

VARIABLES AND PATTERNS Introducing Algebra

<p>Instructional Time and Investigations</p>	<p>25 $\frac{1}{2}$ days</p>	<ul style="list-style-type: none"> • Inv. 1: Variable, Tables, and Graphs (4 Problems) • Inv. 2: Analyzing Relationships Among Variables (4 Problems) • Inv. 3: Relating Variables With Equations (4 Problems) • Inv. 4: Expressions, Equations, and Inequalities (5 Problems)
<p>Goals</p>	<p>Variables and Patterns (Relationships): Develop understanding of variables and how they are related.</p> <ul style="list-style-type: none"> • In many real-world situations, one variable quantity depends on another. Tables, graphs, and equations are various representations that can be used to better understand the pattern of change between variable quantities. • Not all relationships are linear. Linear relationships have a constant rate of change between variables and are written in the form $y = mx$, $y = b + x$, and $y = b + mx$. 	<p>Expressions and Equations: Develop understanding of expressions and equations.</p> <ul style="list-style-type: none"> • There is more than one way to write an expression to model a real world situation. Properties of operations allow you to generate equivalent expressions and check equivalence. • Solutions for equations and inequalities can be found by examining the table or graph of the equation or by rewriting it as a related equation.
<p>Common Core Standards</p>	<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>6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g. by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.</p> <p>6.NS.C.8 Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distance between points with the same first coordinate or the same second coordinate.</p> <p>6.EE.A.3 Apply the properties of operations to generate equivalent expressions.</p> <p>6.EE.B.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$, and $px = q$ for cases in which p and q and x are all nonnegative rational numbers.</p> <p>6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.</p> <p>Also 6.RP.A.2, 6.RP.A.3a–b, 6.RP.A.3d, 6.NS.C.6, 6.NS.C.6b–c, 6.EE.A.1, 6.EE.A.2, 6.EE.A.2a–c, 6.EE.A.4, 6.EE.B.5, 6.EE.B.6, 6.EE.B.8</p>

VARIABLES AND PATTERNS Focus on Algebra

Content Connections to Other Units

Goals of the Unit	Prior Work	Future Work
<p>Variables and Patterns (Relationships): Develop understanding of variables and how they are related.</p>	<ul style="list-style-type: none"> Analyzing patterns to develop concepts of area and volume (<i>Covering and Surrounding</i>) Developing algorithms for operations of fractions and decimals (<i>Let's Be Rational; Decimal Ops</i>) Identifying patterns in number and geometry (<i>Prime Time; Covering and Surrounding</i>) Analyzing maximum and minimum values in measurement (<i>Covering and Surrounding</i>) Organizing, displaying, and interpreting data in one- and two- dimensional graphs and tables (<i>Data About Us</i>) Constructing graphs of the relationship between the dimensions and area of a rectangle when the perimeter is held constant (<i>Covering and Surrounding</i>) 	<ul style="list-style-type: none"> Gathering data by conducting trials of an experiment and organizing data in tables and graphs in order to look for patterns and relationships (<i>Data About Us; What Do You Expect?; Thinking With Mathematical Models</i>) Analyzing patterns to develop concepts of surface area and volume (<i>Filling and Wrapping</i>) Understanding the relationship between edge lengths and surface area and volume of three-dimensional figures (<i>Stretching and Shrinking; Filling and Wrapping</i>) Studying data to develop the concept of linear, exponential, and quadratic functions (<i>Moving Straight Ahead; Growing, Growing, Growing; Frogs, Fleas and Painted Cubes</i>) Gathering and analyzing data about populations (<i>Samples and Populations</i>) Identifying maximum and minimum values for a mathematical model or equation (<i>Thinking with Mathematical Models; Frogs, Fleas, and Painted Cubes; Function Junction</i>) Extending tables and graphs to include negative coordinates and quantities (<i>Accentuate the Negative</i>) Formalizing understandings of linear equations in $y = mx + b$ form (<i>Comparing and Scaling; Moving Straight Ahead</i>) Studying and developing mathematical models (<i>Thinking With Mathematical Models</i>) Identifying and studying nonlinear patterns of growth (<i>Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Function Junction</i>) Identifying patterns of inverse variation (<i>Thinking With Mathematical Models</i>)
<p>Expressions and Equations: Develop understanding of expressions and equations.</p>	<ul style="list-style-type: none"> Developing operation algorithms for fractions, decimals, and percents (<i>Comparing Bits and Pieces; Let's Be Rational</i>) Developing rules for perimeter (<i>Covering and Surrounding</i>) Using four function calculators for computation (<i>Prime Time; Let's Be Rational; Decimal Ops</i>) 	<ul style="list-style-type: none"> Expressing linear relationships in $y = mx + b$ form (<i>Moving Straight Ahead</i>) Describing situations with linear models or equations (<i>Thinking With Mathematical Models</i>) Developing strategies for expressing linear relationships in symbols and for solving linear equations (<i>Moving Straight Ahead; Say It With Symbols</i>) Developing exponential and quadratic relationships (<i>Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Function Junction</i>) Developing strategies for solving simultaneous linear equations (<i>It's In the System</i>) Developing the quadratic formula (<i>Function Junction</i>) Using graphing calculators to graph and compare functions (<i>Moving Straight Ahead; Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Say It With Symbols; It's In the System; Function Junction</i>)