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Lesson 7: Simplifying Algebraic Expressions

OBJECTIVES: SWBA to

Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients. **(7. EE.1)**

INTRODUCTION:

Based on Unit Assessment #2, Expressions and Equations and Ratios and Proportions are the two domains where you need the most help. That said, for the next few weeks, we are going to concentrate on these two domains starting with Expressions and Equations. Today, in particular, we are going to address standard **7.EE.1**-- Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients.

MINI-LESSON (I Do):

Vocabulary

Variable: A *variable* is a symbol (such as a letter) that represents a number, i.e., it is a placeholder for a number.

Equivalent Expressions: Two expressions are *equivalent* if both expressions evaluate to the same number for every substitution of

Term: Each summand of an expression in expanded form is called a *term*. For example, the expression $2x + 3x + 5$ consists of 3 terms: $2x$, $3x$, and 5.

Coefficient of the Term: The number found by multiplying just the numbers in a term together. For example, given the product $2 \cdot x \cdot 4$, its equivalent term is $8x$. The number 8 is called the coefficient of the term $8x$.

"Simplify" an expression means to combine like terms in the expression to generate an **equivalent expression**.

To simplify algebraic expressions, follow these steps:

1. Apply the distributive property first, if necessary.
2. Combine like terms to generate an equivalent expression.

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Modeling

Problem 1: (question 32 in Unit Assessment #2)

Which expression is equivalent to $(7x - 5) - (3x - 2)$?

- A** $10x - 7$
- B** $10x - 3$
- C** $4x - 7$
- D** $4x - 3$

Let me use this what-why table to model each step for you.

<i>Step</i>	<i>What</i>	<i>why</i>
1	$(7x - 5) - (3x - 2)$	Original expression. Because of the (), I have to apply the distributive property to $-(3x - 2)$.
2	$7x - 5 - 1(3x - 2) =$ $7x - 5 - 3x + 2$	First notice that $-(3x - 2)$ equivalent to $-1(3x - 2)$. I must distribute the $-$ sign or -1 over $(3x - 2)$. When I distribute a $-$ sing over the (), the sign affects the signs of the terms in the parentheses—the signs of the terms become their opposite!
3	$7x - 5 - 3x + 2 =$ $7x + (-3x) - 5 + (2) =$ $4x - 3$	Highlight the terms that are liked terms. Combine like terms: $7x$ and $-3x$, and -5 and 2 are like terms. Therefore, they can be combined. I used two different highlighters since I have two sets of terms. Notice that I highlight the sign of the number and the number.
4	D	Solution

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Guided Practice: (We Do

Simplify:

$$9x + 3y + 4x + 2y$$

<i>Step</i>	<i>What</i>	<i>why</i>
1	$9x + 3y + 4x + 2y$	Original expression. There are no (), therefore we do not use the distributive property
2	$9x + 3y + 4x + 2y$	Identified the liked terms that we have to combine. We are going to use two different highlighters since we have two sets of like terms: 9x and 4x and 3y and 2y are like terms and can be combined.
3	$9x + 4x + 3y + 2y =$	We re-write the problem with the like terms together. We should not forget that the sign in front with each term. Add liked terms.
4	$13x + 5y$	

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Independent Practice (You do):**Problem 1:****Simplify:**

$$4r - 5s + 2rs - 8s - 3r$$

<i>Step</i>	<i>What</i>	<i>why</i>
1		
2		
3		
4		

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Problem 2:

Simplify:

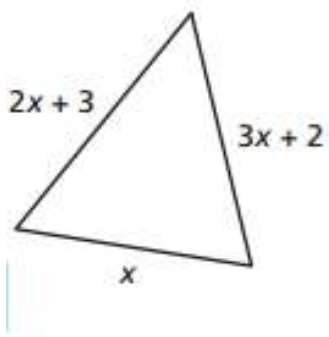
$$2(x+4) + 3(x-5) - 2y$$

<i>Step</i>	<i>What</i>	<i>why</i>
1		
2		
3		
4		
5		
6		

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Problem 3:

Write an expression for the perimeter of the triangle. Then simplify the expression.

**Show your work.**

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Problem 4: Challenge!

Draw a line from each set of terms in Column A to its equivalent combination in Column B. Then circle each letter in Column B that does not have a matching term. Unscramble those letters to answer the riddle.

Column A

1. $2x + 7 + 5x - 4 - x$
2. $5 + 7x + 2x - 3 + 6$
3. $x + y + 4x - 3x + 2y + 3y$
4. $3x^2 + 5x - 17 + 6x + 20$
5. $4x + x^2 + 12 - 4 + 2x$
6. $12y + 12x + 12 - 6x + 12$
7. $12y + 4 + x - 7y + 8 + 8x$
8. $5x + x^2 + 2x + 5 - 4 - x^2$
9. $5x^2 + 8x + 7x^2 + 6x$
10. $12x + 6 - 8x - 4x - 3 + 12$
11. $5x + 4 - 3x + 5 + 2x - 9$
12. $4x + 2y + 8 - 3 - y - x$
13. $4x + 5 + 7x + 2y + 2 - y$
14. $2y + 2x + 8 - 6 + x - 2y$
15. $4x + 6y + 6 + 7x + y$
16. $3x^2 + 4x - 2x^2 - 3x + 2x$
17. $8x + 4 - 4 - 4x + x$
18. $y + 5x + 6y + 9 - 6$
19. $x^2 + 3 + 2x^2 + 4 - 7$
20. $5y + 3 + 7x^2 - 2 - x^2 + y$

Column B

- A. $5y + 9x + 12$
- B. $12y + 6x + 24$
- C. 15
- D. $9x + 8$
- E. 4
- F. $6x + 3$
- G. $11x + y + 7$
- H. $x^2 + 6x + 8$
- I. $4x$
- J. $3x^2 + 11x + 3$
- K. $3x + 2$
- L. $3x^2$
- M. $6x$
- N. $x^2 + 3x$
- O. $6x^2 + 6y + 1$
- P. $12x^2 + 14x$
- Q. $7x + 1$
- R. x^2
- S. $5x + 7y + 3$
- T. 0
- U. $2x + 6y$
- V. $3x + y + 5$
- W. $11x + 7y + 6$
- X. $5x$

Riddle: What can be a word, a number, a period of time, or a variable?

A _____

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Final Summary

In a U-Shape:

1. Re-state the objective to assess if students learn it
2. Elicit from students what they have learned and what they want to learn more about.
3. Tie what they learn to the lesson, and upcoming lessons (7.EE.4a)