Family Letter
5th Grade Operations and Algebraic Thinking with Expressions

Dear Family,

Focus of the Unit

This unit on operations and algebraic thinking builds on students' work with addition, subtraction, multiplication, and division. This unit focuses on the use of expressions, which are series of numbers and symbols (+, -, x, ÷) without an equal sign. Students are expected to interpret numerical expressions without actually calculating them. See a sample example below:

Write an expression for the steps "double seven and then add 13."

Student
(2 x 7) + 13

Describe how the expression 5 x (10 x 10) relates to 10 x 10.

Student
The expression 5 x (10 x 10) is 5 times larger than the expression 10 x 10 since I know that I that 5 x (10 x 10) means that I have 5 groups of (10 x 10).

Students are also introduced to the use of parentheses, the order of operations, and the commutative, associative and distributive properties (see examples below).

Building off Past Mathematics

The students' knowledge of place value and the relationship between numbers are important to the work of this unit. In previous grade levels, students have learned how to solve two-step word problems involving the four operations with whole numbers. Students have also explored the commutative, distributive, and associative properties in previous grades, and will use parentheses to represent them in expressions.

Commutative Property	The order of numbers can be moved around in addition and multiplication and the result will stay the same. Examples: 3 + 5 = 8 and 5 + 3 = 8 4 x 3 = 12 and 3 x 4 = 12
Distributive Property	Multiplying a number by a group of numbers added together is the same as multiplying each number separately. Example: break apart one factor (6) with addition into 2 + 4 and multiply each of those addends (2 and 4) by 3: 3 x 6 3 x (2 + 4) 3 x 2 + 3 x 4
Associative Property	Numbers can be added or multiplied regardless of how the numbers are grouped. **3 + 7 + 5 = __** **3 + 7 + 5 = __** **(3 + 7) + 5 = __** **3 + (7 + 5) = __** **(10) + 5 = 15** **3 + 12 = 15**

Strategies that Students Will Learn

In fifth grade, students use their previous understanding of the properties listed above to help them explain the use of parentheses. There are different scenarios that students will see in regards to expressions:

Scenarios with Expressions	
An expression is provided with parentheses, and students are expected to apply the properties of operations to solve.	(6 - 2) × (3 x 1) + (16 - 2) ÷ (8 – 1) 4 x 3 + 14 ÷ 7 12 + 2 14
An equation is provided, and students are expected to add parentheses in the correct position in order to achieve the answer.	<u>Example One:</u> Which pair of parentheses can be removed without changing the value of this expression? (4 + 2) × (6 – 1) + (4 × 3) ÷ (6 – 2) <u>Example Two:</u> Consider the expression: 24 ÷ 4 + 2 – 1 x 3 Part 1: Put parentheses in the following places and find the value of each expression. a) Around 24 ÷ 4 b) Around 4 + 2 c) Around 2 – 1 d) Around 1 x 3 Part 2: Consider the values of each expression above. How do the parentheses change the value of each expression? Part 3: Are some expressions the same regardless of the location of the parentheses? Why is this the case?

<u>Ideas for Home Support</u>

An important component to this work in fifth grade is that students are reasoning about the expressions, without actually calculating them. Encourage your child to think about what they know about addition, subtraction, multiplication, and division and how that can help them determine the reasonableness of an answer. Can they interpret 3 x (18932 + 921) as being three times as large as 18932 + 921? Talk with your child about how that can help them with real life situations such as measuring and estimation.

Talk with your student about real-life situations where the order of operations is used. Here is an example from *The Math Forum:*

Suppose two classes are going on a field trip to the zoo. There are 28 people in one class and 22 people in the other class. The teachers want to order lunch for all of the students, and in each lunch, they want there to be 2 packages of crackers. How many packages of crackers should the teachers order? Well, here is where order of operations comes in: The teachers

want to order 2 x (28+22) packages of graham crackers. If the teachers didn't use order of operations, then instead of ending up with 100 packages of graham crackers, the teachers would end up with 78 packages of graham crackers, and some of the kids would be very unhappy.

Thank you for serving as partners in your child's success as a mathematician!