TOPIC 7

LESSON 7.4

Are they Saying the Same Thing

6.EE.4

Objective

Verifying Equivalent Expressions

Warm-Up

Determine which pairs of ratios are equivalent.

Explain how you know.

1. 5:7 and 100:140

2. 42:48 and 14:15

3. 105:100 and 20:21

4. 9:12 and 60:80

EXPLORE 1

Determining Whether Expressions Are Equivalent

Two algebraic expressions are equivalent expressions if, when any values are substituted for the variables, the results are equal.

While it's not realistic to test each expression for every possible value for the unknown, you can examine the characteristics of each expression in the different representations:

- a table of values
- rewritten expressions using the properties
- a graph of both expressions

Let's explore each representation.

Consider the two expressions 2(x + 2) + 3x and 5x + 4.

1. Use a table to evaluate each expression for different values of the variable.
a. Complete the table of values for each value of x.

x	2(x + 2) + 3x	5x + 4
0	**2(0 + 2) + 3(0) = 4**	**5(0) + 4 = 4**
1		
2		
3		

b. What can you determine based on the values in the table?

_____

_____

_____

c. What would you need to know to be able to verify that the two expressions are equivalent?

_____

_____

_____

2. Rewrite the given expression and identify the property applied at each step.

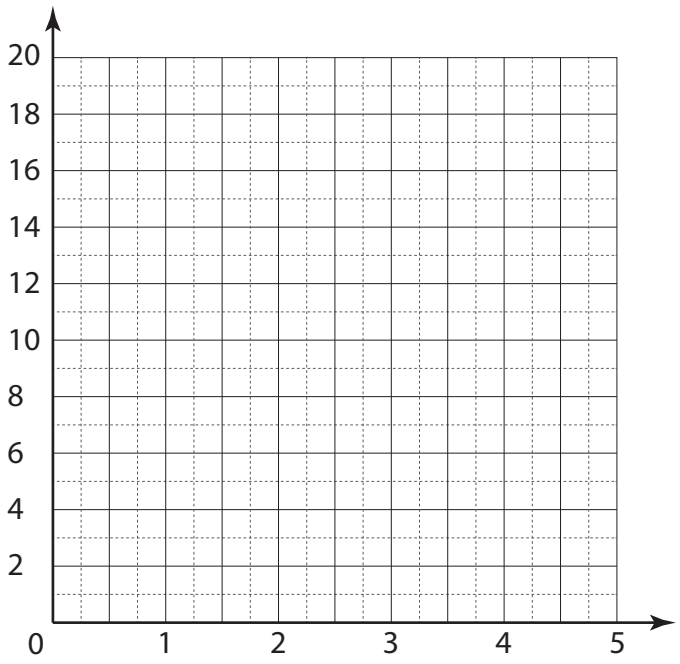
$2(x + 2) + 3x$	_____
$= 2x +$ _____ $+ 3x$	_____
$=$ _____$x + 4$	_____

3. Are the two expressions equivalent? Explain.

You can also use a graph to determine or verify if two expressions are equivalent.

4. Use the table of values to sketch the graph of both expressions on the coordinate plane.

a. Plot the values for each expression on the coordinate plane. Use a □ to represent the values from the first expression and a Δ for the values from the second expression. Then, connect the results for each expression with a line.



b. How does the graph demonstrate that the two expressions are equivalent?

_____

_____

_____

Now, let's consider the expressions 2x + 5 and 2(x + 5).
5. Use a table to evaluate each expression for different values of the variable.

a. Complete the table of values for each value of x.

x	2x + 5	2(x + 5)
0		
1		
2		
4		

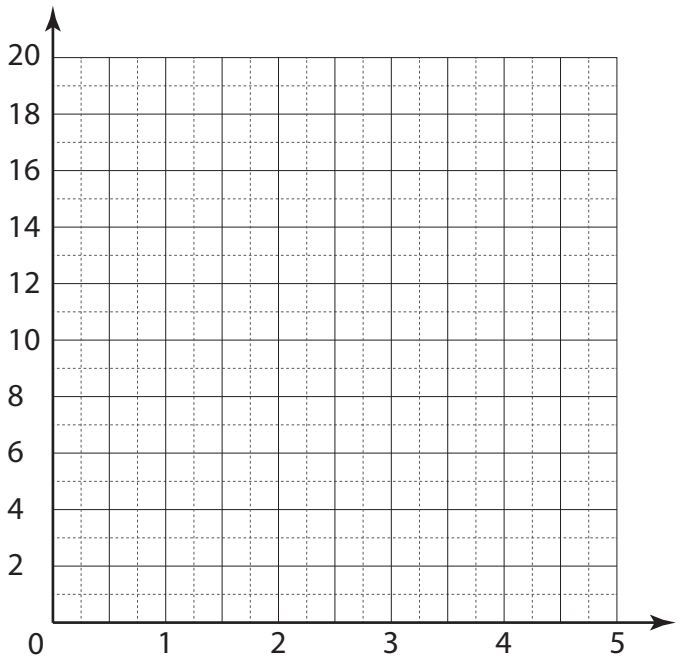
b. What can you determine based on the values in the table?

6. Use the Distributive Property to rewrite the second expression.

7. Are the two expressions equivalent? Explain your reasoning.

8. Use the table of values to sketch the graph of both expressions on the coordinate plane.

a. Plot the values for each expression on the coordinate plane. Use a □ to represent the values from the first expression and a Δ for the values from the second expression. Then, connect the results for each expression with a line.



b. What does the graph tell you about the equivalence of the two expressions?

For each pair of expressions, use a table, properties, and a graph to determine if the expressions are equivalent.

9. $(3x + 8) + (6 - x)$ and $4x + 14$

a.

x	$(3x + 8) + (6 - x)$	$4x + 14$
0		
1		
2		

b. $(3x + 8) + (6 - x)$

$= (3x + 8) + (6 - x)$ _____

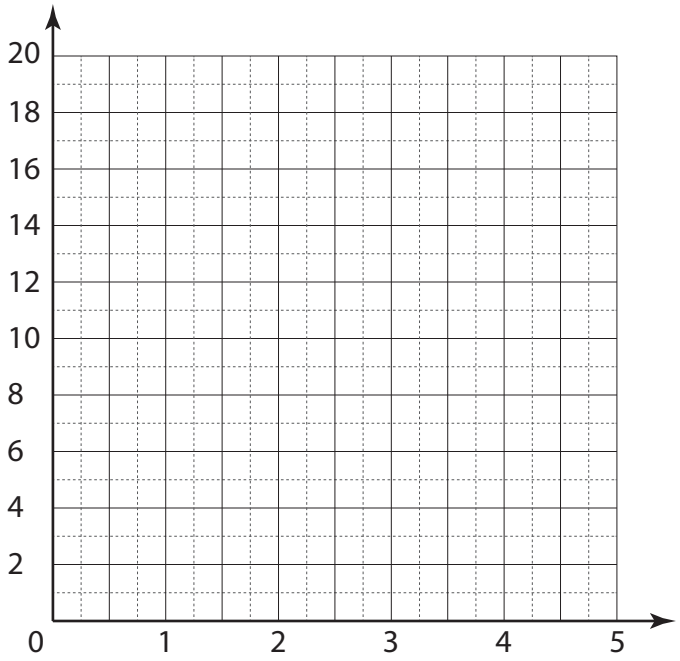
$= 3x + (8 + 6) - x$ _____

$= 3x +$ _____ $- x$ _____

$=$ _____ $+ 3x - x$ _____

$=$ _____ _____

c.



d. Are the two expressions equivalent? Explain using all three representations.

10. x + 3(2x + 1) and 7x + 3

a.

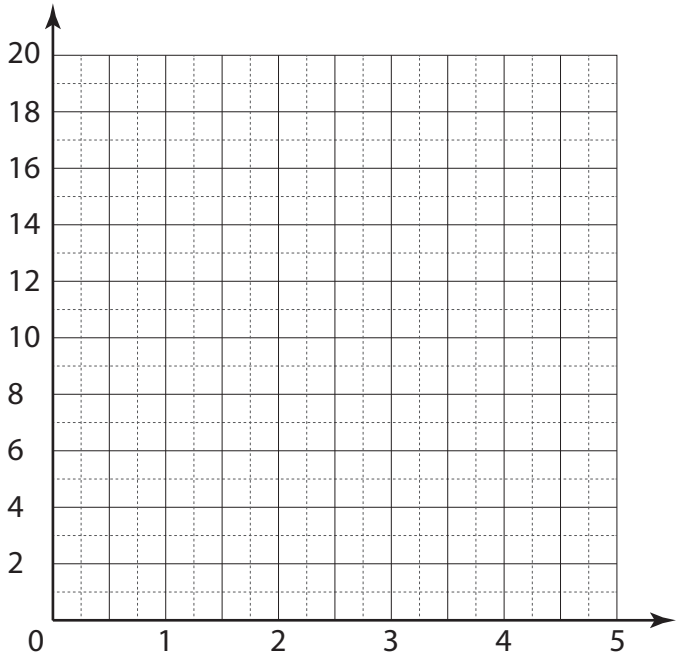
x	x + 3(2x + 1)	7x + 3
0		
1		
2		

b. x + 3 (2x + 1) _____

= x + _____

= _____

c.



d. Are the two expressions equivalent? Explain using all three representations.

Show You KNOW

For each step of the simplification of the expression, identify the property or operation applied.

	Number Property or Operation
1. $10 \cdot 4x + 3(2x + 1)$	Given
$= (10 \cdot 4)x + 3(2x + 1)$	
$= 40x + 3(2x + 1)$	Multiplication
$= 40x + 6x + 3$	
$= 46x + 3$	
2. $20 + (6 + x) + 7$	Given
$= 20 + (x + 6) + 7$	
$= 20 + x + (6 + 7)$	Associative Property of Addition
$= 20 + x + 13$	
$= x + 20 + 13$	
$= x + 33$	
3. $7x + \frac{12x - 8}{4} + 5x$	Given
$= 7x + 3x - 2 + 5x$	
$= 10x - 2 + 5x$	
$= 10x + 5x - 2$	
$= 15x - 2$	

Name: _____ Date: _____ Class: _____

Homework HW

LESSON 7.4

Are they Saying the Same Thing

Objective

Verifying Equivalent Expressions

Practice

Determine if the two expressions are equivalent. Use properties, a table, and a graph in each problem to verify your answer.

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

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

Review

Use the Distributive Property and Combine like terms to rewrite each expression

1. $9(6m + 3) + 6(1 - 4m)$

2. $\frac{3(4x + 8y)}{6} + 2y - x$

Determine the better buy.

3. 6 car washes for $50 or 4 car washes for $36

4. 10 markers for $2.40 or 32 markers for $7.00

Determine the least common multiple (LCM) of each pair of numbers

5. 6 and 10

6. 7 and 12