Expressions and Equations

Domain Overview

GRADE 6

At this level, the study of expressions and equations centers on the use of variables in mathematical expressions. Students write and evaluate numerical expressions and use expressions and formulas to solve problems. Students also solve simple one-step equations and use equations such as $3x = y$ to describe relationships between quantities. The sixth-grade study of expressions and equations is foundational in the transition to algebraic representation and problem solving, which is extended and formalized in Grade 7.

GRADE 7

Seventh graders use properties of operations to generate equivalent expressions. They use the arithmetic of rational numbers to formulate expressions and equations in one variable and use these equations to solve problems.

The seventh-grade focus of solving real-world and mathematical problems using numerical and algebraic expressions and equations provides the foundation for equation work in Grade 8 and assists in building the foundation work for writing equivalent nonlinear expressions in later grades.

GRADE 8

Eighth graders focus on more complex equations by learning about and applying the properties of integer exponents, square and cube roots, and scientific notation. They also connect previous understandings about proportional relationships to linear equations. Systems of two linear equations in two variables are introduced, and three methods for finding solutions are learned.

SUGGESTED MATERIALS FOR THIS DOMAIN

6	7	8	
		✓	Books: *My Full Moon is Square* by Elinor Pinczes and *Sea Squares* by Joy Hulme
✓		✓	Cubes such as linking cubes, Unifix cubes™, wooden cubes
✓			Number line
✓	✓	✓	Square tiles (paper or commercially produced)

KEY VOCABULARY

6	7	8	
✓	✓		**base** in 4^2, 4 is the base; the number multiplied by itself
	✓	✓	**bivariate data** data in two variables, one to be graphed on the *x*-axis and the other on the *y*-axis
✓	✓		**coefficient** a number or variable used to multiply a variable; in $3x + 7$, 3 is the numerical coefficient; in $y = mx + b$, x is the variable and m is the variable coefficient
✓	✓		**constant** a fixed value; in $3c + 5 = 11$, 5 and 11 are constants
✓	✓		**dependent variable** the output variable in a function; the variable whose value depends on the input
✓	✓	✓	**distributive property** property that states that multiplying a sum by a number is the same as multiplying each addend by the number and then adding the products. The distributive property states that if *a, b,* and c are real numbers, then $a \times (b + c) = (a \times b) + (a \times c)$.
✓	✓	✓	**equation** statement using an equal sign (=) showing that two expressions have the same value
✓		✓	**equivalent** the same as; equal to
✓		✓	**evaluate** solve
✓		✓	**exponents** in 4^2, 2 is the exponent; the number that dictates how many times the base multiplies by itself; $4^2 = 4 \times 4$
✓			**exponential notation** written in the form of B^x
✓	✓	✓	**expression** a value expressed as numbers and/or variables, and operation symbols (such as +, −, ×) grouped together; $9y + 7$ is an expression; one side of an equation
✓	✓		**factor** as a verb, to break down into the terms that multiply to make the quantity to be factored

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KEY VOCABULARY

6	7	8	
✓			**independent variable** the input value in a function; the variable whose value determines the value of the dependent variable
✓	✓		**inequality** statement that two values are not equal; the inequality symbol is $\neq$; inequalities can also use the symbols $>$ and $<$
		✓	**irrational number** any real number that cannot be expressed as a ratio $\frac{a}{b}$, where a and b are integers, with b non-zero, and is therefore not a rational number
		✓	**linear equation** an equation whose graph is a straight line
✓		✓	**numerical expressions** expressions using all numbers such as 34×82
✓		✓	**rational numbers** any number that can be expressed as the quotient $\frac{a}{b}$ of two integers, with the denominator b not equal to zero
		✓	**scientific notation** a number written in the form of a number between 1 and 10 (including 1) times a power of 10; 4.2×10^6 is 4,200,000 written in scientific notation
✓			**simplify** to change an expression or equation into its lowest terms; combining like terms is one method to simplify an equation or expression
		✓	**simultaneous equations** a set of equations whose solution(s) are all the points that make all the equations in the set true; when graphed, the solutions are shown as the point(s) of intersection; also known as a system of equations
✓			**substitution** use of a numerical value to replace a variable
✓	✓	✓	**variable** a symbol that stands for an unknown number or any number in a specified set