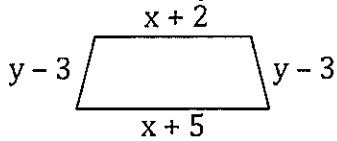Name: _____   Date: _____

Unit 3 Big Idea #1: Algebraic expressions allow us to model situations even when we don't know all the values.

1. Write the expression to model the perimeter of the figure below.

    ```
          x + 2
         _____
    y - 3 /      \ y - 3
        /_____\
          x + 5
    ```

    Write a different expression that also represents the perimeter of that shape.

2. Laura went to Disney World and had a list of gifts she needed to bring back for her family. She needed to buy **3 T-shirts, 2 sets** of mouse ears, and **1 princess costume. Write and simplify** an expression to represent the total she was going to spend on these gifts if the T-shirts cost **T** dollars, the mouse ears cost **M** dollars and the princess costume cost **P** dollars.

    Simplified expression: _____

3. Dwayne went to the movies with his dad and older brother. Before they left, his dad asked them to figure out how much it would cost if all three of them got movie tickets, shared 1 tub of popcorn, and 3 boxes of Skittles, when the tickets cost M dollars, the popcorn cost P dollars and Skittles cost K dollars.

    Dwayne said it would cost 3M + P + 3K.
    His brother said it would cost 3(M+K) + 1P
    His dad said with would cost 6(M·K) + P.

    Who is correct and who is not correct? Explain how you know.

    _____

    _____

    _____

Name: _____   Date: _____

Unit 3 Big Idea #2: Evaluating allows us to find the value of an expression when given specific values for the unknowns. Equivalent expressions will always give the same solution when evaluated for the same value. Sometimes, expressions that are not equivalent will also give the same solution, so evaluating does **not prove** expressions are equivalent.

4. Evaluate each expression for the given value. **Show all work.** Don't forget to follow the order of operations!

   $3h + 5k + 4$ *when* $h = -8$, $k = -2$,

5. The volume of a cylinder is found by using the formula $\pi r^2 h$.
   Find the volume if $\pi = 3.14, r = 3, h = 2.5$. **Show all work.**

6. Mr. Perito said the two expressions, $8 - 5x - 6$ and $3x - 6$, are equivalent because when he substitutes 1 in for x he gets the same answer. Here's his work.

Equation 1	Equation 2
$8 - 5x - 6 =$	$3x - 6$
$8 - 5(1) - 6 =$	$3(1) - 6$
$8 - 5 - 6 =$	$3 - 6$
$3 - 6 =$	-3
$-3 =$	-3

   Explain if you think his work shows that the two expressions are equivalent or if they are not equivalent.

   _____

   _____

   _____

Name: _____   Date: _____

Unit 3 Big Idea #3: Mathematical properties allow us to make equivalent expressions in order to make them easier to understand and/or easier to work with. We can prove expressions are equivalent by identifying the properties used to change one expression into the other.

7. Draw a line to match each statement with the property it represents.

<u>Properties</u>

a) $5x + 6 + 2x = 5x + 2x + 6$ ☐ Associative

b) $(7x \cdot 3) \cdot 5 = 7x (3 \cdot 5)$ ☐ Identity

c) $w = 0 + w$ ☐ Commutative

8. Fill in the blank to make each equation represent the property named.

Associative Property: $(6 + x) + 5 = 6 + (x + \underline{\quad})$

Commutative Property: $3 \cdot y \cdot \frac{2}{3} = 3 \cdot \underline{\quad} \cdot y$

Identity Property: $1 \cdot q = \underline{\quad\quad}$

9. **Mark ALL** the expressions below that model the **Commutative Property.**

☐ $3 + 5 = 5 + 3$
☐ $xyz = x(yz)$
☐ $3(5+y) = 3(5) + 3(y)$
☐ $4 \cdot q \cdot 2 = 4 \cdot 2 \cdot q$

10. **Rewrite** each expression to model the property named.

a) Associative Property: $3(4x) =$

b) Commutative Property: $L + M + N =$

c) Identity Property: $y =$

Name: _____   Date: _____

Unit 3 Big Idea #4: The distributive property is especially helpful when trying to simplify expressions with variables. Distributing allows us to multiply the parts of a sum when the addends cannot be combined. Factoring expressions using the distributive property allows us to combine like terms.

11. Use the distributive property to simplify each expression.

   a) $-4(x + 5)$

   b) $8 \cdot (\frac{3}{4} - 2w)$

   c) $(y - 2.4)1.5$

12. Factor each expression.

   a) 2x + 10

   b) 3x – 6

   c) 6y + 9y

13. Identify the rules and properties used to simplify the expression

   5(2x + 3) – 4x   original expression

   5(2x + 3) + -4x   _____

   10x + 15 + -4x   _____

   10x + -4x + 15   _____

   6x + 15   _____

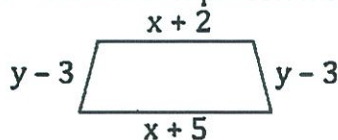14. Simplify the expression. Show all work and label each property used.

   8x – 2(3x – 5y) + 7y

Name: _____ *Key* _____   Date: _____

Unit 3 Big Idea #1: Algebraic expressions allow us to model situations even when we don't know all the values.

1. Write the expression to model the perimeter of the figure below.

$(x+2) + (x+5) + (y-3) + (y-3)$

or $\quad 2x + 7 + 2y + -6$

or $\quad 2x + 2y + 1$

Write a different expression that also represents the perimeter of that shape.

$(x+2) + (x+5) + 2(y-3)$

2. Laura went to Disney World and had a list of gifts she needed to bring back for her family. She needed to buy **3 T-shirts, 2 sets** of mouse ears, and **1 princess costume. Write and simplify** an expression to represent the total she was going to spend on these gifts if the T-shirts cost **T** dollars, the mouse ears cost **M** dollars and the princess costume cost **P** dollars.

$3T + 2M + 1P$ $T + T + T + M + M + P$

Simplified expression: _____ $3T + 2M + 1P$ _____

3. Dwayne went to the movies with his dad and older brother. Before they left, his dad asked them to figure out how much it would cost if all three of them got movie tickets, shared 1 tub of popcorn, and 3 boxes of Skittles, when the tickets cost M dollars, the popcorn cost P dollars and Skittles cost K dollars.

$3M + 1P + 3K$

correct → Dwayne said it would cost 3M + P + 3K.

correct → His brother said it would cost 3(M+K) + 1P

NOT correct → His dad said ~~with~~ would cost 6(M·K) + P.
       It would

Who is correct and who is not correct? Explain how you know.

Dwayne & his brother are both correct

They both have showed 3 movie tickets, 3 boxes of skittles and 1 tub of popcorn. His brother just factored out a 3 using the distributive property

His Dad is not correct he multiplied the movie tickets & skittles instead of adding the costs & he used 6 not 3

Name: _____   Date: _____

Unit 3 Big Idea #2: Evaluating allows us to find the value of an expression when given specific values for the unknowns. Equivalent expressions will always give the same solution when evaluated for the same value. Sometimes, expressions that are not equivalent will also give the same solution, so evaluating does **not prove** expressions are equivalent.

4. Evaluate each expression for the given value. **Show all work.** Don't forget to follow the order of operations!

$3h + 5k + 4$ when $h = -8,$ $k = -2,$

$3(-8) + 5(-2) + 4 =$ $-34 + 4 =$
$-24 + 5(-2) + 4 =$ $\boxed{-30}$
$-24 + -10 + 4 =$

5. The volume of a cylinder is found by using the formula $\pi r^2 h$. Find the volume if $\pi = 3.14, r = 3, h = 2.5$. **Show all work.**

$\pi r^2 h$

$(3.14)(3^2)(2.5) =$
$(3.14)(9)(2.5) = \boxed{70.65 \text{ units}^3}$

6. Mr. Perito said the two expressions, $8 - 5x - 6$ and $3x - 6$, are equivalent because when he substitutes 1 in for x he gets the same answer. Here's his work.

Equation 1	Equation 2
$8 - 5x - 6$ =	$3x - 6$
$8 - 5(1) - 6$ =	$3(1) - 6$
$8 - 5 - 6$ =	$3 - 6$
$3 - 6$ =	-3
-3 =	-3

$8 - 5x - 6 \overset{?}{=} 3x - 6$
$\downarrow$
$8 + -5x + -6$
$8 + -6 + -5x$
$\boxed{2 + -5x \neq 3x - 6}$ when simplified they are not equal

* We don't know for sure if the expressions are equivalent from 1 test.

We must simplify each to see if they are equivalent

Explain if you think his work shows that the two expressions are equivalent or if they are not equivalent.

his answer does not prove they are equivalent

it just shows they are = when x = 1

If you use x = 2 it shows these expressions are NOT "="

Ex 1	Ex 2
$8 - 5x - 6$	$3x - 6$
$8 - 5(2) - 6$	$3(2) - 6$
$8 - 10 - 6$	$6 - 6$
$-2 - 6$	0

We don't know for sure if the expressions are equivalent from only 1 test

Name: _____ _____   Date: _____

Unit 3 Big Idea #3: Mathematical properties allow us to make equivalent expressions in order to make them easier to understand and/or easier to work with. We can prove expressions are equivalent by identifying the properties used to change one expression into the other.

7. Draw a line to match each statement with the property it represents.

Properties

a) $5x + 6 + 2x = 5x + 2x + 6$ **b** Associative

b) $(7x \cdot 3) \cdot 5 = 7x (3 \cdot 5)$ **c** Identity

c) $w = 0 + w$ **a** Commutative

8. Fill in the blank to make each equation represent the property named.

Associative Property: $(6 + x) + 5 = 6 + (x + \underline{5})$

Commutative Property: $3 \cdot y \cdot \frac{2}{3} = 3 \cdot \underline{\frac{2}{3}} \cdot y$

Identity Property: $1 \cdot q = \underline{q}$

9. **Mark ALL** the expressions below that model the **Commutative Property**.

☑ $3 + 5 = 5 + 3$

☐ $xyz = x(yz)$ *associative property*

☐ $3(5+y) = 3(5) + 3(y)$ *distributive property*

☑ $4 \cdot q \cdot 2 = 4 \cdot 2 \cdot q$

10. **Rewrite** each expression to model the property named.

a) Associative Property: $3(4x) = (3 \cdot 4)x$

b) Commutative Property: $L + M + N = N + M + L$
OR $L + N + M$
OR $M + L + N$
OR $M + N + L$
OR $N + L + M$

c) Identity Property: $y = 1y$

Name: _____   Date: _____

Unit 3 Big Idea #4: The distributive property is especially helpful when trying to simplify expressions with variables. Distributing allows us to multiply the parts of a sum when the addends cannot be combined. Factoring expressions using the distributive property allows us to combine like terms.

11. Use the distributive property to simplify each expression.

   a) $-4(x + 5)$ $-4(x) + -4(5) =$ $\boxed{-4x + -20}$ OR $\boxed{-4x - 20}$ OR $\boxed{-20 - 4x}$

   b) $8 \cdot (\frac{3}{4} - 2w)$ $8(\frac{3}{4}) - 8(2w) = \frac{24}{4} - 16w = \boxed{6 - 16w}$ or $\boxed{6 + -16w}$

   or $\boxed{-16w + 6}$

   c) $(y - 2.4)1.5$
   $(y + -2.4)1.5 = 1.5(y) + 1.5(-2.4)$

   $\boxed{1.5y + -3.6}$ or $\boxed{1.5y - 3.6}$ or $\boxed{-3.6 + 1.5y}$

12. Factor each expression.

   a) $2x + 10 = 2(x + 5)$

   b) $3x - 6 = 3(x - 2)$

   c) $6y + 9y = 3y(2 + 3)$

13. Identify the rules and properties used to simplify the expression

$5(2x + 3) - 4x$	original expression
$5(2x + 3) + -4x$	changed subtraction to adding the opposite (KCC)
$10x + 15 + -4x$	distributive property
$10x + -4x + 15$	commutative property
$6x + 15$	addition /combining like terms

14. Simplify the expression. Show all work and label each property used.

   $8x - 2(3x - 5y) + 7y$

   Step 1: (KCC) Rewrite all subtraction to addition of opposite
   Step 2: distributive property
   Step 3: Combine like terms

   $8x + -2(3x + 5y) + 7y$

   $8x + -2(3x) + -2(-5y) + 7y$

   $8x + -6x + 10y + 7y$

   $\boxed{2x + 17y}$

   or $\boxed{17y + 2x}$