Module 3: Determining Unknown Quantities

TOPIC 1: EXPRESSIONS

In this topic, students develop their understanding of variables and algebraic expressions. They also formalize their knowledge of powers and evaluate expressions involving whole number exponents, expanding their application of the Order of Operations to include exponents. Students compose algebraic expressions from verbal statements, decompose expressions into their component terms, and evaluate algebraic expressions for given values of the variable. They use algebra tiles and properties of arithmetic and algebra to form equivalent expressions, just as they did in previous lessons with numeric expressions. Students also use tables and graphs to determine if expressions are equivalent, and they write algebraic expressions to model and solve real-world and mathematical problems.

Where have we been?

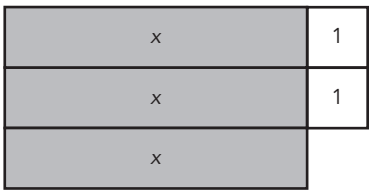
Students enter grade 6 with knowledge of factors and properties of numbers. They have used the Commutative and Associative Properties in first and third grades and the Order of Operations, although formal terminology may not have been used. These properties, along with the Distributive Property, were reviewed in previous lessons in this course. During elementary school, students wrote expressions with whole number exponents for powers of ten, and they wrote numeric expressions to record verbal descriptions of calculations.

Where are we going?

This topic provides the foundation for future work with algebraic structures, including algebraic equations and inequalities and their representations. Expressions are the foundation of equations. Expertise in writing expressions enables students to write and solve equations for many real-world and mathematical problems. As students continue in the course, they must be able to evaluate expressions and determine whether expressions are equivalent.

Using Algebra Tiles to Model Expressions

Algebra tiles are used to model expressions with variables. For example, this model could show the combination of the expressions $x + 1$ and $2x + 1$. The sum can be written, even when the value of x is not known. The model shows that the sum is $3x + 2$.



Myth: "I learn best when the instruction matches my learning style."

If asked, some people will tell you they have a *learning style* – the expressed preference in learning by seeing images, hearing speech, seeing words, or being able to physically interact with the material. Some people even believe that it is the teacher's job to present the information in accordance with that preference.

However, it turns out that the best scientific evidence available does not support learning styles. In other words, when an auditory learner receives instruction about content through a visual model, they do just as well as auditory learners who receive spoken information. Students may have a *preference* for visuals or writing or sound, but sticking to their preference doesn't help them learn any better. Far more important is ensuring the student is engaged in an interactive learning activity and the new information connects to the student's prior knowledge.

#mathmythbusted

Talking Points

You can support your student's learning by resisting the urge, as long as possible, to get to the answer in a problem that your student is working on. Students will learn the algebraic shortcuts that you may know about, but only once they have experience in mathematical reasoning. This may seem to take too long at first. But if you practice asking good questions instead of helping your student arrive at the answer, they will learn to rely on their own knowledge, reasoning, patience, and endurance when struggling with math.

Key Terms

Order of Operations
Evaluate expressions inside parentheses, then exponents, then multiply and divide from left to right, then add and subtract from left to right.

variable
A variable is a symbol, often a letter, that represents a quantity that varies.

algebraic expression
An algebraic expression is a mathematical phrase involving at least one variable, and sometimes numbers and operation symbols.

coefficient
A coefficient is the number that is multiplied by a variable in an algebraic expression.