

**MOVING STRAIGHT AHEAD** Linear Relationships

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| <p><b>Instructional Time and Investigations</b></p> | <p>25 days</p>  | <ul style="list-style-type: none"> <li>• Inv. 1: Walking Rates (4 Problems)</li> <li>• Inv. 2: Exploring Linear Relationships With Graphs and Tables (4 Problems)</li> <li>• Inv. 3: Solving Equations (5 Problems)</li> <li>• Inv. 4: Exploring Slope: Connecting Rates and Ratios (4 Problems)</li> </ul>  |
| <p><b>Goals</b></p>                                 | <p><b>Linear Relationships:</b> Recognize problem situations in which two variables have a linear relationship.</p> <ul style="list-style-type: none"> <li>• Two variables are in a linear relationship if one variable is changing by a constant amount when the other variable changes by increments of 1 unit.</li> <li>• The rate of change in a linear relationship is represented by the slope of the line representing the relationship.</li> <li>• The equation <math>y = mx</math> is a particular kind of linear relationship in which <math>x</math> and <math>y</math> are proportional to each other.</li> </ul> | <p><b>Equivalence:</b> Understand that the equality sign indicates that two expressions are equivalent.</p> <ul style="list-style-type: none"> <li>• Solutions for linear equations of the form <math>y = mx + b</math> are pairs of values <math>(x, y)</math> which make this equation true. Graphically, solution pairs are points on the graph of the line.</li> <li>• Properties of equality can be used to maintain equivalent expressions on each side of the equation when finding a solution. Determining which equivalent expression to use in solving a problem is important.</li> </ul>  |
| <p><b>Common Core Standards</b></p>                 | <p><b>Common Core Standards for Mathematical Practice</b></p> <p><b>MP.1:</b> Make sense of problems and persevere in solving them.</p> <p><b>MP.2:</b> Reason abstractly and quantitatively.</p> <p><b>MP.3:</b> Construct viable arguments and critique the reasoning of others.</p> <p><b>MP.4:</b> Model with mathematics.</p> <p><b>MP.5:</b> Use appropriate tools strategically.</p> <p><b>MP.6:</b> Attend to precision.</p> <p><b>MP.7:</b> Look for and make use of structure.</p> <p><b>MP.8:</b> Look for and express regularity in repeated reasoning.</p>   | <p><b>Common Core Content Standards</b></p> <p><b>7.RP.A.2:</b> Recognize and represent proportional relationships between quantities.</p> <p><b>7.EE.A.1:</b> Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.</p> <p><b>7.EE.A.2:</b> Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.</p> <p><b>7.EE.B.4:</b> Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> <p><b>Also 7.RP.A.2a–d, 7.EE.B.3, 7.EE.B4a–b</b></p> |

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**Content Connections to Other Units**

| Goals of the Unit   | Prior Work   | Future Work   |
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| <p><b>Linear Relationships:</b><br/>Recognize problem situations in which two variables have a linear relationship.</p> | <ul style="list-style-type: none"> <li>Graphing data in the coordinate plane; using symbols to represent relationships between variables (<i>Variables and Patterns; Accentuate the Negative; Comparing and Scaling</i>)</li> <li>Expressing relationships between variables in words, symbols, graphs, and tables (<i>Variables and Patterns; Covering and Surrounding; Shapes and Designs; Comparing and Scaling</i>)</li> <li>Computing and interpreting ratios (<i>Comparing Bits and Pieces; Decimal Ops; Stretching and Shrinking; Comparing and Scaling</i>)</li> <li>Finding rates of change in relationships between two variables (<i>Variables and Patterns; Comparing and Scaling</i>)</li> <li>Understanding positive and negative rational numbers (<i>Accentuate the Negative</i>)</li> <li>Graphing relationships between two variables (<i>Variables and Patterns; Comparing and Scaling</i>)</li> <li>Finding values of the variables in a linear relationship using graphs or tables or numeric reasoning (<i>Variables and Patterns; Comparing and Scaling</i>)</li> <li>Understanding the meaning of parallel and intersecting lines (<i>Shapes and Designs</i>)</li> </ul> | <ul style="list-style-type: none"> <li>Identifying and interpreting patterns of change for exponential (<math>y = ax</math>), quadratic (<math>y = ax^2 + bx + c</math>), and inverse variation relationships (e.g. <math>y = k/x</math>) (<i>Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Say It With Symbols; Function Junction</i>)</li> <li>Writing and interpreting equations that represent linear, inverse, exponential, and quadratic relationships (<i>Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Say It With Symbols; It's In the System; Function Junction</i>)</li> <li>Analyzing linear models and interpreting slope of lines representing linear relationships (<i>Thinking With Mathematical Models; Growing, Growing, Growing</i>)</li> <li>Finding the slope of a line to determine an equation in <math>y = mx + b</math> form (<i>Thinking With Mathematical Models; Say It With Symbols; It's In the System</i>)</li> <li>Interpreting and constructing graphs of lines; determining the equation of lines (<i>Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Say It With Symbols; It's In the System; Function Junction</i>)</li> <li>Graphing step and piecewise-defined functions (<i>Function Junction</i>)</li> <li>Finding values of the variables in more complicated linear equations (<i>Thinking With Mathematical Models; Say It With Symbols; It's In the System</i>)</li> <li>Finding values of the variables for exponential and quadratic relationships using tables, graphs, and symbolic methods (<i>Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes</i>)</li> <li>Solving systems of linear equations; interpreting, graphing, and solving inequalities (<i>It's In the System</i>)</li> <li>Finding and interpreting points of intersection of two or more graphs of relationships from graphs or tables (<i>Thinking With Mathematical Models; Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes, Say It With Symbols; It's In the System</i>)</li> <li>Interpreting parallel and perpendicular lines (<i>Looking for Pythagoras</i>)</li> <li>Analyzing equivalent linear and quadratic expressions (<i>Frogs, Fleas, and Painted Cubes; Say It With Symbols</i>)</li> <li>Finding the solution to a system of linear equations and interpreting and graphing inequalities (<i>It's In the System</i>)</li> </ul> |
| <p><b>Equivalence:</b><br/>Understand that the equality sign indicates that two expressions are equivalent.</p>         | <ul style="list-style-type: none"> <li>Understanding inequalities (<i>Comparing Bits and Pieces; Variables and Patterns; Accentuate the Negative</i>)</li> <li>Writing and interpreting equivalent numeric expressions (<i>Prime Time; Variables and Patterns; Comparing and Scaling</i>)</li> </ul>   | <ul style="list-style-type: none"> <li>Solving more complicated linear inequalities (<i>It's In the System</i>)</li> <li>Writing and interpreting equivalent linear, exponential and quadratic expressions (<i>Growing, Growing, Growing; Frogs, Fleas, and Painted Cubes; Say It With Symbols; It's In the System; Function Junction</i>)</li> </ul>   |