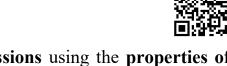
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# EQUIVALENT EXPRESSIONS – DAY 2 N-GEN MATH<sup>®</sup> 7



It will be important to be able to **manipulate algebraic expressions** using the **properties of numbers** to produce **equivalent expressions**. In the last 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.

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

Property: \_\_\_\_\_

Property:



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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 (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)  $-5(-2x-11)$ 





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

### EQUIVALENT EXPRESSIONS – DAY 2 N-GEN MATH<sup>®</sup> 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: 10*x* 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



