

SAY IT WITH SYMBOLS Making Sense of Symbols		
Instructional Time and Investigations	25 days	<ul style="list-style-type: none"> • Inv. 1: Making Sense of Symbols: Equivalent Expressions (4 Problems) • Inv. 2: Combining Expressions (4 Problems) • Inv. 3: Solving Equations (4 Problems) • Inv. 4: Looking Back at Functions (4 Problems) • Inv. 5: Reasoning With Symbols (3 Problems)
Goals	<p>Equivalence: Develop understanding of equivalent expressions and equations.</p> <ul style="list-style-type: none"> • Equivalence is useful when solving equations and problems. Equivalent expressions can be generated using properties of operations. Examining equivalent forms of an expression can reveal new information about the context of a problem. • Equivalent expressions can be used to develop and relate formulas for geometric shapes including volumes of cones, spheres, and cylinders. • Algebraic equations and expressions can be used to solve problems. • Equations can have one solution, no solution, or an infinite number of solutions, which can be identified by examining the equation or its graph. 	<p>Functions: Develop understanding of specific functions such as linear, exponential, and quadratic functions.</p> <ul style="list-style-type: none"> • The underlying pattern of change in a relationship or function can be represented symbolically with an equation. Different types of functions, such as linear, inverse, exponential, or quadratic, have specific characteristics in their symbolic representations.
Common Core Standards	<p>Common Core Standards for Mathematical Practice</p> <p>MP.1: Make sense of problems and persevere in solving them.</p> <p>MP.2: Reason abstractly and quantitatively.</p> <p>MP.3: Construct viable arguments and critique the reasoning of others.</p> <p>MP.4: Model with mathematics.</p> <p>MP.5: Use appropriate tools strategically.</p> <p>MP.6: Attend to precision.</p> <p>MP.7: Look for and make use of structure.</p> <p>MP.8: Look for and express regularity in repeated reasoning.</p>	<p>Common Core Content Standards</p> <p>8.EE.C.7: Solve linear equations in one variable.</p> <p>8.F.A.3: Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.</p> <p>8.F.B.4: Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.</p> <p>8.F.B.5: Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.</p> <p>8.G.C.9: Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</p> <p>Also 8.EE.A.2, 8.EE.C.7a–b, 8.EE.C.8, 8.EE.C.8a–c, 8.F.A.1, 8.F.A.2</p>

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Content Connections to Other Units

Goals of the Unit	Prior Work	Future Work
<p>Equivalence: Develop an understanding of equivalent expressions and equations.</p>	<ul style="list-style-type: none"> Using the appropriate order of operations in evaluating expressions and writing symbolic sentences; using parentheses and properties of real numbers to communicate effectively (<i>Prime Time; Variables and Patterns; Accentuate the Negative; Moving Straight Ahead; Filling and Wrapping; Thinking With Mathematical Models; Growing, Growing, Growing</i>) Making sense of linear, quadratic, exponential, and other symbolic expressions (<i>Variables and Patterns; Comparing and Scaling; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing</i>) Evaluating and making sense of symbolic expressions (<i>Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing</i>) Writing and interpreting symbolic sentences (<i>Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing</i>) Reasoning with equivalent expressions (<i>Comparing Bits and Pieces; Let's Be Rational; Variables and Patterns; Shapes and Designs; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing</i>) Predicting patterns of change (<i>Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing</i>) Solving linear and quadratic equations using tables, graphs, and simple symbolic rules (<i>Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing</i>) Modeling and solving problems (<i>Variables and Patterns; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing</i>) 	<ul style="list-style-type: none"> Making sense of linear relationships of the form $ax + by = c$ and linear inequalities (<i>It's In the System; Function Junction</i>) Making sense of polynomial, logarithmic, trigonometric, and rational symbolic expressions and functions (<i>Function Junction; High School</i>) Writing equivalent linear relationships, systems of linear equations and linear inequalities (<i>It's In the System; Function Junction</i>) Writing equivalent expressions involving polynomial, logarithmic, trigonometric, and rational expressions that communicate reasoning using the properties of real numbers (<i>Function Junction; High School</i>) Reasoning with linear relationships and inequalities (<i>It's In the System; Function Junction</i>) Reasoning with equivalent expressions to solve problems that can be modeled by polynomial, logarithmic, trigonometric, and rational functions (<i>Function Junction; High School</i>) Solving linear inequalities and systems of linear equations (<i>It's In the System ; Function Junction</i>) Developing a deeper understanding of solving linear and quadratic equations and applying and extending the techniques to solving polynomial and rational equations (<i>Function Junction; High School</i>)
<p>Functions: Develop an understanding of specific functions such as linear, exponential and quadratic functions.</p>	<ul style="list-style-type: none"> Modeling and solving problems (<i>Variables and Patterns; Comparing and Scaling; Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing</i>) 	<ul style="list-style-type: none"> Modeling and solving problems using polynomial functions (<i>Function Junction; High School</i>) Modeling and solving problems using logarithmic and trigonometric functions (<i>High School</i>)