

3.1 Evaluating Variable Expressions TEACHER Notes

Vocabulary:

- 1.) Algebraic expression - a mathematical phrase with at least one variable (does not have an "equal" sign)
- 2.) Coefficient - The numerical factor of a term that contains a variable
- 3.) Constant - A term without a variable.
- 4.) Term - Parts of an algebraic expression.
- 5.) Variable - a letter that represents an unknown number

Identify the terms, coefficients, and constants in each expression.

1.) $5x + 13$ Terms: $5x$ and 13 Coefficient: 5 Constant: 13	2.) $2w^3 + y + 4$ Terms: $2w^3$ and y and 4 Coefficients: 2 and 1 Constant: 4
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How to Evaluate Expressions:

- 1.) Replace the variables with the appropriate numbers
- 2.) Use order of operations (PEMDAS) to simplify

Evaluate each expression for $n = 3$, $x = 5$, and $y = 6$.

3.) nxy $3 \cdot 5 \cdot 6$ $= 90$	4.) $\frac{xy-3}{n^2} = \frac{(5)(6)-3}{3^2}$ $= \frac{30-3}{9} = \frac{27}{9} = 3$
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Evaluate each expression for $a = 2$, $b = 5$, and $c = 10$

5.) $3b + 4$ $3(5) + 4$ $15 + 4 = 19$	6.) $6 + ac$ $6 + (2)(10)$ $6 + 20$ $= 26$
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3.2 Writing Algebraic Expressions TEACHER notes

Vocabulary:

1. Numerical expression- a mathematical phrase with numbers and operation symbols only (no variables)
2. algebraic expression - a mathematical phrase with at least one variable
3. Phrase "a number" - means a variable

Common Mathematical Word Phrases that imply Operations:

Addition	Subtraction	Multiplication	Division
➤ Sum of	➤ difference of	➤ product of	➤ Quotient of
➤ more than	➤ less than	➤ times	➤ divided by
➤ plus	➤ fewer than	➤ twice	
➤ total of	➤ minus	➤ multiplied by	
➤ increased by	➤ decreased by	➤ "of" a number	
➤ added to	➤ subtracted from		
➤ all together	➤ take away		

Examples:

Write an expression for each word phrase.

1. 14 more than a number x _____ $x + 14$ _____

2. 8 fewer than 21 _____ $21 - 8$ _____

3. the sum of 18 and x _____ $18 + x$ _____

4. the quotient of 3 and a number z _____ $\frac{3}{z}$ _____

5. the product of n and 12 _____ $12n$ _____

6. three less than w _____ $w - 3$ _____

7. twice x _____ $2x$ _____

Write a word phrase for each expression. (sample answers given)

8. $x + 2$ *the sum of x and 2; x increased by 2*

9. $\frac{p}{9}$ *the quotient of p and 9; p divided by 9*


Application Problems:

10.) Write an expression for the problem:

You buy 5 bags of peanuts to share with your friends. Each bag contains p ounces of peanuts. How many ounces of peanuts did you buy?

Expression: $5p$

11.) Write an expression to describe the relationship of data in the table below.

n	
15	19
20	24
25	29

Expression: $n + 4$

3.3 Properties of Addition and Multiplication TEACHER Notes

Vocabulary:

1. Equivalent Expressions- expressions with the same value

Key Ideas

Commutative Properties

Words Changing the order of addends or factors does not change the sum or product.

Numbers $5 + 8 = 8 + 5$ **Algebra** $a + b = b + a$
 $5 \cdot 8 = 8 \cdot 5$ $a \cdot b = b \cdot a$

Associative Properties

Words Changing the grouping of addends or factors does not change the sum or product.

Numbers $(7 + 4) + 2 = 7 + (4 + 2)$
 $(7 \cdot 4) \cdot 2 = 7 \cdot (4 \cdot 2)$

Algebra $(a + b) + c = a + (b + c)$
 $(a \cdot b) \cdot c = a \cdot (b \cdot c)$

Identity Properties:

Identity property of multiplication: A number multiplied by 1 is still the original number.

Example: $7 \times 1 = 7$

Identity property of addition: Zero added to any number is still the original number.

Example: $3 + 0 = 3$

Simplify each expression.

1.) $7 + (12 + x)$ $(7 + 12) + x$ $19 + x$	2.) $(6.1 + x) + 8.4$ $(6.1 + 8.4) + x$ $14.5 + x$
3.) $5(11y)$ $55y$	4.) $4.5 \cdot r \cdot 1$ $4.5r$
5.) $5(4n)$ $20n$	6.) $10 + (a + 9)$ $a + (10 + 9)$ $a + 19$

Tell which property the statement illustrates: (Associative, Identity, Commutative)

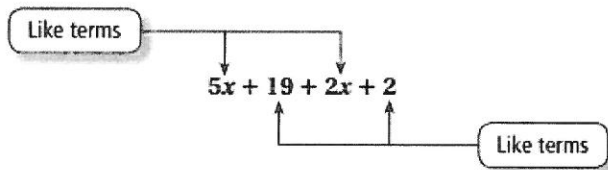
7.) $4 \cdot x = x \cdot 4$ Commutative Property of Multiplication	8.) $6 + 0 = 6$ Identity Property of Addition
9.) $7(1) = 7$ Identity Property of Multiplication	10.) $2 + (3 + x) = (x + 2) + 3$ Associative Property of Multiplication

3.4a Simplifying Expressions Notes

Objective: Students will be able to simplify algebraic expressions by combining like terms.

Vocabulary:

Like terms: Terms that have the same variables raised to the same exponents. Constant terms are also like terms.



How to Simplify a Variable Expression:

1.) Combine "like terms" (variables with variables, numbers with numbers)

1.) $3x + 9 + 2x$ $5x + 9$	2.) $y + y + y$ $3y$
3.) $7y + 6 - 1 + 12y$ $19y + 5$	4.) $5x + 2y + 3x + 4$ $8x + 2y + 4$
5.) $4d + 9 - d - 8$ $3d + 1$	6.) $3x + 9 - 2x - 5$ $x + 4$

Challenge question:

Simplify: $7m + 2m^2 + 9b - 3m + 5m^2 - 3b$

$7m^2 + 6b + 4m$

3.4b Distributive Property and Expressions Notes

Distributive Property: To multiply a sum or difference by a number, multiply each number in the sum or difference by the number outside of the parentheses.

Steps for using the distributive property ("Jump the Fence"):

- 1.) The number outside the parentheses "jumps the fence" (distributes).
- 2.) The number tags everyone inside (tag = multiply).
- 3.) Simplify the expression by combining like terms if needed.

Multiply Using the Distributive property:

1.) 35×4 $30 \times 4 = 120$ $5 \times 4 = 20$ $120 + 20 = 140$	2.) 63×7 $60 \times 7 = 420$ $3 \times 7 = 21$ $420 + 21 = 441$
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Simplify each expression:

3.) $5(2x) = 10x$	4.) $4(x + 5) = 4x + 20$
5.) $10(2b - 6) = 20b - 60$	6.) $3(4w + 2) + 7w$ $12w + 6 + 7w$ $19w + 6$
7.) $6(2x + y + 4)$ $12x + 6y + 24$	8.) $5 + 2(3x + 6)$ $5 + 6x + 6$ $6x + 11$

Are the expressions equivalent? Simplify. Then explain why or why not.

9.) $3(2x + 9) + 3$ and $6x + 30$

Yes, $6x + 27 + 3 = 6x + 30$

The expressions are equivalent