^2 + 2x - 12 - 23x^2 - 15x$

3.  $-5 + 8p + 24 - 17p$

4.  $13z + 2z^2 - 15 - 2z + 6z^2 + 9$

5.  $-4m^4 - 6m + 3m^4 - 5$

6.  $7y - 2y + 17y^2 - 32 + 4y$

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### Independent Practice

1.  $3(4y - 7)$

2.  $-(8m^2 - 29m + 13)$

3.  $4(3x - 7) - 2(4x^2 + 1)$

4.  $2n(3n^2 - 5)$

5.  $3v(2v^3 + 3) - 2(-v + 10)$

# Solving Equations

## Notes

Inverse

Operations:

Steps:

1. Remove any ( ) by distributing
2. Isolate variables
3. Combine like terms
4. Divide/Multiply to remove coefficient of variable
5. CHECK!!!

**\*\*Remember: Whatever is done to one side of an equation MUST be done to the other side!**

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**One-Step Examples:**

1.  $x - 4 = 6$

2.  $4y = 8$

3.  $\frac{z}{8} = 1$

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**Two-Step Examples:**

1.  $3c + 4 = 7$

2.  $\frac{d}{4} - 2 = 6$

3.  $\frac{m}{2} + 1 = -3$

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**Multi-Step Examples:**

1.  $3(x - 4) + 1 = 1$

2.  $-2(3n + 1) - 2 = 6$

3.  $-(y + 1) = 4$

### Special Cases:

Sometimes when solving equations we don't get simply one solution. We can get *no solution* or *multiple solutions*.

\*\*No Solution occurs when you are solving an equation and end up with a statement that IS NOT true (such as  $3=4$  or  $0=-1$ )!!

\*\*Infinite Solutions ( $\infty$ ) occurs when you are solving an equation and end up with a statement that IS ALWAYS true (such as  $2=2$  or  $-3=-3$ )!!

### **Examples:**

1.  $3(x - 4) + 1 = 3x - 4$

5.  $-6y + 8 = y + 10 - 7y$

2.  $2y + 3 - y = y + 3$

6.  $112 = 7x + 7(-4x - 17)$

3.  $5(z + 3) - 1 = 2z - 3(-z + 1)$

7.  $2x - 3 = x + (x - 3)$

4.  $4p + 2 = 4p - 2$

8.  $5y - 6 - 5y = 0$

## Algebraic Proportions:

1. Cross Multiply
2. Distribute
3. Combine Like Terms
4. Add or subtract to isolate variable
5. Multiply or divide to isolate variable

**\*\*All rules for solving  
still apply! 😊**

## **Examples:**

$$1. \frac{x+4}{5} = \frac{x-2}{7}$$

$$2. \frac{x+2}{14} = \frac{x}{5}$$

$$3. \frac{12x-32}{4x} = 5$$

$$4. \frac{2x-2}{3x+6} = \frac{2}{5}$$

## Notes: More Solving Fun

Practice from Yesterday:

Solve each of the following equations...

$$1) -15 = -47$$

$$2) -4(2x+5) = 2(-x-9) - 4x$$

$$3) -7(x-3) = -4$$

$$4) 4(2a-8) = \frac{1}{7}(49a+70)$$

$$5) -6x+8 = x+10-7x$$

$$6) 3x-2 = 4(x-2)+15$$

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### Equations with Fractions/Decimals:

Steps:

1. Clear parentheses by using the distributive property.
2. If there are fractions or decimals, clear them by multiplying by the lowest common denominator (lowest decimal place value for decimal numbers).
3. Combine like terms on each side of the equal sign.
4. Add or subtract to isolate the variable
5. Multiply or Divide to isolate the variable

Example 1:  $\frac{2}{7}x + \frac{4}{7}x = -\frac{30}{7}$

Multiply by 7 to clear the fraction.  $2x + 4x = -30$ . Solve like other equations.

Example 2: Solve  $6.5m + 1.5 = 4.3m - 0.7$

Try on your own and check with a partner

$$1. \frac{3}{7}x - \frac{2}{9} = \frac{1}{9}x + \frac{1}{7}$$

$$2. 0.6x + 0.5 = 2.9$$

$$3. \frac{1}{2}x + 4 = -\frac{2}{3}x + .5$$

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### Algebraic Proportions:

Steps:

1. Cross multiply
2. Distribute
3. Combine like terms
4. Add or subtract to isolate the variable
5. Multiply or divide to isolate the variable

Example 1:  $\frac{x+4}{5} = \frac{x-2}{3}$