

Name: \_\_\_\_\_

Date: Sept. 3

Hour: Alg (4)

### Unit 1B Day 10: Substituting in Expressions

Focus Question: How do I substitute and evaluate correctly?

#### A. How to Substitute and Evaluate Correctly

1. Brainstorm: When you hear the word substitute, what do you think?

fillin, teacher, take someone's place, replacement

2. **Substitute** in math means replace a variable with an expression

**Evaluate** in math means substitute and simplify.

3. To substitute correctly, you need to remember what operation is occurring between the coefficient and the variable. The operation is multiplication. The higher you go in math, the more you should use parenthesis to mean multiplication. Thus, when we substitute, we always use ( ) around our substitution to remind ourselves to multiply if necessary.

4. You should get in the habit of showing all your work for higher level math courses To evaluate correctly, you need to use the order of operations. If you have substituted correctly, the calculator will CHECK them for you.

**Grouping Symbols**  
**Exponents**  
**Multiplication**  
**Division**  
**Addition**  
**Subtraction**

*simplify a term*  
*simplify an expression*

\*Notice the G for grouping symbols. **Operations inside** parenthesis or brackets, in numerators or denominators, under radicals, etc fall in this category.

#### B. Evaluating Expressions Practice Problems

Evaluate the algebraic expressions for the given values of each variable:

1)  $4ab + b^2 - 2a$  when  $a = 4$  and  $b = -3$

$$4(4)(-3) + (-3)^2 - 2(4)$$

$$-48 + 9 - 8$$

$$\boxed{-47}$$

2)  $\frac{xy}{m} + \frac{m}{x}$  at  $x = -2$ ,  $y = 7$  and  $m = 9$

$$\frac{(-2)(7)}{9} + \frac{9}{-2} \Rightarrow \frac{-14}{9} + \frac{9}{-2}$$

$$\Rightarrow \frac{-28}{18} - \frac{81}{18}$$

$$\boxed{\frac{-109}{18}}$$

3)  $6x - \frac{1}{2} + \frac{3}{4}b - 3$  when  $a = \frac{1}{4}$ ,  $b = 2$ , and  $x = -5$

$$6(-5) - \frac{1}{2} + \frac{3}{4}(2) - 3$$

$$-30(-\frac{1}{2} + \frac{3}{2}) - 3$$

$$-30 + 1 - 3$$

$$\boxed{-32}$$

4)  $2h + 3h^2 - 4h$  at  $h = -5$

$$2(-5) + 3(-5)^2 - 4(-5)$$

$$-10 + 3(25) + 20$$

$$-10 + 75 + 20$$

$$\boxed{85}$$

5)  $-3a + 5 - 2b + x^2$  when  $x = \frac{1}{3}$ ,  $a = 1$  and  $b = -7$       6)  $x - y$  when  $x = 2a^3 + 4a - 7$  and  $y = 3a^2 - 2a - 1$

$$2a^3 + 4a - 7 - (3a^2 - 2a - 1)$$

$$2a^3 - 3a^2 + 4a + 2a - 7 + 1$$

$$\boxed{2a^3 - 3a^2 + 6a - 6}$$



### C. Expressions and Equations

Look at the table of expressions and equations.

Expression	Equation
$3x + 7$	$6x + 4 = 10$
$2x + 3x + 9 - 4$	$5x - 2x = 10x + 5$
$2x - 6 + 3$	$4(x - 1) = 2(x + 2)$
$3 - 2x + 4 + 4x^2$	$2x^2 + 3 = 21$

1. What is the difference between an expression and an equation?

Equations have an equals sign

2. What do you think is the definition of **equation**?

3. An **equation** is 2 expressions set equal

We do not say "simplify" an equation. When we see an equation, our goal is usually to **solve** it. This means that we simplify each expression as much as possible and then **isolate the variable** we are told to solve for.

4. What does isolate mean? to get the variable by itself

5. What do you think it means to be a **solution to an equation**?

"answer"

6. Fill in the blanks with what the teacher says: A solution to an equation is a value that when substituted makes the equation true.

### D. Checking Solutions:

George was given the problem  $17 - 2x = 3$ . He says the solution is  $x = 14$ .

The CORRECT WAY to show he is wrong.

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When substituting you need to remember the following steps:

- 1) Copy the equation correctly
- 2) Substitute the values in the correct places using ( )
- 3) Simplify each expression
- 4) Determine if a variable is isolated
- 5) Check your work with a calculator
- 6) Put units if any are needed