Dear Family,

The next Unit in mathematics class, ***Say It With Symbols: Making Sense of Symbols,*** explores the topic that early algebra would focus on almost exclusively: the use of symbols. When you first began studying algebra, you probably spent most of your time learning to manipulate symbols. Chances are you didn't get a chance to think about what the symbols actually meant. This mathematics curriculum emphasizes the *meaning* behind the symbols. This helps students build their own understanding of algebra and its usefulness for solving problems.

Unit Goals

Up to this point in the development of algebra, representing and reasoning about patterns of change have been the main objectives. Students have used symbols to represent relationships and solve equations to find information or make predictions. In *Say It With Symbols*, students learn to use symbolic expressions to represent and reason about relationships. The focus shifts to using the properties of numbers and equality to look at equivalent expressions and the information each expression represents about the relationship. Students also manipulate symbolic expressions into equivalent forms to access new information. In addition, students interpret underlying patterns that a symbolic equation or statement represents. Students look critically at each part of an expression and how each part relates to the original expression, its graph, its table, and the context that it models.

Homework and Conversations About the Mathematics

You can help with homework by asking questions such as the following:

- *What expression or equation captures the underlying pattern or relationship in a context?*
- *What information does an equivalent expression provide for a quantity?*
- *How can you tell if two or more expressions are equivalent?*
- *What operations would transform an equation or expression into an equivalent form so the solution can be more easily determined?*
- *What patterns of change do the equation or expression represent?*

You can help your child with his or her work for this Unit in several ways:

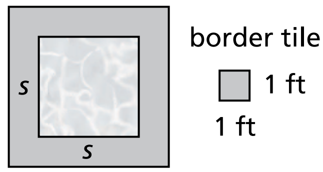
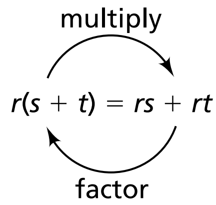
- Talk with your child about the situations that are presented and why you can rearrange symbols.
- Ask your child to show you a problem that can be represented by more than one algebraic expression. Have your child demonstrate that the expressions are equivalent and what they mean in terms of the problem.
- Look over your child's homework and make sure all questions are answered and that explanations are clear.

Common Core State Standards

Students will spend significant time in this Unit on the standards for Mathematical Practice, developing their ability to "reason abstractly and quantitatively" and "look for and make use of structure." *Say It With Symbols* is a pivotal Unit for helping students to reason with expressions and equations and culminate their experience with different functions.

A few important mathematical ideas that your child will learn in *Say It With Symbols* are given on the next page. As always, if you have any questions or concerns about this Unit or your child's progress in the class, please feel free to call.

Sincerely,

Important Concepts	Examples
Equivalent Expressions In previous Units, students explored ways in which relationships can be expressed in tables, graphs, and equations. Often, the contextual clues or the patterns in tables or graphs could only be represented by one form of an equation. Here, students are deliberately presented with situations in which contextual clues can be interpreted in several ways to produce different but equivalent equations.	*Find the number of 1-foot-square tiles N needed to make a border around a square pool with sides of length s feet.* Different conceptualizations of the situation can lead to different but equivalent expressions for the number of tiles: $N = 4s + 4$ $N = 4(s + 1)$ $N = s + s + s + s + 4$ $N = 8 + 4(s - 1)$ $N = 2s + 2(s + 2)$ $N = (s + 2)^2 - s^2$ 
Revisiting the Distributive Property If an expression is written as a factor multiplied by a sum of two or more terms, the Distributive Property can be applied to *multiply* the factor by each term in the sum. If an expression is written as a sum of terms and the terms have a common factor, the Distributive Property can be applied to rewrite the expression as the common factor multiplied by a sum of two or more terms. This process is called *factoring*.	The Distributive Property allows you to group symbols (shown on the left side of the equation) or to expand an expression as needed (shown on the right side of the equation). 
Checking for Equivalence Students may use geometric reasoning to decide if expressions are equivalent. Students may check whether equations have the same graphs and tables. Students should also be able to use the Distributive and Commutative properties to show that expressions are equivalent.	By applying the Distributive Property, $4(s + 1) = 4s + 4$. $8 + 4(s - 1)$ can be shown to be equivalent to $4s + 4$. $8 + 4(s - 1) = 8 + 4s - 4$ (Distributive Property) $= 8 - 4 + 4s$ (Commutative Property) $= 4 + 4s$ (Subtraction) $= 4s + 4$ (Commutative Property)
Combining Expressions Students combine expressions to create a new expression by adding or subtracting, or by substituting an equivalent expression for a given quantity in the original expression or equation. They then interpret what information the variables and numbers represent in the context of the problem.	The equations represent the amount of money M raised by individuals who walk x kilometers in a walkathon. $M_{Leanne} = 160$ $M_{Gilberto} = 7(2x)$ $M_{Alana} = 11(5 + 0.5x)$ These equations are combined by addition to find the total amount of money raised. $M_{total} = 160 + 7(2x) + 11(5 + 0.5x)$ Students find equivalent equations such as: $M_{total} = 215 + 19.5x$
Solving Linear Equations Students have used tables or graphs to find solutions. They can solve linear equations such as $y = mx + b$, $y = a(x + b)$, or $mx + b = px + c$. In this Unit, students solve more complicated equations.	$200 = 5x - (100 + 2x)$ $200 = 5x - (2x + 100)$ (Commutative Property) $200 = 5x - 2x - 100$ (Distributive Property) $200 = 3x - 100$ (Subtraction) $300 = 3x$ (Addition Property of Equality) $100 = x$ (Division Property of Equality)
Solving Quadratic Equations Students connect solving quadratic equations for x when $y = 0$ to finding x-intercepts on the graph. They are introduced to solving quadratic equations by factoring. Quadratic equations of the form $y = ax^2 + bx$ or $y = ax^2 + bx + c$ can be factored into the product of two binomials and solved for x when $y = 0$.	If $y = 2x^2 + 8x$, then you can find the values of x when $y = 0$ by rewriting the equation in the equivalent form of $2x(x + 4) = 0$. This product can only be zero if one of the factors, $2x$ or $x + 4$, is equal to zero. Thus, $2x = 0$ or $x + 4 = 0$. By solving each of these linear equations, $x = 0$ or $x = -4$. If $y = x^2 + 5x + 6$, write $x^2 + 5x + 6$ in factored form $(x + 2)(x + 3)$ and then solve $0 = (x + 2)(x + 3)$. Thus, $x + 2 = 0$ or $x = -2$, and $x + 3 = 0$ or $x = -3$.