

# UNIT 6

PROPERTIES AND EXPRESSIONS 2015-16

## CCM6 and CCM6+

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

Math Teacher: \_\_\_\_\_

Projected Test Date: \_\_\_\_\_

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**Unit 6 – Algebraic Expressions and Properties Vocabulary**

Variable	A letter or symbol that represents a number
Coefficient	A number before the variable that expresses how many of each variable there are. For Ex: $3x$ The coefficient is 3 therefore there are 3 x's or 3 times x
Term	a <i>term</i> is either a single number or variable, or the product of several numbers or variables, separated from another term by a + or – sign in an overall expression. For example, in $3 + 4x + 5wyz$  3, $4x$ , and $5wyz$ are all terms.
Constant	A value that does not change
Expression	A set of numbers that are related to one another by the use of operator symbols that represent a mathematical situation
Equation	A mathematical statement that 2 expressions are equal
Quantity	A specified or indefinite amount
Sum	The answer to an addition problem
Difference	The answer to a subtraction problem
Product	The answer to a multiplication problem
Quotient	The answer to a division problem
Like terms	In algebra, like terms are more than one term or terms that have the same variables and powers. The coefficients do not matter.
Unlike Terms	Unlike terms are two or more terms that are not like terms, i.e. they do not have the same variables or powers.
factored form	An expression is in factored form if it is written as the product of its factors
Distributive Property	The property that states if you multiply a sum by a number, you will get the same result if you multiply each addend by that number and then add the products
Associative Property	The property that states for three or more numbers, their sum (or product) is always the same, regardless of grouping
Commutative Property	The property that states that two or more numbers can be added (or multiplied) in any order without changing the sum (or product)
Multiplicative Identity	Any amount multiplied by one is itself
Additive Identity	Any amount plus zero is itself
sum	The result when two or more numbers are added.
addend	A number added to one or more other numbers to form a sum.
factor	A number that is multiplied by another number to get a product.
expression	A mathematical phrase that contains operations, numbers, and/or variables.
least common multiple	The smallest number, other than zero, that is a multiple of two or more given numbers.
multiple	The product of any number and a whole number is a multiple of that number.

## Vocabulary for Algebraic Expressions

$3a + 4y - 6$ “a” and “y” are the <b>variables</b> <b>A variable is a letter or symbol that represents a number.</b>	$3a + 4y - 6$ There are 3 <b>terms</b> : 3a, 4y and 6 <b>A term is either a single number or variable or the product of several numbers or variables, separated from another term by a plus or minus sign in an overall expression.</b>
$3a + 4y - 6$ <ul style="list-style-type: none"> <li>• 3 and 4 are <b>coefficients</b></li> <li>• They explain how many of that variable the term contains                There are 3 a’s and 4 y’s</li> </ul> <b>A coefficient is the number before the variable that expresses how many of each variable there are.</b>	$3a + 4y - 6$ <ul style="list-style-type: none"> <li>• 6 is the <b>constant</b></li> <li>• The value of the term 6 will always be 6</li> <li>• The values of the other terms can change depending on the values assigned to the variables</li> </ul> <b>A constant is a value that does not change.</b>
$3(2 + 6)$ <ul style="list-style-type: none"> <li>• Can be described as the product of two factors: 3 and <math>(2 + 6)</math>. (<i>A factor is one of the numbers that can be multiplied together to get the product</i>)</li> <li>• The quantity <math>(2 + 6)</math> is viewed as one factor consisting of two terms</li> </ul> <b>A quantity is a specified or indefinite amount of something.</b>	
Additional Notes:	
Guided Practice:	
Label the following parts in the algebraic expression: a) Terms b) Operations c) Variables d) Coefficients e) Constant	$\frac{3y + 8z}{15}$
True or False?	$3(x + 4)$ can be stated as both: “the product of 3 and the sum of x and 4” AND “three times the quantity of x and 4”

**Expression Vocabulary Practice**

- For this activity you will need red, green and blue colored pencils or markers.
- For each problem below underline the coefficients with red, circle the variables with green, put a blue square around all constants and label how many terms are in the expression.

1.  $4a - 5y + 10z + 8$  Numbers of terms = \_\_\_\_\_

2.  $6x^2 + 7x - 3$  Numbers of terms = \_\_\_\_\_

3.  $14x^3 + 42x - 36x + 21y$  Number of terms = \_\_\_\_\_

4.  $26x^4 + 59x^3 - 12y + 6x - 9$  Numbers of terms = \_\_\_\_\_

5.  $2x + y + 4$  Numbers of terms = \_\_\_\_\_

6.  $5x^2y^2 + 3xy + 4$  Numbers of terms = \_\_\_\_\_

7.  $3xyz + 8xy + 2y + 6$  Numbers of terms = \_\_\_\_\_

8.  $2x^5y^2$  Numbers of terms = \_\_\_\_\_

9.  $5x + 8y + 3$  Numbers of terms = \_\_\_\_\_

10.  $\frac{m}{2} + 9n - 5$  Numbers of terms = \_\_\_\_\_

**Algebraic Expression Vocabulary Homework**

**Match the vocabulary to the correct definition. Write the answer in the blank on the left side.**

- |                               |   |
|-------------------------------|---|
| _____ 1. Algebraic Expression | A. Each part of an expression separated by an operation.                            |
| _____ 2. Coefficient          | B. A number that stands by itself.  |
| _____ 3. Constant             | C. A number that does not stand by itself, it is attached to a variable.            |
| _____ 4. Term                 | D. A letter that stands for a particular numerical value.                           |
| _____ 5. Variable             | E. A mathematical phrase that can contain numbers, variables and operation symbols. |

**Identify each part of the algebraic expression as the coefficient, constant or variable.**

1.  $4x - 12$ 
  - a. 4 is a(n) \_\_\_\_\_
  - b. x is a(n) \_\_\_\_\_
  - c. What is the constant? \_\_\_\_\_
  - d. How many terms are there? \_\_\_\_\_
  
2.  $a + 3b + 8$ 
  - a. a is a(n) \_\_\_\_\_
  - b. 3 is a(n) \_\_\_\_\_
  - c. b is a(n) \_\_\_\_\_
  - d. What is the constant? \_\_\_\_\_
  - e. How many terms are there? \_\_\_\_\_
  
3.  $6y$ 
  - a. 6 is a(n) \_\_\_\_\_
  - b. y is a(n) \_\_\_\_\_
  - c. What is the constant? \_\_\_\_\_
  - d. How many terms are there? \_\_\_\_\_

# MATH PROPERTIES

<p>Commutative Property</p> <ul style="list-style-type: none"> <li>• Addition</li> <li>• Multiplication</li> </ul>	
<p>Associative Property</p> <ul style="list-style-type: none"> <li>• Addition</li> <li>• Multiplication</li> </ul>	
<p>Distributive Property</p> <ul style="list-style-type: none"> <li>• always 2 operations!</li> </ul>	
<p>Identity Property</p> <ul style="list-style-type: none"> <li>• Additive Identity</li> <li>• Multiplicative Identity</li> </ul>	
<p>Zero Property</p> <ul style="list-style-type: none"> <li>• Multiplication</li> </ul>	

Name it...C, A, D, AI, MI, Z

$$3 + 5 = 5 + 3$$

$$0(9 + 3^2) = 0$$

$$\frac{2}{3}(9 - 8) = \frac{2}{3}$$

$$(5 \cdot 7) \cdot 3 = (7 \cdot 5) \cdot 3$$

$$5 + (11 + 5) = (5 + 5) + 11$$

$$12 + (19 + 2 - 21) = 12$$

$$4(x + 5) = 4x + 20$$

$$3(7x) = x(3 \cdot 7)$$

Name \_\_\_\_\_

Date \_\_\_\_\_ Core \_\_\_\_\_

**Math Properties**

The **commutative property** shows that the \_\_\_\_\_ of the numbers does not change the answer to an \_\_\_\_\_ problem.

Commutative Property	
Addition	Multiplication

The **associative property** shows that the \_\_\_\_\_ of the numbers does not change \_\_\_\_\_.

Associative Property	
Addition	Multiplication

The **identity property** shows that the sum of any number and \_\_\_\_\_ is that number and that the product of any number and \_\_\_\_\_ is that number.

Identity Property	
Addition	Multiplication

**Directions:** Write the property that is represented by the given equation.

- $3 + 9 = 9 + 3$  \_\_\_\_\_
- $(7 \cdot 13) \cdot 5 = 7 \cdot (13 \cdot 5)$  \_\_\_\_\_
- $12 \cdot 4 = 4 \cdot 12$  \_\_\_\_\_
- $615 + 0 = 615$  \_\_\_\_\_
- $(x + y) + z = x + (y + z)$  \_\_\_\_\_
- $j \cdot 1 = j$  \_\_\_\_\_

**Directions:** Complete the equation to represent each property.

- Associative Property (x)  
 $9(7 \times 8) =$  \_\_\_\_\_
- Multiplicative Inverse  
 $3 \times \underline{\quad} = 1$
- Additive Identity  
 $8 + \underline{\quad} = 8$
- Commutative Property (+)  
 $12 + 90 =$  \_\_\_\_\_
- Multiplicative Identity  
 $24 \times \underline{\quad} = 24$
- Additive Inverse  
 $62 + \underline{\quad} = 0$
- Associative Property (+)  
 $8 + (7 + 12) =$  \_\_\_\_\_
- Commutative Property (x)  
 $34 \times 54 =$  \_\_\_\_\_

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

Score : \_\_\_\_\_

Teacher : \_\_\_\_\_

Date : \_\_\_\_\_

### Identify the Properties of Mathematics

- 1 ) Adding 0 to any number leaves it unchanged. For example  $a + 0 = a$ . \_\_\_\_\_
- 2 ) When three or more numbers are added, the sum is the same regardless of the grouping of the addends. For example  $(a + b) + c = a + (b + c)$  \_\_\_\_\_
- 3 ) Multiplying any number by 0 yields 0. For example  $a \times 0 = 0$ . \_\_\_\_\_
- 4 ) When three or more numbers are multiplied, the product is the same regardless of the order of the multiplicands. For example  $(a \times b) \times c = a \times (b \times c)$  \_\_\_\_\_
- 5 ) The product of any number and one is that number. For example  $a \times 1 = a$ . \_\_\_\_\_
- 6 ) When two numbers are multiplied together, the product is the same regardless of the order of the multiplicands. For example  $a \times b = b \times a$  \_\_\_\_\_
- 7 ) Adding 0 to any number leaves it unchanged. For example  $a + 0 = a$ . \_\_\_\_\_
- 8 ) The sum of any number and zero is the original number. For example  $a + 0 = a$ . \_\_\_\_\_
- 9 ) The product of any number and one is that number. For example  $a \times 1 = a$ . \_\_\_\_\_
- 10 ) When two numbers are multiplied together, the product is the same regardless of the order of the multiplicands. For example  $a \times b = b \times a$  \_\_\_\_\_
- 11 ) The sum of any number and zero is the original number. For example  $a + 0 = a$ . \_\_\_\_\_
- 12 ) When two numbers are added, the sum is the same regardless of the order of the addends. For example  $a + b = b + a$  \_\_\_\_\_
- 13 ) When three or more numbers are multiplied, the product is the same regardless of the order of the multiplicands. For example  $(a \times b) \times c = a \times (b \times c)$  \_\_\_\_\_
- 14 ) Multiplying any number by 0 yields 0. For example  $a \times 0 = 0$ . \_\_\_\_\_
- 15 ) When two numbers are added, the sum is the same regardless of the order of the addends. For example  $a + b = b + a$  \_\_\_\_\_

**Name That Property....**

**C(ommutative), A(ssociative), D(istributive), AI (Additive Identity),  
MI (Multiplicative Identity), Z (Zero Property of Multiplication)**

$3 + a = a + 3$	$5(10 - x) = 50 - 5x$	$a + b + c = b + c + a$
$5ab = ab5$	$4(x + 3) = 4x + 12$	$(5 \bullet a) \bullet 8 = 5 \bullet (a \bullet 8)$
$3 \bullet 4 \bullet 9 = 4 \bullet 3 \bullet 9$	$(7 + 20) + (5 + 4) = 7 + (20 + 5) + 4$	$5 \bullet 6 = 6 \bullet 5$
$2 \bullet x = x \bullet 2$	$7(3 - 2) = (7 \bullet 3) - (7 \bullet 2)$	$(3 \bullet 2) \bullet 8 = 3 \bullet (2 \bullet 8)$
$2 + 5 + 7 = 7 + 5 + 2$	$(5 \bullet 7 \bullet 8) = (7 \bullet 5 \bullet 8)$	$25 + 30 = 30 + 25$
$4y + 8 = 4(y + 2)$	$(6 \bullet x) + (6 \bullet 3) = 6(x + 3)$	$(9 \bullet y) \bullet 10 = 9 \bullet (y \bullet 10)$
$2 + 8 = 8 + 2$	$3 \bullet 2 \bullet 4 = 2 \bullet 3 \bullet 4$	$5 + (9 + 2) = (5 + 9) + 2$
$24 + 4x = 4(6 + x)$	$x + y = y + x$	$xy = yx$
$5x \bullet 6 = 5 \bullet 6x$	$(8x \bullet 5) \bullet 4 = 8x \bullet (5 \bullet 4)$	$x(6 - 4) = 6x - 4x$

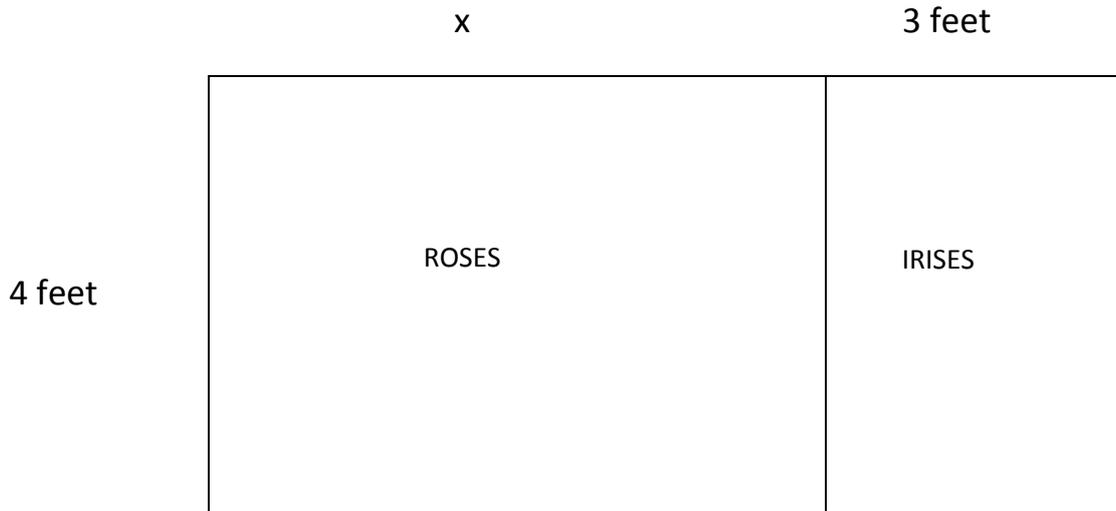
**Warm- Up Same Value**

Determine whether each equation has the same value. Explain how you know.

Equation	True or False	Explanation=Property
$45 \div 9 = 9 \div 45$		
$(4 + 10) + 8 = 4 + (10 + 8)$		
$7(2 + 4) = (7 \cdot 2) + (7 \cdot 4)$		
$12 \cdot 8 \cdot 10 = 12 \cdot 10 \cdot 8$		
$8(13 - 9) = 8 \cdot 4$		

**Why are math properties useful?**

Focus Activity – Distributive Property



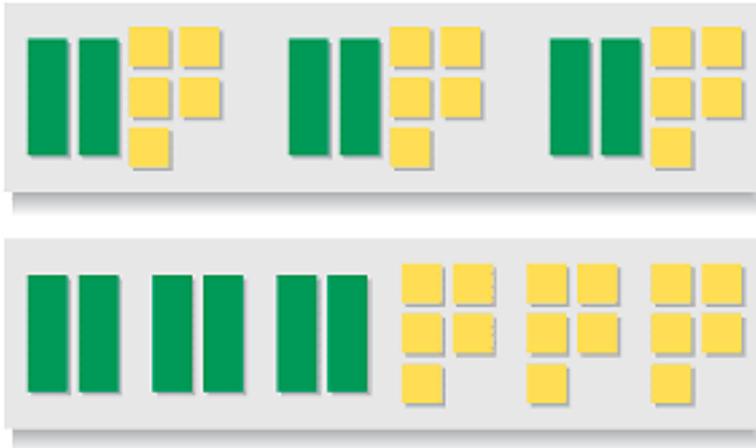
1. Write an algebraic expression to represent the areas of the following:

	Length	Width	Area
Rose Garden			
Iris Garden			
Entire Garden			

2. What could you do with the area of the rose garden and area of the Iris garden to find the area of the whole garden? Write it as an algebraic expression.
3. Look at your chart. Are there two ways to find the total area?
4. Prove it! Make  $x=4$  feet and see if your prediction is true.

## Using Tiles to Multiply

Use algebra tiles to multiply  $3(2x + 5)$ . Each green bar represent  $x$  and each yellow square represent 1.



Model three groups of  $2x + 5$ .

Group like tiles.

$$3(2x + 5) = 6x + 15.$$

Use Apples and Bananas to model  $3(a + b) = 3a + 3b$



Practice: Simplify the following expressions.

1.  $3(x + 4)$

2.  $4(x + 5)$

3.  $4(2x + 1) + 3x$

4.  $2(x + 5) + 4$

5.  $3(x + 2) + 2(2x + 1)$

## Distributive Property Powerpoint – Notes

Find the area of the rectangle.

Area = length x width



$$\text{Area} = 6 \bullet 24$$

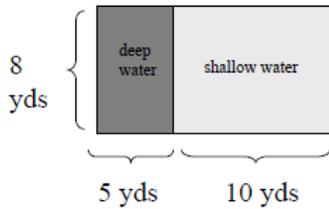
$$= 6 ( \quad + \quad )$$

$$= 6 \bullet \quad + 6 \bullet \quad$$

$$= \quad + \quad$$

$$= \quad \text{ft}^2$$

A swimming pool has a shallow end and a deep end. Find the surface area of the pool.



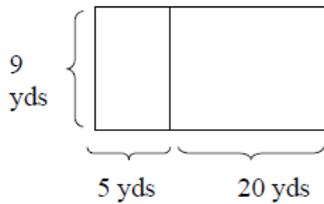
$$\text{Area} = 8( \quad + \quad )$$

$$= 8 \bullet \quad + 8 \bullet \quad$$

$$= \quad + \quad$$

$$= \quad \text{yd}^2$$

Write an expression that shows how to find the area of the rectangle and uses the distributive property.



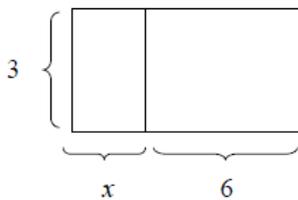
$$\text{Area} = 9( \quad + \quad )$$

$$= 9 \bullet \quad + 9 \bullet \quad$$

$$= \quad + \quad$$

$$= \quad \text{yd}^2$$

Write an expression that shows how to find the area of the rectangle and uses the distributive property.



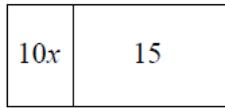
$$\text{Area} = 3( \quad + \quad )$$

$$= 3 \bullet \quad + 3 \bullet \quad$$

$$= \quad + \quad$$

**\*\*Why can't you find the sum?**

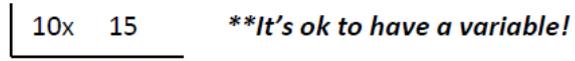
The expression  $10x + 15$  can represent the area of the figure below.



Find the expression that represents the length and the width.

Area =  $10x + 15$

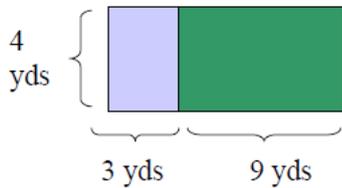
What is GCF of  $10x$  and  $15$ ? Use ladder diagram!



Area =  $\underline{\hspace{1cm}}(\underline{\hspace{1cm}} + \underline{\hspace{1cm}})$  ***\*Distributive Property!***

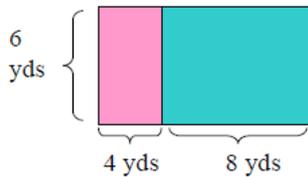
This problem was taken from the 6<sup>th</sup> Grade Mathematics Unpacked Content Document

Write an expression that shows how to find the area of the rectangle and uses the distributive property.



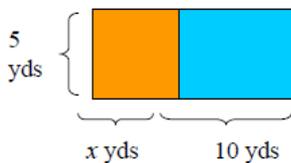
Area =  $\underline{\hspace{1cm}}(\underline{\hspace{1cm}} + \underline{\hspace{1cm}})$   
 =  $\underline{\hspace{1cm}} \bullet \underline{\hspace{1cm}} + \underline{\hspace{1cm}} \bullet \underline{\hspace{1cm}}$   
 =  $\underline{\hspace{1cm}} + \underline{\hspace{1cm}}$   
 =  $\underline{\hspace{1cm}} \text{yd}^2$

Write an expression that shows how to find the area of the rectangle and uses the distributive property.



Area =  $\underline{\hspace{1cm}}(\underline{\hspace{1cm}} + \underline{\hspace{1cm}})$   
 =  $\underline{\hspace{1cm}} \bullet \underline{\hspace{1cm}} + \underline{\hspace{1cm}} \bullet \underline{\hspace{1cm}}$   
 =  $\underline{\hspace{1cm}} + \underline{\hspace{1cm}}$   
 =  $\underline{\hspace{1cm}} \text{yd}^2$

8) Write an expression that shows how to find the area of the rectangle and uses the distributive property.



Area =  $\underline{\hspace{1cm}}(\underline{\hspace{1cm}} + \underline{\hspace{1cm}})$   
 =  $\underline{\hspace{1cm}} \bullet \underline{\hspace{1cm}} + \underline{\hspace{1cm}} \bullet \underline{\hspace{1cm}}$   
 =  $\underline{\hspace{1cm}} + \underline{\hspace{1cm}}$   
**\*\*Why can't you find the sum?**

Equivalent to  $3(x + 7)$ :  $\underline{\hspace{2cm}}$

Equivalent to  $4(x + 5)$ :  $\underline{\hspace{2cm}}$

Equivalent to  $8(x + 2)$ :  $\underline{\hspace{2cm}}$

Equivalent to  $2(x + 3)$ :  $\underline{\hspace{2cm}}$

## More Distributive Property Practice...

1) Which of the following expressions shows the distributive property for  $5(3 + 7)$ ?



$$(5 + 3)(5 + 7)$$



$$(5 \times 3)(5 \times 7)$$



$$(5 \times 3) + (5 \times 7)$$

2) Which of the following expressions shows the distributive property for  $3(9 + 4)$ ?



$$(3 \times 9) + (3 \times 4)$$



$$(3 + 9) + (3 + 4)$$



$$(3 + 9)(3 + 4)$$

3) Which of the following expressions is equivalent to:

$$2 + 3 + 2 + 3$$

and shows the distributive property.



$$2 + 2 + 3 + 3$$



$$2(2 + 3)$$



$$3(2 + 3)$$

4) Which of the following expressions is equivalent to:

$$(4 \times 3) + (4 \times 8)?$$



$$3(4 + 8)$$



$$8(3 + 4)$$



$$4(3 + 8)$$

5) Which of the following expressions is equivalent to:

$$(5 \times 9) + (5 \times 3)?$$



$$3(9 + 5)$$



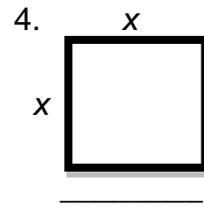
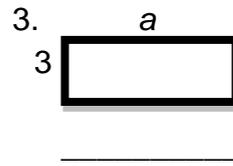
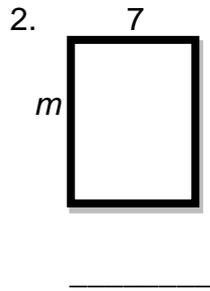
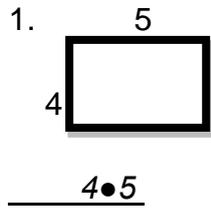
$$5(9 + 3)$$



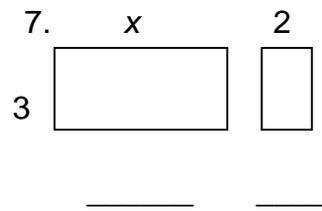
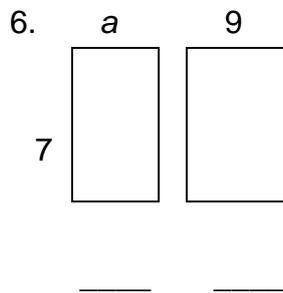
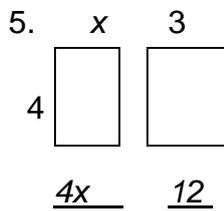
$$9(3 + 5)$$

# Distributive Property Using Area

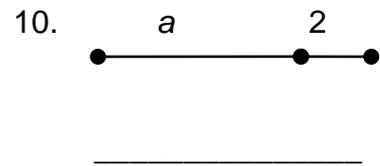
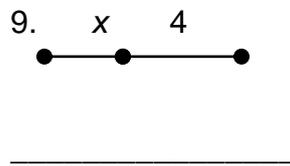
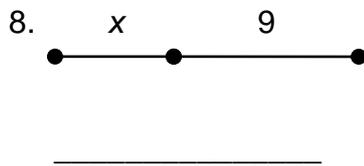
Write the **expression** that represents the area of each rectangle.



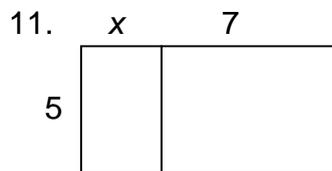
Find the area of each box in the pair.



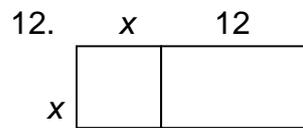
Write the expression that represents the total length of each segment.



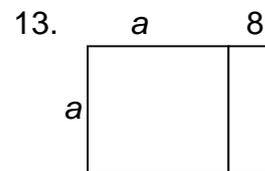
Write the area of each rectangle as the ***product of length x width*** and also as a ***sum of the areas*** of each box.



AREA AS PRODUCT	AREA AS SUM
$5(x + 7)$	$5x + 35$

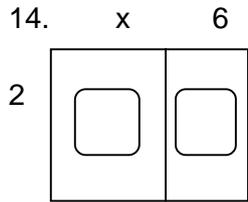


AREA AS PRODUCT	AREA AS SUM



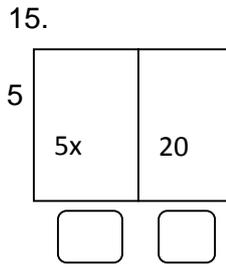
AREA AS PRODUCT	AREA AS SUM

Fill in the missing information for each: **dimensions**, **area as product**, and **area as sum**.



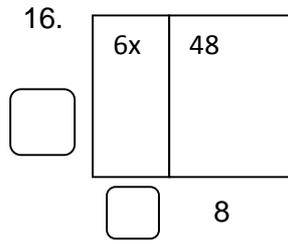
                    
 $2(x + 6)$

                    
 $2x + 12$



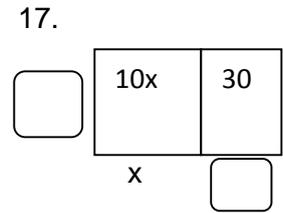
                  



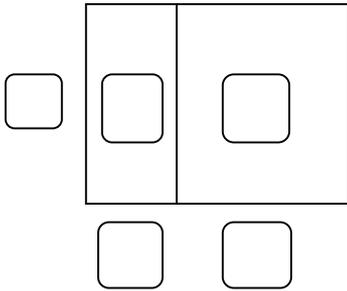


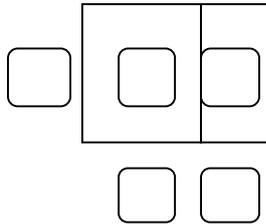
                  

Fill in the missing dimensions (  ) from the expression given.

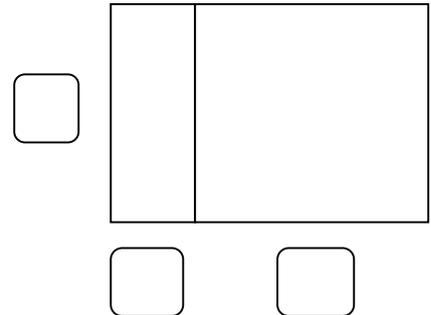
18.  $5x + 35 = 5(\underline{\hspace{2cm}})$



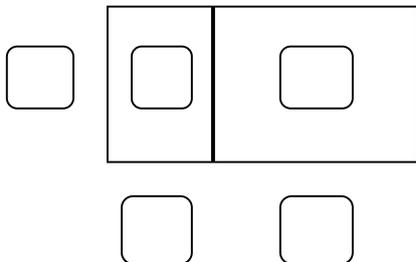
19.  $2x + 12 = 2(\underline{\hspace{2cm}})$



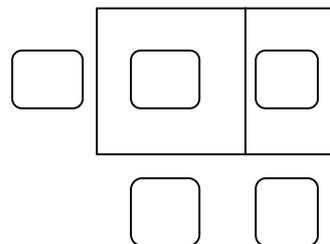
20.  $3x + 21 = 3(\underline{\hspace{2cm}})$



21.  $4x + 16 = \underline{\hspace{1cm}}(\underline{\hspace{2cm}})$



22.  $x^2 + 5x = \underline{\hspace{1cm}}(\underline{\hspace{2cm}})$



**Equivalent Expressions**

For each question determine if the expressions are equivalent. If they are equivalent, give a property that allows you to make this conclusion. If they are not equivalent, substitute a value for the variable to show that the two expressions are not equivalent.

1. Is  $x + y$  equivalent to  $y + x$ ?
2. Is  $3(a + b)$  equivalent to  $3a + 3b$ ?
3. Is  $m - n$  equivalent to  $n - m$ ?
4. Is  $3x + 8x$  equivalent to  $11x$ ?
5. Is  $a - a$  equivalent to  $0$ ?
6. Is  $12 \div 4$  equivalent to  $4 \div 12$ ?
7. Is  $\frac{1}{2}x$  equivalent to  $\frac{x}{2}$ ?
8. Is  $ab$  equivalent to  $ba$ ?
9. Is  $5 - x$  equivalent to  $x - 5$ ?
10. Is  $7(a - b)$  equivalent to  $7a - 7b$ ?

**EXPRESSIONS NOTES**

<p>What is a <b>CONSTANT</b>?</p>	<ul style="list-style-type: none"> <li>• A constant is a <b>NUMBER</b> that does not change. <ul style="list-style-type: none"> <li>○ ie) 2, 4, 6, 17, 28, 40, 85...</li> </ul> </li> </ul>
<p>What is a <b>VARIABLE</b>?</p>	<ul style="list-style-type: none"> <li>• A variable is a <b>LETTER</b> that stands for a value (or number) that may change/vary. <ul style="list-style-type: none"> <li>○ ie) a, b, c, m, n, x, y, z...</li> </ul> </li> </ul>
<p>What is a <b>VARIABLE EXPRESSION</b>?</p>	<ul style="list-style-type: none"> <li>• A math sentence containing constants, variables, and operational symbols (+, -, •, ÷)</li> </ul>
<p>So...What's a <b>TERM</b>?</p>	<ul style="list-style-type: none"> <li>• In a variable expression, <b>TERMS</b> are separated by addition or subtraction signs. <ul style="list-style-type: none"> <li>○ <math>a + 2b + 5c - 6</math> has 4 TERMS</li> </ul> </li> <li>• Therefore, a <b>TERM</b> can be one of three things: <ul style="list-style-type: none"> <li>○ Constants (or Numbers) <ul style="list-style-type: none"> <li>▪ 2, 3, 5, 9</li> </ul> </li> <li>○ Variables (or Letters) <ul style="list-style-type: none"> <li>▪ a, b, x, y</li> </ul> </li> <li>○ The product (multiplication) of constants and variables <ul style="list-style-type: none"> <li>▪ a, 2b, 7c, 12d, 5x, y</li> </ul> </li> </ul> </li> <li>• The number that multiplies the variable is called the <b>COEFFICIENT</b>.</li> </ul>

What are  
**LIKE**  
**TERMS?**

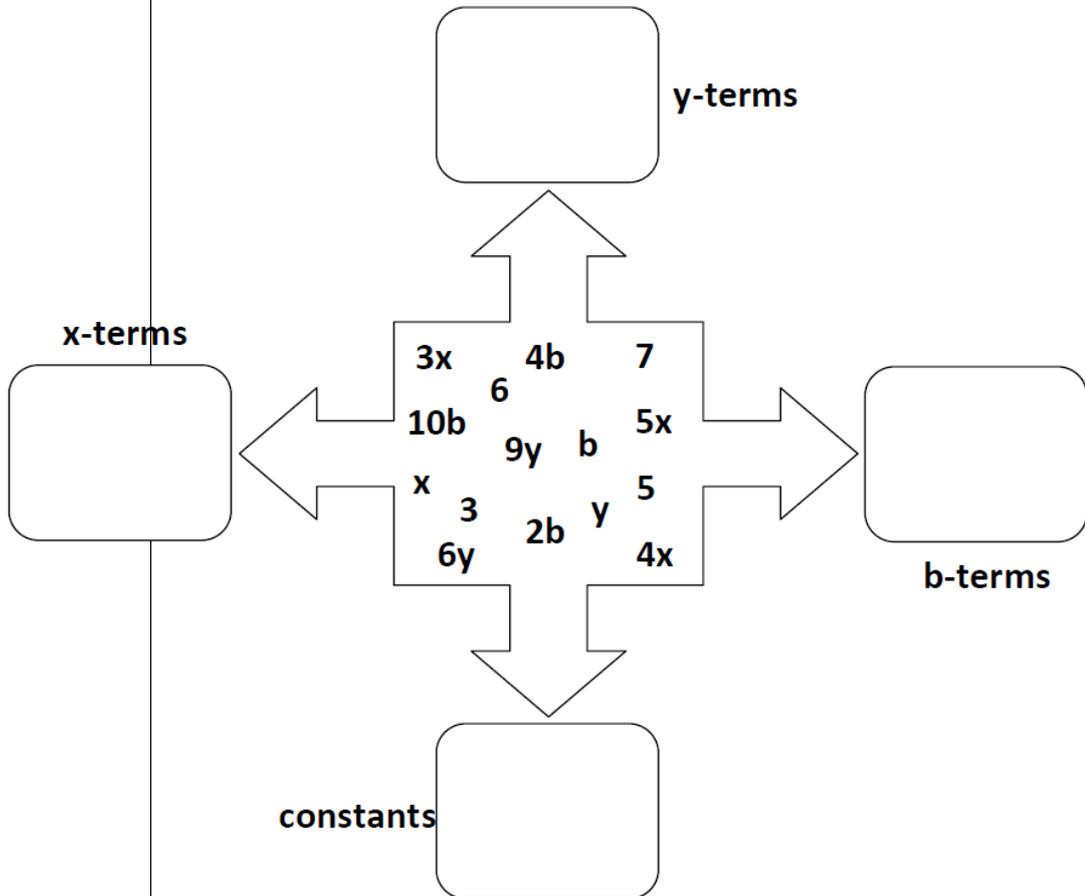
❖ All **CONSTANTS** (or numbers) are "Like Terms"

- 18, 2, 17, 35

❖ "Like Terms" have **IDENTICAL VARIABLES:**

- 2a, 3a, 9a, a
- b, 8b, 13b, 2b
- 5c, 9c, 2c, c
- 6xy, 5xy, 12xy, xy
- $9x^2$ ,  $4x^2$ ,  $18x^2$

❖ Activity: Separate the terms within the box into their corresponding circles to form "Like Terms"



<p>How to <b>COMBINE LIKE TERMS?</b></p>	<ol style="list-style-type: none"> <li>1. Assign a color/shape to a group of <u>LIKE TERMS</u></li> <li>2. Circle the <u>LIKE TERMS</u> <ul style="list-style-type: none"> <li>○ Include the SIGN in FRONT of the Term.</li> </ul> </li> </ol> <div data-bbox="427 443 1393 1070" style="border: 1px solid black; background-color: #e0ffff; padding: 10px; text-align: center;"> <p><b>When Combining Like Terms</b> be sure to include the + or - sign in FRONT of the term. If you don't "see" it, then it's a plus sign (positive).</p> </div> <ul style="list-style-type: none"> <li>○ The sign in FRONT of the term determines if addition or subtraction will be used to <u>COMBINE LIKE TERMS</u>.</li> </ul> <ol style="list-style-type: none"> <li>3. <u>COMBINE LIKE TERMS</u></li> </ol>
<p>Examples of Combining Like Terms:</p>	<ul style="list-style-type: none"> <li>• The sign in front of the term determines if we add or subtract the "Like Terms."</li> </ul> <ol style="list-style-type: none"> <li>1. <math>3x + 9 + 2x - 8 = 5x + 1</math></li> <li>2. <math>10 + 12y + 2 - 8y = 12 + 4y</math> or <math>4y + 12</math></li> </ol>

# Notes on Simplifying Algebraic Expressions

1. To add or subtract, you <i>must have</i> like terms.	<i>Notes:</i>
Example: $2z + 4z + 3z = 9z$ Example: $5r - 2r = 3r$	<i>Additional Example:</i> $6a + 5a - 3a = \underline{\hspace{2cm}}$
2. To multiply or divide, you <i>don't need</i> like terms.	<i>Notes:</i>
Examples: $5(2z) = 10z$ $12(3a) = 36a$	<i>Additional Example:</i> $8(5n) = \underline{\hspace{2cm}}$ $12(4z) = \underline{\hspace{2cm}}$
3. As always, follow the Order of Operations. Use Math Properties to work your way through Order of Operations.	<i>Notes:</i>

## Practice Section:

Simplify with a partner...finish all multiplying and dividing then combine like terms!

1.  $(t + 5) + 4(t - 1)$

3.  $12r \div 2 + 3s + 2(2) + 4(s + y)$

2.  $5x + 10 \div 2 + 3(x - 1)$

4.  $3x + 3x^2 - x + 2x$

**SIMPLIFYING EXPRESSIONS #1**

**Directions:** For each expression below, simplify the expression by combining *like terms*. Any two terms can be added/subtracted as long as they contain the same variable(s) and the same exponents. Terms that have different variables or exponents must be kept separated. Write the simplified expression on the line provided.

**Examples:**  $5x + 2y + 8x = \underline{13x + 2y}$        $5x^2 + 2y + 8x + 2x^2 = \underline{7x^2 + 8x + 2y}$

1)  $10x + 3y + 5x = \underline{\hspace{2cm}}$

2)  $2x^2 + 7y + 4x + 6x^2 = \underline{\hspace{2cm}}$

3)  $9y + 3y + 5x = \underline{\hspace{2cm}}$

4)  $2y^2 + 7y + 4y + 6y^2 = \underline{\hspace{2cm}}$

5)  $8x + y - 2x = \underline{\hspace{2cm}}$

6)  $x^2 + 7y - 4y + 9x^2 = \underline{\hspace{2cm}}$

7)  $14x - 3x + 2y - y + 3x = \underline{\hspace{2cm}}$

8)  $5y^2 + 5y + 5y + 5x^2 = \underline{\hspace{2cm}}$

9)  $23x + 3y - 5x = \underline{\hspace{2cm}}$

10)  $18x^2 + 3y + x + 6x^2 = \underline{\hspace{2cm}}$

## Simplifying Algebraic Expressions

Simplify the following:

1. $2a + 5(a + 3) + 9$	2. $6(5+x) + 2 \cdot 3x$
3. $3x - x + 4(8x \div 2)$	4. $3 + 2a + 5 + 5a$
5. $6x + x(3 + x)$	6. $2x + 5(x+3) + 3$
7. $3^2 + 8x \cdot 3 + 2(x+2)$	8. $\frac{24x}{2} + 3(x+8)$

## Task 1: Simplify and Explain

Fill out the chart below. Make sure you provide an explanation of how your group simplified each expression. Explanations would include properties used and how you combined like terms.

Expression	Simplify	Explanation
$4(x+5)$	$4(x + 5)$ $4x + 20$	Distributive Property
$3x + 14 + 2x$		
$8(x+5) - 23$		
$x(4 + 12) + 2x$		
$4x \div 2 + 9(x + 4)$		
$4y + 3x + y + 5x - 10$		

## Task 2: Prove It!

Look at the following Algebraic Expressions. First, simplify each expression. Then, substitute in the assigned values for the variables and evaluate both the original and simplified expressions to prove that they are equivalent to each other. Show your work!

Original Expression	$2^2 \cdot 3a + 5(3+a) - 2$	$5(x+3) \cdot 5 - 6$	$18p \div 3 \cdot 5 + 4(p+5)$
Substitution for Original	$a=2$	$x=4$	$p=2$
Original Expression ( <i>same as before</i> )	$2^2 \cdot 3a + 5(3+a) - 2$	$5(x+3) \cdot 5 - 6$	$18p \div 3 \cdot 5 + 4(p+5)$
Simplified Expression			
Substitution for Simplified	$a=2$	$x=4$	$p=2$
Are the expressions equivalent?			

## Mid- Unit 6 Review

Use the expression below to answer questions 1-4.

$$2x + 6y + 4 + x$$

1. What is an example of a *coefficient* in the expression above?  
\_\_\_\_\_
2. What is an example of a *term* in the expression above?  
\_\_\_\_\_
3. What is an example of a variable in the expression above?  
\_\_\_\_\_
4. What is an example of a constant in the expression above?  
\_\_\_\_\_

Translate the following words into algebraic expressions.

5. *the quotient of g and 9* \_\_\_\_\_
6. *the difference of 3 and y* \_\_\_\_\_
7. *8 times the quantity x plus 4* \_\_\_\_\_
8. *7 less than double a number p* \_\_\_\_\_

Translate the following algebraic expressions into words.

9.  $y - 7$  \_\_\_\_\_
10.  $5(x - 4)$  \_\_\_\_\_
11.  $m \div 16$  \_\_\_\_\_
12.  $(s + 10) - 8$  \_\_\_\_\_

**Evaluate:**

13. Evaluate the expression  $5(x + 8) + x + y$ , given that  $x = 3$  and  $y = 30$
- \_\_\_\_\_

14. Evaluate the expression  $5(x + 2) + x^2 + y$ , given that  $x = 5$  and  $y = 8$
- \_\_\_\_\_

**Write and evaluate the expressions:**

15. The formula for the perimeter of rectangle is  $P = 2l + 2w$ . The length of the rectangle is 5 units longer than the width. Write an algebraic expression that can be used to find the perimeter of the rectangle. \_\_\_\_\_

16. What is the perimeter of the rectangle in Question 5 if the length is 12 cm?

17. You have decided to treat yourself and two friends to ice cream. Now, you need to decide if you are going to get ice cream from “Scoops” Ice Cream Shop or “Cold Treats” Ice Cream Shop.

***“Scoops” has one cone of ice cream for \$3 and each topping is \$1***

***“Cold Treats” has one cone of ice cream for \$2 and each topping is \$1.50***

- a. Write an expression for the cost of an ice cream cone and “ $t$ ” number of toppings at both shops.

Scoops \_\_\_\_\_

Cold Treats \_\_\_\_\_

- b. If you and your two friends all want to get an ice cream cone and 3 toppings, which shop will be the least expensive? How do you know?

Least expensive: \_\_\_\_\_

Explanation:

What questions do you still have and want to discuss before taking the quiz?

**“Can You Speak Math?”**

Three times a number $x$ plus 14	The quotient of $x$ and 2	6 less than twice the distance $x$	$x$ less than 20
Triple the sum of $x$ and 14	The product of $x$ and 2	$x$ less than 6	The difference between $x$ and 20
14 more than three times $x$	The sum of twice $x$ and 6	20 less than the quotient of $x$ and 2	The sum of $x$ and 3

**Notes on translating word phrases and speaking algebraically**

<b>+</b>	<b>-</b>	<b>X</b>	<b>÷</b>
Added	Subtracted	times	Divided by
Plus	Minus	Multiply by	Quotient
Sum	Difference	product	Split into
Increased	Less than	Groups of	
More than	Take away	Each/per/of	

- When the terms “more”, “less”, or “subtracted” are used the number or variable will come after the operation.

Examples: “5 more than  $x$ ” =  $x+5$

“5 less than  $x$ ” =  $x-5$

“5 subtracted from  $x$ ” =  $x-5$

$10-y$  = “ $y$  less than 10”

$\frac{x}{2}$  = “ $x$  divided by 2”

How would you write “5 more than twice a number  $x$ ”?

How would I write “8 less than quadruple a number  $d$ ”?

**Translating Algebraic word problems**

- Ted was buying soda for a party. He needs 2 cans of soda per person. Ted is having  $p$  number of people. Write an expression to represent the amount of soda he should buy.
- The expression is  $2p$

**Practice: Write each phrase as a numerical or algebraic expression.**

1. 287 plus 932

2.  $b$  divided by 14

**Algebraic word problem**

The number of senators that each of the 50 states has in the U.S. Senate. This is represented by  $s$ . Write an expression for the total number of senators.

Now, YOU create a word problem and an algebraic expression that matches your problem.

### Translating Word Phrases and Speaking Algebraically

With a partner translate the following into expressions:

1. 287 plus 932
2. a number divided by 14
3. 3 more than the quotient of a number and 6
4. 7 subtracted from a number
5. 9 less than a number
6. 6 times the quantity of a number minus 5

**Ones to Watch!**

- When the terms “less than” or “subtracted from” are used the number or variable will come after the operation.
- When the term “more than” is used, because it indicates addition, the order the terms are written in will not matter—remember the Commutative Property?
- When the term quotient is used it typically has “and” as part of the words. This does not signify addition but which numbers/variables are being divided.
- When the term “quantity” is used it means one of the factors in an expression and is written in parenthesis.

Ones to Watch:

Examples: “10 less than  $x$ ” would be written  $x - 10$

“5 subtracted from  $y$ ” would be written  $y - 5$

“the quotient of  $x$  and 2” would be written  $\frac{x}{2}$

“the quantity of a number plus 4 times 9” would be written  $9(x + 4)$

Try:

- 1) The quotient of a number and 3
- 2) 17 subtracted from a number
- 3) 5 more than twice a number
- 4) 8 less than quadruple a number
- 5) 6 times the quantity of 4 divided by a number

## EXPONENT RULES &amp; PRACTICE

1. **PRODUCT RULE:** To multiply when two bases are the same, write the base and ADD exponents.

Examples:

$$A. x^3 \cdot x \quad B. 2^4 \cdot 2^2 = 2^6 \quad C. (x^2y)(x^3y^4) = x^5y^5$$

2. **QUOTIENT RULE:** To divide when two bases are the same, write the base and SUBTRACT the exponents.

$$A. \frac{x^6}{x^4} = x^2 \quad B. \frac{3^7}{3^2} = 3^5 \quad C. \frac{x^2y^6}{xy^4} = xy^2$$

3. **ZERO EXPONENT RULE:** Any base (except 0) raised to the zero power is equal to ONE.

$$A. y^0 = 1 \quad B. 6^0 = 1 \quad C. (3a^5b^{-2})^0 = 1$$

4. **POWER RULE:** To raise a power to another power, write the base and MULTIPLY the exponents.

$$A. (x^3)^2 = x^6 \quad B. (3^2)^5 = 3^{10} \quad C. (x^7)^3 = x^{21}$$

5. **EXPANDED POWER RULE:** raise all parts to the power

$$A. (xy)^3 = x^3y^3 \quad \left(\frac{x}{y}\right)^4 = \frac{x^4}{y^4}$$

Practice the Rules:

$$1) x^2 \cdot x^7 = \underline{\hspace{2cm}} \quad 2) \frac{x^8}{x^3} = \underline{\hspace{2cm}} \quad 3) (x + y)^0 = \underline{\hspace{2cm}}$$

$$4) (x^2y^3)^2 = \underline{\hspace{2cm}} \quad 5) \left(\frac{x}{5}\right)^3 = \underline{\hspace{2cm}} \quad 6) \left(\frac{x^2}{y^3}\right)^2 = \underline{\hspace{2cm}}$$

Using Variables

1. A car travels 55 miles per hour. Write an expression for how far the car will have traveled:

a. After 3 hours                      a. \_\_\_\_\_

b. After 5 hours                      b. \_\_\_\_\_

c. After  $h$  hours                      c. \_\_\_\_\_

2. A plain pizza costs \$7.00. Each topping adds an extra cost of \$.50. How much does a pizza cost:

a. With one topping                      a. \_\_\_\_\_

b. With two toppings                      b. \_\_\_\_\_

c. With  $n$  toppings                      c. \_\_\_\_\_

3. Jeff uses this rule to determine how many scoops of ice cream he needs to plan for his friends:

Number of Ice Cream Scoops = 2 times the number of friends

If he has 7 friends, how many scoops of ice cream does he need for his friends and himself?

Explain your reasoning.

**Evaluate expressions**

Write an expression: 8 less than the quotient of $x$ and 3	
Evaluate the expression if $x = 12$ .	
Evaluate the expression if $x = 27$ .	

Fill in the charts below by evaluating the expressions.

$x$	$3x + 1$
0.2	
$\frac{1}{2}$	
9	

$x$	$5x - 7$
5	
6	
9	

$x$	$x^2 - 3$
2	
5	
9	

$x$	$4(x + 1)$
0	
$\frac{1}{4}$	
$\frac{1}{2}$	

This time, can you name the expression?

$x$	
3	18
5	30
8	48

$x$	
25	4
30	5
35	6

Calculate the value of the following if:

$$m = 4.2,$$

$$t = 3.1,$$

$$a = 7.5,$$

$$d = 2.5$$

1.  $2m$

2.  $4a$

3.  $m - t$

4.  $2a + m$

5.  $3t - a$

6.  $3m + 2d$

7.  $4d + 2a - m$

8.  $3d + 4t - 2a$

Calculate the value of the following if:

$$b = 4,$$

$$j = 15,$$

$$w = 8,$$

$$n = 2$$

9.  $\frac{3}{5}j$

10.  $\frac{b+w}{n}$

11.  $\frac{j}{5} + \frac{1}{4}w$

12.  $\frac{6b+5j}{11}$

13.  $\frac{1}{2}w - \frac{3b}{6}$

14.  $\frac{5j-2n}{4}$

15.  $3n + \frac{7b}{2} - \frac{w}{4} + \frac{1}{3}j$

16.  $\frac{2n+2j-2w}{8}$

# EOG Practice Chapter 2

## 2A Understanding Variables and Expressions

### LESSON 2-1

1. What is the value of  $5x + 9$  when  $x = 3$ ?

- A 17  
B 24  
C 34  
D 60

2. What is the value of  $59 - 7x$  when  $x = 8$ ?

- A 3  
B 17  
C 56  
D 416

3. What is the value of  $23 + y$  when  $y = 37$ ?

- A 50  
B 60  
C 74  
D 107

$y$	$23 + y$
17	40
27	50
37	■

4. What is the value of  $w \times 3 + 10$  when  $w = 6$ ?

- A 28  
B 34  
C 78  
D 79

$w$	$w \times 3 + 10$
4	22
5	25
6	■

5. What are the missing values in the table?

- A 6; 7  
B 7; 8  
C 40; 48  
D 56; 64

$x$	$x \div 8$
40	5
48	■
56	■

6. What are the missing values in the table?

- A 3; 1  
B 12; 16  
C 12; 22  
D 18; 22

$c$	$12 + c \div 2$
4	14
12	■
20	■

7. What are the missing values in the table?

- A 8; 18; 28  
B 9; 18; 29  
C 9; 19; 29  
D 10; 20; 30

$a$	$2 \times a - 1$
5	■
10	■
15	■

8. What are the missing values in the table?

- A 18; 8; 6  
B 18; 9; 6  
C 51; 48; 45  
D 57; 60; 63

$b$	$54 \div b$
3	■
6	■
9	■

9. **SHORT RESPONSE** Find an expression for the table. Explain how you found the expression, and verify that the expression fits each pair of numbers in the table.

$t$	■
7	35
8	40
9	45

10. **SHORT RESPONSE** Find an expression for the table. Explain how you found the expression, and verify that the expression fits each pair of numbers in the table.

$s$	■
66	11
54	9
36	6

11. **SHORT RESPONSE** Find an expression for the table. Explain how you found the expression, and verify that the expression fits each pair of numbers in the table.

$g$	■
52	26
60	30
68	34

12. **SHORT RESPONSE** Find an expression for the table. Explain how you found the expression, and verify that the expression fits each pair of numbers in the table.

$m$	■
2	6
4	12
6	18

# EOG Practice ■ Chapter 2

## 2A Understanding Variables and Expressions

### LESSON 2-2

13. Which expression represents the phrase “the product of 7 and 12”?
- A  $7 + 12$                       C  $7 - 12$   
 B  $7 \times 12$                       D  $7 \div 12$
14. Which algebraic expression represents the phrase “14 more than  $x$ ”?
- A  $x + 14$                       C  $x - 14$   
 B  $14 - x$                       D  $14 \times x$
15. Which algebraic expression represents the phrase “the quotient of  $n$  and 8”?
- A  $n - 8$                       C  $8 \div n$   
 B  $n \times 8$                       D  $\frac{n}{8}$
16. Which expression represents the phrase “the sum of 322 and 18”?
- A  $322 \times 18$                       C  $322 - 18$   
 B  $322 + 18$                       D  $\frac{322}{18}$
17. Which of the following is a phrase for  $y \div 4$ ?
- A 4 less than  $y$   
 B  $y$  less than 4  
 C the quotient of  $y$  and 4  
 D the quotient of 4 and  $y$
18. Which of the following is a phrase for  $52 - p$ ?
- A  $p$  less than 52  
 B 52 less than  $p$   
 C the quotient of 52 and  $p$   
 D the sum of  $p$  and 52
19. Which of the following is a phrase for  $(23)(6)$ ?
- A the sum of 23 and 6  
 B 23 divided by 6  
 C the product of 23 and 6  
 D the difference of 23 and 6
20. Which of the following is a phrase for  $h + 96$ ?
- A the difference of  $h$  and 96  
 B the product of  $h$  and 96  
 C 96 more than  $h$   
 D 96 minus  $h$
21. **SHORT RESPONSE** Jodie’s class is dividing into groups of 3 students for a project. Let  $x$  represent the total number of students in the class. Write an expression that represents the number of groups in the class. What action in the problem tells you which operation to use?
22. **SHORT RESPONSE** Joseph cut 18 inches from a piece of kite string. Let  $y$  represent the remaining length of the string. Write an expression that represents the original length of the kite string. What action in the problem tells you which operation to use?
23. **SHORT RESPONSE** Let  $p$  represent the number of players on a team. Write an expression that represents how many players will be on 65 teams. What action in the problem tells you which operation to use?
24. **SHORT RESPONSE** Earth has a diameter of 7,926 miles. Let  $d$  represent the diameter of the Moon, which is smaller than the diameter of Earth. Write an expression that represents how much larger the diameter of Earth is than the diameter of the Moon. What action in the problem tells you which operation to use?
25. **SHORT RESPONSE** Marion scored 82 more points than Jody in a contest. Let  $j$  represent the number of points that Jody scored. Write an expression that represents the number of points Marion scored. What action in the problem tells you which operation to use?

## Using Formulas

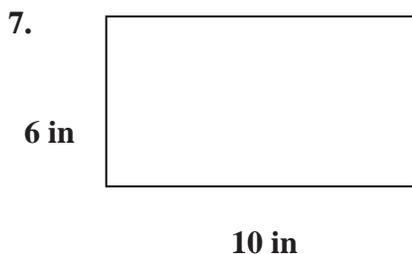
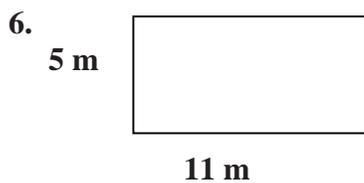
In the formula  $d = rt$ ,  $d =$  distance,  $r =$  rate, and  $t =$  time.

1. Find the distance travelled if  $r = 55$  m/h,  $t = 3$  h
  
2. If the distance travelled is 2,730 miles, give two different combinations for what the rate and time could be.
  
3. If the distance in #2 were changed to 2,730 inches would your two possible answers have to change? Why or why not?

Estimate the temperature outside using the chirps of a cricket. Use the formula  $T_F = \frac{n}{4} + 37$ , where  $n$  is the number of times a cricket chirps in one minute. Determine the temperature based on the number of chirps below.

4. 120 chirps/min
5. 80 chirps/min

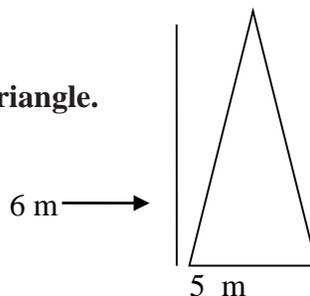
Use the formula  $P = 2l + 2w$  to find the perimeter of each rectangle.



Given that  $C$  is the temperature in degrees Celsius, use the formula  $\frac{9}{5}C + 32$  to find each temperature  $F$  in degrees Fahrenheit.

8.  $C = 35$
9.  $C = 25$

10. Use the formula  $A = \frac{1}{2}bh$  to find the area of each triangle.



**HW: Variables, Expressions, and Formulas**

Directions: First, underline key words and write the meaning on top if it is an operation.

Second, write an algebraic expression.

Third, evaluate the expression given the value of the variable.

1. Mary earns an allowance of \$5 per week. She also earns \$6 per hour baby-sitting. Write an expression that would represent the total amount of money she earns in one week. If Mary babysits for 6 hours, how much money will she make?

Expression: \_\_\_\_\_

Value of the variable: \_\_\_\_\_ = \_\_\_\_\_

Evaluate:

2. The Food Lion grocery store advertises a special on 2-liter bottles of soft drinks. The first bottle purchased is \$1.50 and each bottle after that is \$1.10. Write an expression that can be used to find the total cost. Find the total cost if you purchase 5 bottles.

Expression: \_\_\_\_\_

Value of the variable: \_\_\_\_\_ = \_\_\_\_\_

Evaluate:

3. One Middle School sold tickets for a school play. The price of an adult ticket was \$5, and the price of a student ticket was \$3. Write an expression that represents the total amount of money collected. Suppose 150 adult tickets and 100 student tickets were sold. How much money was collected?

Expression: \_\_\_\_\_

Value of the variable: \_\_\_\_\_ = \_\_\_\_\_

Evaluate:

4. Ms. Li's car needs to be repaired. The cost of the repair is going to be \$90 per hour for labor and an additional \$220 for parts. Write an expression that would represent the cost of getting the car repaired if a mechanic works on it for  $h$  hours. Find the total cost if the mechanic works on the car for 4 hours.

Expression: \_\_\_\_\_

Value of the variable: \_\_\_\_\_ = \_\_\_\_\_

Evaluate:

5. The formula that is used to convert Fahrenheit (F) to Celsius (C) is  $5 \cdot (F - 32) \div 9$ . Convert 77°F to degrees in Celsius.

Expression: \_\_\_\_\_

Value of the variable: \_\_\_\_\_ = \_\_\_\_\_

Evaluate:

6. In order to encourage recycling, city of Taiyuan is offering 20 cents for every kilogram of newspapers collected, five cents per plastic bottle. Write an expression for the total amount earned from recycling. If Chen brings in ten kilograms of newspapers, 32 plastic bottles, how much will he receive?

Expression: \_\_\_\_\_

Value of the variable: \_\_\_\_\_ = \_\_\_\_\_

Evaluate:

7. Borders book store is advertising a sale. The price of hardback books is \$8.50 and the price of paperback books is \$4.50. Write an algebraic expression that can be used to find the total amount of money spent at the bookstore. Suppose Tom buys 6 hardback books and 4 paperback books. Find the total amount he spent at the book sale.

Expression: \_\_\_\_\_

Value of the variable: \_\_\_\_\_ = \_\_\_\_\_

Evaluate:

8. Find the total area of a rectangle tile using the formula  $lw$  with the length is  $6in$  and a  $w$  is  $8in$ .

Expression: \_\_\_\_\_

Value of the variable: \_\_\_\_\_ = \_\_\_\_\_

Evaluate:

9. Find the volume of a cubical packing box using the formula  $s^3$  if the side length is  $2ft$ .

Expression: \_\_\_\_\_

Value of the variable: \_\_\_\_\_ = \_\_\_\_\_

Evaluate:

10. Ms. Li want to make a rectangular garden. The length of the garden is 8ft and width of the garden is 7ft. Use the formula  $2l + 2w$  to find the perimeter of the garden.

Expression: \_\_\_\_\_

Value of the variable: \_\_\_\_\_ = \_\_\_\_\_

Evaluate:

**TASK 1: Healthy Choice?**

The following charts list calories in a serving based on how many pieces are eaten.

Number of Chicken Fingers Eaten	Calories
4	168
5	210
6	252
8	336

Number of Waffle Fries Eaten	Calories
10	300
11	330
12	360
14	420

- A. Write an algebraic expression that you could use to determine the number of calories consumed for any number ( $c$ ) of chicken tenders eaten and any number ( $w$ ) of waffle fries. How did you determine this?
- B. How many calories are in your meal if you eat 12 chicken tenders and 18 waffle fries? (You just finished a marathon and have a large appetite!)

**TASK 2: New iPod**

Melissa wants to purchase a new iPod. An electronics store offers two installment plans for buying the \$250 iPod.

**PLAN A: A fixed weekly payment of \$10.50**

**PLAN B: A \$120 initial payment, followed by \$5 per week**

- A. Write an expression for each of the plans for "s" number of weeks.
- B. After 12 weeks, how much money will she have paid on each plan?
- C. Which plan requires the least number of weeks to pay off the iPod? How do you know?

**TASK 3: Decisions**

Juan wants a part time job when he goes to college and has been offered jobs by two different firms. Both jobs require him to work 50 weeks per year for 20 hours each week, with no overtime. Firm A would pay \$130 per week and a \$500 bonus at the end of each year. Firm B would pay \$6.25 per hour and a \$600 bonus at the end of each year.

- A. Write an expression for both situations.
- B. Which job should Juan take based on a **three year total** and why?

**TASK 4: Birthday Party!**

Brett's mom is hiring a DJ for his twelfth birthday. She obtained several prices for the cost of three DJs.

**The Great Rhyme Master charges \$75 an hour.**

**Music Maker charges \$100 plus \$30 an hour.**

**DJ Mixer charges \$150 plus \$20 an hour.**

- A. Write an expression for the cost to have each DJ at the party for  $x$  number of hours.
  
- B. If Brett's mom needs the DJ to perform at the party for 3 hours, which DJ should she hire?
  
- C. Would the answer be the same regardless of the number of hours Brett's mom needed the DJ to perform? Justify your answer.

## **TASK 5: Shopping**

A customer needs 3 bottles of orange juice and 2 pounds of apples.

- A. Write an algebraic expression for to represent the situation based on a cost of  $x$  per bottle of orange juice and  $y$  per pound of apples.

At Food Town, customers can buy a bottle of orange juice for \$2.95 and a pound of apples for \$1.79.

- B. How much money would a customer need in order to buy 3 bottles of orange juice and 2 pounds of apples?

At the Piggly Wiggly, customers can buy a bottle of orange juice for \$2.65 and a pound of apples for \$1.99.

- C. How much money would a customer need in order to buy 3 bottles of orange juice and 2 pounds of apples?

- D. At which store should the customer shop and why?

- E. If the customer were buying 2 bottles of orange juice and 3 pounds of apples instead, what would the new expression be? Evaluate your expression for the values at each grocery store. Would this change your answer to D? Why or why not?

**TASK 6: Walkathon**

Mr. Burton's class is sponsoring a walkathon to raise money for St. Jude's Children's Hospital. Three students found sponsors who are willing to pledge the following amounts.

**Ashley's sponsor will pay \$20 regardless of how far she walks.**

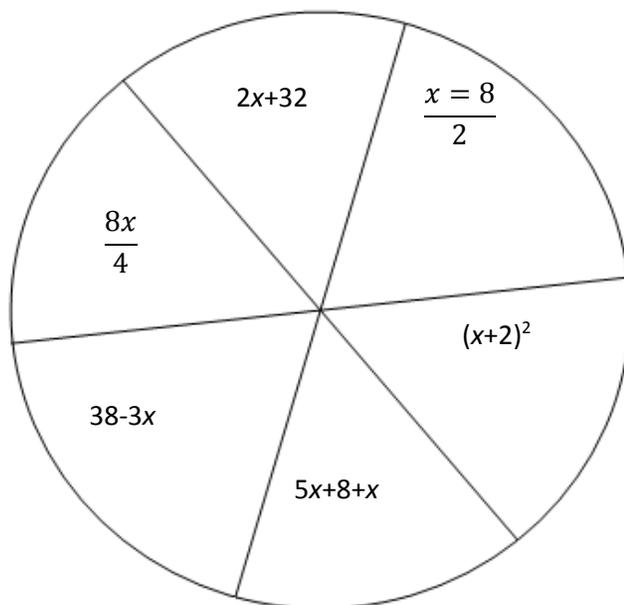
**Jazmine's sponsor will pay \$3 per mile.**

**Aquez's sponsors will make a \$5 donation, plus \$1 per mile.**

- A. Write an algebraic expression for each sponsor for  $x$  number of miles.
  
- B. Which pledge will bring in the most money if the students are planning on walking 8 miles? How do you know?
  
- C. Which pledge will bring in the most money if the students are planning on walking only 1 mile? How do you know?
  
- D. Will Aquez's pledge ever bring in the most money? How do you know?

**“Evaluate This..”**

Spin the spinner below to select your algebraic expression.



Roll the dice. The sum of your roll will be the value of  $x$ . Substitute the value for  $x$  and evaluate the expression. Locate your answer in the ranges below. You earn the number of points at the top of the column where your answer is located.

**Points Chart**

1 POINT	2 POINTS	3 POINTS	4 POINTS	5 POINTS
(1-9.99)	(10-19.99)	(20-29.99)	(30-39.99)	(40-49.99)
(50-59.99)	(60-69.99)	(70-79.99)	(80-89.99)	(90-99.99)
(100-109.99)	(110-119.99)	(120-129.99)	(130-139.99)	(140-149.99)
(150-159.99)	(160-169.99)	(170-179.99)	(180-189.99)	(190-199.99)

**“Evaluate This..”**

Game 1:

Round	Value of $x$	Expression	Evaluate	Score
1				
2				
3				
4				
5				
<b>Total</b>				

Game 2:

Round	Value of $x$	Expression	Evaluate	Score
1				
2				
3				
4				
5				
<b>Total</b>				

## STUDY GUIDE...UNIT 6 CCM6 and CCM6+

Name that Property. Identify the property being used for the following.

1.  $(5 \cdot y) \cdot 10 = 5 \cdot (y \cdot 10)$  \_\_\_\_\_

2.  $4b + 12 = 4(b + 3)$  \_\_\_\_\_

3.  $2 + 5 + 7 = 7 + 5 + 2$  \_\_\_\_\_

4.  $5109 + 0 = 5109$  \_\_\_\_\_

5.  $33 \cdot 1 = 33$  \_\_\_\_\_

Answer the questions

6. Why are properties important/useful?

7. Which property/properties do you use the most?

8. Make an example of each type of property (make a problem to show it):

Commutative: \_\_\_\_\_

Associative: \_\_\_\_\_

Distributive: \_\_\_\_\_

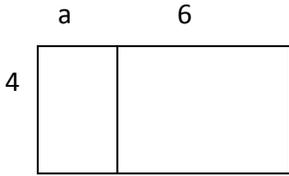
Identity: \_\_\_\_\_

Zero: \_\_\_\_\_

9. Which property is this and why?  $(7 + 15) + 8 = (15 + 7) + 8$

Use the Distributive Property to model areas

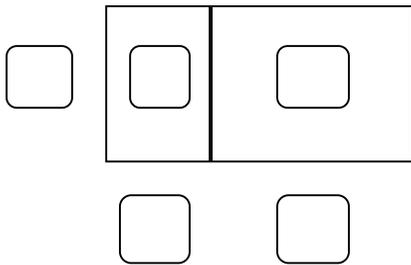
10. **Fill in the chart** to the right for the rectangles shown below.



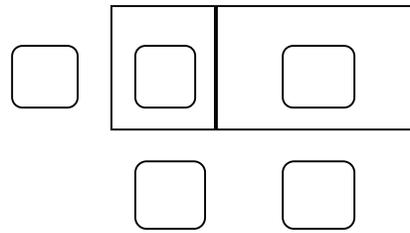
AREA AS PRODUCT	AREA AS SUM

Fill in the missing dimensions (  ) and the blanks for the expression given.

11.  $4x + 20 = 4(\text{_____})$



12.  $5x + 15 = \text{____}(\text{_____})$



13. How do area models help with distributive property?

14. How is knowing the GCF helpful in solving distributive property problems?

Use the distributive property to simplify

15.  $5(x + 7)$

16.  $8(3x + 4)$

17.  $2(2x + 3) + 17$

Use the distributive property to create parentheses by dividing out the GCF

(see p.21 #18-22)

18.  $3x + 9$

19.  $12 + 18$

20.  $8xy + 24y$

**SHOW YOUR WORK!!!**

Use the algebraic expression below to give **ONE** example of each of the vocabulary words listed.

$$2(n + 4) - 3r + 12$$

21) Coefficient \_\_\_\_\_

23) Variable \_\_\_\_\_

25) Quantity \_\_\_\_\_

22) Term \_\_\_\_\_

24) Constant \_\_\_\_\_

Translate the following words into algebraic expressions.

26) 5 times the quantity of the difference of g and 3

27) 23 less than y divided by 5

Translate the following algebraic expressions into words. Then evaluate each expression for the value given.

28)  $\frac{18}{x} - 2x$  \_\_\_\_\_

Evaluate when  $x = 3$ : \_\_\_\_\_

29)  $x^3 + (x + 4)$  \_\_\_\_\_

Evaluate when  $x = 2$ : \_\_\_\_\_

Match the equation with the property it represents.

30)  $x \cdot (3 \cdot 4) = (x \cdot 3) \cdot 4$

**Associative Property**

31)  $25 \cdot 1 = 25$

**Additive Identity**

32)  $12 + 4 = 4 + 12$

**Distributive Property**

33)  $6(t + 5) = (6 \cdot t) + (6 \cdot 5)$

**Multiplicative Identity**

34)  $9 + 0 = 9$

**Commutative Property**

*Simplify each algebraic expression.*

35)  $5x - 2x + x + 3 + 3x + 12$

36)  $4(4e + 2) - 6e$

37)  $2(v + 3) + 5(v + 5)$

*Simplify each side. Write = or ≠ between the expressions.*

38)  $2(y + 4) \boxed{\phantom{000}} y + y + y + 8$

39)  $3(n + 5) \boxed{\phantom{000}} 5(n + 3) - 2n$

*Write and evaluate the expressions.*

40) Maggie wants to purchase a new iPod. An electronics store offers two installment plans for buying the \$250 iPod.

**PLAN A: A fixed weekly payment of \$20**

**PLAN B: A \$150 initial payment followed by \$5 per week**

- a. Write an algebraic expression for each of the plans for “s” number of weeks.

Plan A: \_\_\_\_\_

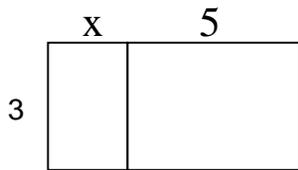
Plan B: \_\_\_\_\_

- b. After 10 weeks, how much money will she have paid on each plan?

Plan A: \_\_\_\_\_

Plan B: \_\_\_\_\_

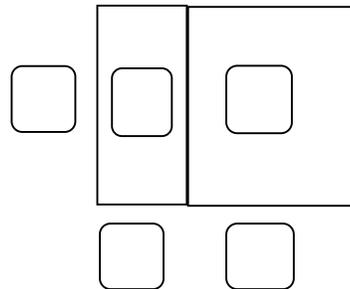
41)



AREA AS PRODUCT	AREA AS SUM
—(—+—)	— + —

42) Fill in the missing dimensions (  ) from the expression given.

$$5x + 35 = 5(\text{—————})$$



Fill in the chart with the missing values.

43)

x	$\frac{x}{2} + 4$
0	_____
2	_____
4	_____
6	_____

} **Fill in these blanks.**

44)

x	_____
50	10
30	6
25	5
_____	11

Fill in the expression AND the missing x-value.