TABLE of CONTENTS

NYS NEXT GENERATION MATHEMATICS LEARNING STANDARDS

7.EE.1 Add, subtract, factor, and expand linear expressions with rational coefficients by applying the properties of operations.

7.EE.2 Understand that rewriting an expression in different forms in real-world and mathematical problems can reveal and explain how the quantities are related.

Introduction

The lesson reviews rewriting linear expressions in equivalent forms by using the commutative and associative properties and identifying what the equivalent form reveals about a real-world situation. Read or have a volunteer read through the lesson and discuss the examples with the class. Remind students that a number written adjacent to a variable indicates multiplication and that a variable alone is equivalent to the variable with a coefficient of 1. Point out that when using properties to rearrange terms, the sign travels with the term.

Guided Practice

The guided practice page provides sample multiple-choice and constructed answer problems for the students to complete on their own. Each item is accompanied by a hint or reminder that guides the student's thinking about how to solve the problem. Offer assistance as needed. When students have completed the items, review the answers and solution processes as a class.

GUIDED PRACTICE

Read and solve each problem.

1 Which expression is equivalent to $4a$?

A $12a - 6a$

B $4 + a$

C $10a + (\text{-}6a)$

D $a \cdot a \cdot a \cdot a$

> What are some ways to rewrite the coefficient, the number that multiplies the variable?

2 Which expression has the same value as $2n + n$?

A $2n^2$

B $2 + n + n$

C $3n$

D $4n$

> A variable by itself is understood to have a coefficient of 1.

3 Andrei buy 3 notebooks for d dollars each and a calculator for 7 dollars. A store coupon gives him $2 off his entire purchase. The expression $(3d + 7) - 2$ represents this situation. Write an equivalent expression in simpler form.

Answer _____ $3d + 5$ _____

> What property lets you regroup numbers?

4 Brendan earns 25% more than his regular hourly rate, d, when he works on holidays. Write an expression to represent the hourly rate Brendan earns working on a holiday.

Answer _____ $1.25d$ _____

> The holiday rate is more than 100% of Brendan's regular hourly rate.

© The Continental Press, Inc.
DUPLICATING THIS MATERIAL IS ILLEGAL.

UNIT 4 Expressions **73**

Answer Rationales

1. Use the commutative property to rearrange the terms as $6y + y - 3$. Then combine the variable terms: $7y - 3$. Choice D is correct. *(7.EE.1, 2)*

2. The variables are different so the terms cannot be combined, eliminating choices B and D. In choice D, the coefficients have been reordered but not the variables, so these are not the same terms. Choice A shows the terms reordered via the commutative property and is correct. *(7.EE.1, 2)*

3. Choices A and B show different operations on the left and right; they are incorrect. Choice D uses e as a factor twice on the right and is incorrect. In choice C, the factors are correctly regrouped according to the associative property; choice C is correct. *(7.EE.1, 2)*

4. The expression contains three factors, two of them fractions. Multiplying the fractions results in $\frac{6}{20}$, which simplifies to $\frac{3}{10}$. Combined with the remaining factor, a variable, the equivalent expression is $\frac{3}{10}w$. Choice D is correct. *(7.EE.1, 2)*

5. The variable term g is equivalent to $1g$, so to combine the variable terms, add the coefficients: $1g + 2g - 3 = 3g - 3$. Choice D is correct. *(7.EE.1, 2)*

6. The commutative property of addition allows numbers to be added in any order, so switch the order of the addends: $9 + 4p$. *(7.EE.1, 2)*

7. One way to simplify the expression is to use the commutative property to switch the order of the addends in parentheses. Next, regroup the variable terms in parentheses. Then add the variable terms. The result is $6 + 9t$ or the reverse, $9t + 6$. *(7.EE.1, 2)*

8. **Parts A and B** If Kevin is n inches tall and Jeremy is shorter, then Jeremy's height can be expressed using subtraction: $n - 4$. Jeremy is $n - 4$ inches tall. Dimitri is 3 inches taller than this, or $(n - 4) + 3$. This can be simplified to $n - 1$, which is Dimitri's height in relation to Kevin's height. This shows that Dimitri is 1 inch shorter than Kevin. *(7.EE.1, 2)*

9. **Parts A and B** The total cost of n magnets at $4.50 each is $4.50n$. The total cost of n postcards at $0.75 each is $0.75n$. So Marisol's total cost is $4.50n + 0.75n$. Since the terms have the same variable, the coefficients can be added: $(4.50 + 0.75)n = 5.25n$. *(7.EE.1, 2)*

TEST YOURSELF

8 Jeremy is 4 inches shorter than Kevin. Kevin is n inches tall.

Part A Write an expression to represent Jeremy's height.

Answer ___ $n - 4$ ___

Part B Dimitri is 3 inches taller than Jeremy. Write an expression to represent Dimitri's height. Use the expression to explain how Dimitri's height compares to Kevin's height.

$n - 4 + 3$ *or* $n - 1$. This expression shows that Dimitri is 1 inch shorter than Kevin.

9 In a gift shop, magnets cost $4.50 each and postcards cost $0.75 each.

Part A Marisol bought the same number, n, of magnets as postcards in this gift shop. Write an expression to show her total cost.

Answer _____ $4.50n + 0.75n$ _____

Part B Write another expression equivalent to the one you wrote in part A. Explain why both expressions are correct.

$5.25n$. This expression is equal to the sum of the expression written in part A. The expression in part A multiplies the cost of each item by n, the unknown number of items she bought, and then adds them together.

UNIT 4 **Expressions** 75

CONNECTING TO MATHEMATICAL CONTENT

Grade-span connections:
6.EE.3 → 7.EE.1 → 8.EE.7
6.EE.4 → 7.EE.2 → 8.EE.8 c

Grade-level connections:
7.EE.3 (solving problems with rational numbers)
7.EE.4 (writing equations)

CONNECTING TO MATHEMATICAL PRACTICES

MP2: Reason abstractly and quantitatively.
MP4: Model with mathematics.
MP7: Look for and make use of structure.