Name: _____ Date: _____

EQUIVALENT EXPRESSIONS – DAY 2
N-GEN MATH® 7

It will be important to be able to **manipulate algebraic expressions** using the **properties of numbers** to produce **equivalent expressions**. In this lesson we saw how to use the commutative and associative properties of addition and multiplication. In this lesson we will concentrate on the **distributive property**.

THE DISTRIBUTIVE PROPERTY

If a, b, and c are any numbers then: $a\cdot(b+c)=a\cdot b+a\cdot c$ and $a\cdot(b-c)=a\cdot b-a\cdot c$.

***Exercise* #1:** Calculate the product $2(37)$ in two different ways using the distributive property.

(a) $2(30+7)=$

(b) $2(40-3)=$

The distributive property is often used when variables are involved.

***Exercise* #2:** Consider the expression $2(x+7)$.

(a) Write an equivalent expression using the distributive property. Show your steps.

(b) Test the original expression and the one from (a) using $x=3$. Show the substitution.

Original: Expression from (a):

A distributive property manipulation is slightly more difficult if the **coefficient** on the variable is not equal to **one**.

***Exercise* #3:** Consider the expression $5(3x+4)$. Justify each of the following steps using a property.

$5(3x+4)=5(3x)+5(4)$ $5(3x)+5(4)=(5\cdot 3)x+20=15x+20$

Property: _____ Property: _____

It is critical that you get good at using the distributive property because it will arise in many of the lessons that you see.

***Exercise* #4:** Rewrite each of these expressions using the distributive property. Show the steps in your manipulation. Write all fractions in simplified form.

(a) $3(4x+7)$ (b) $8(3x-2)$ (c) $-2(4x+1)$

(d) $\frac{3}{2}(4x+10)$ (e) $-4(-5x+7)$ (f) $\frac{1}{3}(9x-6)$

Let's look at an additional case that we didn't see in *Exercise* #4 that involves negatives and subtraction.

***Exercise* #5:** Consider the expression $-3(5x-8)$.

(a) Rewrite the expression so that the difference in the parentheses is a sum instead.

(b) Use the distributive property on (b) to simplify the expression.

What we see is that when we multiply difference by a negative number, it becomes a sum.

***Exercise* #6:** Use what you learned in *Exercise* #5 to rewrite each of the following.

(a) $-2(4x-5)$ (b) $-7(3x-4)$ (c) $-5(-2x-11)$

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EQUIVALENT EXPRESSIONS – DAY 2
N-GEN MATH® 7 HOMEWORK

FLUENCY

1. The expression $7(x+3)$ is equivalent to which of the following?

   (1) $7x+3$ (3) $x+21$

   (2) $7x+10$ (4) $7x+21$

_____

2. If the binomial $2x+8$ was multiplied by 5 the result would be equivalent to

   (1) $10x+40$ (3) $7x+13$

   (2) $2x+13$ (4) $10x+8$

_____

3. Find the product $5(18)$ in two ways using the distributive property:

   (a) $5(10+8)=$ (b) $5(20-2)=$

4. Rewrite each of the following expressions using the distributive property.

   (a) $8(x+5)$ (b) $4(y-9)$ (c) $-6(n+3)$

   (d) $7(x+1)$ (e) $-10(x-3)$ (f) $\frac{2}{3}(6x+3)$

5. Rewrite each of the following expressions using the distributive property.

(a) $3(4x+7)$ (b) $11(8x-3)$ (c) $-5(3x+2)$

(d) $-12(-2x+5)$ (e) $\frac{5}{4}(8x-20)$ (f) $-3(5x-2)$

(g) $\frac{7}{5}(10x+5)$ (h) $-9(-5x-3)$ (i) $\frac{5}{6}(12x-42)$

6. Patrick is manipulating the expression: $5(2x-3)$. He does the following steps.

Step #1: $5(2x)-5(3)$ _____

Step #2: $(5\cdot 2)x-5(3)$ _____

Step #3: $10x-15$

(a) Write the properties that Patrick uses in Step #1 and Step #2 on the blanks provided.

(b) Test the equivalency of these two expressions for $x=4$. Show the substitution for both.

$5(2x-3)$ $10x-15$