## Chapter 1: Quantities and Relationships

This chapter introduces students to the concept of functions. Lessons provide opportunities for students to explore functions, including linear, exponential, quadratic, linear absolute value functions, and linear piecewise functions through problem situations, graphs, and equations. Students will classify each function family using graphs, equations, and graphing calculators. Each function family is then defined and students will create graphic organizers that represent the graphical behavior and examples of each.

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</table>
| 1.1     | Understanding Quantities and Their Relationships | 1    | • Understand quantities and their relationships with each other.  
• Identify the independent and dependent quantities for a problem situation.  
• Match a graph with an appropriate problem situation.  
• Label the independent and dependent quantities on a graph.  
• Review and analyze graphs.  
• Describe similarities and differences among graphs. | 912.N-Q.1.2  
912.F-LE.1.1 |
| 1.2     | Analyzing and Sorting Graphs | 1    | • Review and analyze graphs.  
• Determine similarities and differences among various graphs.  
• Sort graphs by their similarities and rationalize the differences between the groups of graphs.  
• Use the Vertical Line Test to determine if the graph of a relation is a function. | 912.F-IF.1.1  
912.F-IF.2.5 |
| 1.3     | Recognizing Algebraic and Graphical Representations of Functions | 2    | • Write equations using function notation.  
• Recognize multiple representations of functions.  
• Determine and recognize characteristics of functions.  
• Determine and recognize characteristics of function families. | 912.A-REI.4.10  
912.F-IF.1.1  
912.F-IF.1.2  
912.F-IF.2.5  
912.F-IF.3.9  
912.F-IF.3.7 |
| 1.4     | Recognizing Functions by Characteristics | 1    | • Recognize similar characteristics among function families.  
• Recognize different characteristics among function families.  
• Determine function types given certain characteristics. | 912.A-CED.1.2  
912.F-IF.1.1  
912.F-IF.2.4  
912.F-IF.3.9  
912.F-LE.1.1  
912.F-LE.1.2  
912.F-IF.3.7 |

## Chapter 2: Graphs, Equations, and Inequalities

This chapter reviews solving linear equations and inequalities with an emphasis towards connecting the numeric, graphic, and algebraic methods for solving linear functions. Students explore the advantages and limitations of using tables, functions, and graphs to solve problems. A graphical method for solving linear equations, which involves graphing the left and right side of a linear equation, is introduced. Upon student understanding of solving and graphing equations by hand, the chapter introduces the use of a graphing calculator. Finally, the graphical method for solving problems is extended to include non-linear equations and inequalities.
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<td>2.1</td>
<td>Modeling Linear Situations</td>
<td>1</td>
<td>• Complete tables and graphs, and write equations to model linear situations.</td>
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<td>• Analyze multiple representations of linear relationships.</td>
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<td>• Identify units of measure associated with linear relationships.</td>
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<td></td>
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<td></td>
<td>• Determine solutions both graphically and algebraically.</td>
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<td>• Determine solutions to linear functions using intersection points.</td>
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<td>912.A-REI.2.3</td>
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<td>912.F-IF.2.6</td>
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<td>2.2</td>
<td>Analyzing Linear Functions</td>
<td>2</td>
<td>• Complete tables and graphs, and write equations to model linear situations.</td>
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<td>• Analyze multiple representations of linear relationships.</td>
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<td></td>
<td>• Identify units of measure associated with linear relationships.</td>
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<td></td>
<td></td>
<td>• Determine solutions to linear functions using intersection points and properties of equality.</td>
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<td>• Determine solutions using tables, graphs, and functions.</td>
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<td></td>
<td>• Compare and contrast different problem-solving methods.</td>
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<td>• Estimate solutions to linear functions.</td>
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<td></td>
<td>• Use a graphing calculator to analyze functions and their graphs.</td>
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<td>912.F-IF.2.6</td>
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<td>2.3</td>
<td>Modeling Linear Inequalities</td>
<td>1</td>
<td>• Write and solve inequalities.</td>
<td>912.N-Q.1.3</td>
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<td>• Analyze a graph on a coordinate plane to solve problems involving inequalities.</td>
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<td>• Interpret how a negative rate affects how to solve an inequality.</td>
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<td>912.A-CED.1.3</td>
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<td>2.4</td>
<td>Solving and Graphing Compound Inequalities</td>
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<td>• Write simple and compound inequalities.</td>
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<td>• Graph compound inequalities.</td>
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<td>• Solve compound inequalities.</td>
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<td>2.5</td>
<td>Absolute Value Equations and Inequalities</td>
<td>2</td>
<td>• Understand and solve absolute values.</td>
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<td></td>
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<td></td>
<td>• Solve linear absolute value equations.</td>
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<td>• Solve and graph linear absolute value inequalities on number lines.</td>
<td>912.A-CED.1.3</td>
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<td>• Graph linear absolute values and use the graph to determine solutions.</td>
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<td>2.6</td>
<td>Understanding Non-Linear Graphs and Inequalities</td>
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<td>• Identify the appropriate function to represent a problem situation.</td>
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<td>• Determine solutions to linear functions using intersection points.</td>
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<td>• Determine solutions to non-linear functions using intersection points.</td>
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<td>• Describe advantages and disadvantages of using technology different methods</td>
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<td>to solve functions with and without technology.</td>
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### Chapter 3: Linear Functions

This chapter guides student exploration and comprehension of different forms of linear equations. Questions ask students to compare the mathematical and contextual meanings of various linear equations and to determine when to use the most appropriate form of a linear equation to represent a problem situation.
### Section 3.1: Modeling Data Using Linear Regression
- Create a graph of data points on a graphing calculator.
- Determine a linear regression equation using a graphing calculator.
- Recognize the accuracy of a line of best fit using the correlation coefficient.
- Make predictions about data using a linear regression equation.

### Section 3.2: Standard Form of Linear Equations
- Identify contextual meaning of expressions in an function.
- Write equations in standard form.
- Solve equations in standard form.
- Determine the x-intercept and y-intercept of an equation in standard form.
- Use intercepts to graph an equation.
- Convert equations from standard form to slope-intercept form.
- Solve equations in slope-intercept form.
- Determine the x-intercept and y-intercept of an equation in slope-intercept form.
- Perform unit analysis of equations.

### Section 3.3: Literal Equations in Standard Form and Slope-Intercept Form
- Recognize and use literal equations.
- Convert literal equations to highlight a specific variable.
- Convert between standard and slope-intercept form.
- Recognize the value of standard and slope-intercept form.

### Section 3.4: Combining Linear Equations
- Write linear functions using the Distributive Property.
- Write and analyze a linear function as a combination of multiple linear functions.
- Interpret and understand component parts of functions.
- Analyze problem situations modeled by a combination of multiple linear functions.

## Chapter 4: Sequences
This chapter introduces students to sequences, and then focuses student attention on arithmetic and geometric sequences. Students then use recursive and explicit formulas to determine subsequent terms of a sequence. The relationship between arithmetic sequences and linear functions and some geometric sequences and exponential functions is developed.

### Section 4.1: Recognizing Patterns and Sequences
- Recognize patterns.
- Describe patterns.
- Represent patterns as sequences.
- Predict the next term in a sequence.

### Section 4.2: Arithmetic and Geometric Sequences
- Determine the next term in a sequence.
- Recognize arithmetic sequences.
- Determine the common difference.
- Recognize geometric sequences.
- Determine the common ratio.

### Section 4.3: Using Formulas to Determine Terms of a Sequence
- Write an explicit formula for arithmetic and geometric formulas.
- Write a recursive formula for arithmetic and geometric formulas.
- Use formulas to determine unknown terms of a sequence.
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| 4.4     | Graphs of Sequences | 2    | • Graph arithmetic sequences.  
• Graph geometric sequences.  
• Recognize graphical behavior of sequences.  
• Sort sequences that are represented graphically. | 912.F-IF.1.1  
912.F-IF.2.4  
912.F-LE.1.2 |
| 4.5     | Sequences and Functions | 1    | • Write an arithmetic sequence as a linear function.  
• Make the connection between the graph of an arithmetic sequence, and the graph of a linear function.  
• Write a geometric sequence as an exponential function.  
• Make the connection between the graph of a geometric sequence, and the graph of an exponential function.  
• Contrast an exponential function and a geometric sequence with a negative common ratio. | 912.F-IF.1.1  
912.F-IF.1.2  
912.F-IF.1.3  
912.F-BF.1.1  
912.F-LE.1.1  
912.F-LE.1.2  
912.F-LE.2.5  
912.F-BF.1.2 |

**Chapter 5: Exponential Functions**

This chapter examines the graphical behavior of exponential functions, including intercepts, domain and range, intervals of increase or decrease, and asymptotes. Students also explore the transformations of exponential functions. The chapter then introduces students to the relationship between rational exponents and radical form. Students will learn the strategy to use common bases to solve simple exponential equations algebraically.

| 5.1     | Comparing Linear and Exponential Functions | 1    | • Construct and identify linear and exponential functions from sequences.  
• Compare graphs, tables, and equations of linear and exponential functions.  
• Construct a linear function from an arithmetic sequence.  
• Construct an exponential function from a geometric sequence.  
• Compare formulas for simple interest and compound interest. | 912.A-SSE.1.1  
912.A-CED.1.1  
912.F-IF.1.3  
912.F-IF.2.6  
912.F-BF.1.1  
912.F-LE.1.1  
912.F-LE.1.2  
912.F-LE.1.3  
912.F-LE.2.5  
912.F-IF.3.7  
912.F-BF.1.2 |
| 5.2     | Graphs of Exponential Functions. | 2    | • Solve exponential functions using the intersection of graphs.  
• Analyze asymptotes of exponential functions and their meanings in context.  
• Identify the domain and range of exponential functions.  
• Analyze and graph decreasing exponential functions.  
• Compare graphs of linear and exponential functions through intercepts, asymptotes, and end behavior. | 912.A-SSE.1.1  
912.A-CED.1.1  
912.A-REI.4.11  
912.F-IF.2.4  
912.F-LE.1.2  
912.F-LE.2.5  
912.F-IF.3.7 |
| 5.3     | Translations of Linear and Exponential Functions | 2    | • Translate linear and exponential functions vertically.  
• Translate linear and exponential functions horizontally. | 912.A-REI.4.10  
912.F-BF.2.3  
912.F-LE.1.2 |
| 5.4     | Reflections of Linear and Exponential Functions | 2    | • Reflect linear and exponential functions vertically.  
• Reflect linear and exponential functions horizontally.  
• Determine characteristics of graphs after transformations. | 912.A-REI.4.10  
912.F-IF.2.4  
912.F-LE.1.2 |
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<td>Properties of Rational Exponents</td>
<td>1</td>
<td>• Simplify expressions with negative exponents.</td>
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<td>• Simplify expressions with rational exponents.</td>
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<tr>
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<td>• Write negative powers as positive powers.</td>
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<td>• Write rational powers using radicals.</td>
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<td>• Find the nth root of a number.</td>
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<td>• Write an expression in radical form.</td>
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<td>5.6</td>
<td>Solving Exponential Functions</td>
<td>1</td>
<td>• Use multiple representations to model exponential functions.</td>
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<td>• Understand the properties of exponent expressions with positive and negative exponents.</td>
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<td>• Solve exponential functions graphically and algebraically using common bases and properties of exponents.</td>
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<td>• Investigate increasing and decreasing exponential functions.</td>
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<td></td>
<td>• Model inequalities in exponential situations.</td>
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<td>• Use technology to graph, analyze, and solve exponential functions.</td>
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### Chapter 6: Systems of Equations

This chapter focuses on solving systems of linear equations graphically and algebraically using the substitution method and the linear combinations method.

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<td>Solving Linear Systems Graphically and Algebraically</td>
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<td>• Write systems of linear equations.</td>
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<td>• Graph systems of linear equations.</td>
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<td>• Determine the intersection point, or break-even point, from a graph.</td>
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<td>• Use the substitution method to determine the intersection point.</td>
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<td>• Understand that systems of equations can have one, zero, or infinite solutions.</td>
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<td>6.2</td>
<td>Using Linear Combinations to Solve a Linear System</td>
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<td>• Write a system of equations to represent a problem context.</td>
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<td>• Solve a system of equations algebraically using linear combinations (elimination).</td>
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<td>6.3</td>
<td>Solving More Systems</td>
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<td>• Write a linear system of equations to represent a problem context.</td>
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<td>• Solve a linear system of equations using the linear combinations method.</td>
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<td>6.4</td>
<td>Using Graphing, Substitution, and Linear Combinations</td>
<td>1</td>
<td>• Use various methods of solving systems of linear equations to determine the better paying job.</td>
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<td>• Use various methods of solving systems of linear equations to determine the better buy.</td>
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### Chapter 7: Systems of Inequalities

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<td>Graphing Inequalities</td>
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<td>• Write an inequality in two variables.</td>
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<td></td>
<td>• Graph an inequality in two variables.</td>
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<td>• Determine which type of line on a graph represents a given inequality.</td>
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<td>• Interpret the solutions of inequalities mathematically and contextually.</td>
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</table>
| 7.2     | Systems of Linear Inequalities | 2    | • Write and graph systems of linear inequalities.  
• Determine solutions to systems of linear inequalities.  
• Algebraically prove solutions and non-solutions of systems of linear inequalities.  
• Graph systems of linear inequalities using a graphing calculator. | 912.A-CED.1.3  
| 7.3     | Systems with More Than Two Linear Inequalities | 1    | • Solve systems of linear inequalities.  
• Maximize linear expressions on a region in the coordinate plane. | 912.A-CED.1.3  
| 7.4     | Linear Programming | 1    | • Write systems of inequalities with more than two inequalities.  
• Determine constraints from a problem situation.  
• Graph systems of linear inequalities and determine the solution set.  
• Identify the maximum and minimum values of a linear expression. | 912.A-CED.1.3  

### Chapter 8: Analyzing Data Sets for One Variable

This chapter reviews data analysis of data sets with one variable. Students first learn to represent data graphically through dot plots, histograms, and box-and-whisker plots. The chapter leads students to determining measures of center for a data set, determining any outliers in a data set, and determining the interquartile range (IQR) and standard deviation for data sets.

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</table>
| 8.1     | Graphically Representing Data | 2    | • Represent and interpret data displayed on dot plots.  
• Represent and interpret data displayed on histograms.  
• Represent and interpret data displayed on box-and-whisker plots. | 912.S-ID.1.1 |
| 8.2     | Determining the Best Measure of Center for a Data Set | 1    | • Calculate and interpret the mean of a data set.  
• Calculate and interpret the median of a data set.  
• Estimate the mean and median of a data set from its data distribution.  
• Determine which measure of central tendency (mean or median) is best to use for a data set. | 912.S-ID.1.1  
912.S-ID.1.2  
912.S-ID.1.3 |
| 8.3     | Calculating IQR and Identifying Outliers | 1    | • Calculate and interpret the interquartile range (IQR) of a data set.  
• Determine if a data set contains outliers. | 912.S-ID.1.1  
912.S-ID.1.2  
912.S-ID.1.3 |
| 8.4     | Calculating and Interpreting Standard Deviation | 2    | • Calculate and interpret the standard deviation of a data set.  
• Compare the standard deviation of data sets. | 912.S-ID.1.1  
912.S-ID.1.2  
912.S-ID.1.3 |
| 8.5     | Analyzing and Interpreting Data | 1    | • Analyze and interpret data graphically and numerically.  
• Determine which measure of central tendency and spread is most appropriate to describe a data set. | 912.S-ID.1.1  
912.S-ID.1.2  
912.S-ID.1.3 |

### Chapter 9: Correlation and Residuals

This chapter introduces the method of least squares to determine a linear regression line of a data set. The chapter then progresses to provide opportunities to determine the correlation coefficient of a data set by both pencil-and-paper and by using a graphing calculator. Then the chapter exposes students to residuals of a data set in which they will make determinations about which function type might be represent a data set. Finally, the chapter introduces students to causation and correlation.
Chapter 10: Analyzing Data Sets for Two Categorical Variables

This chapter introduces categorical data as opposed to numerical data students have encountered in the previous two chapters. Students learn how to organize data from a data table, determine the relative frequency distributions of a data set, determine the relative frequency conditional distribution, and finally to analyze categorical data to problem solve and make decisions.

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<tbody>
<tr>
<td>10.1</td>
<td>Interpreting Frequency Distributions</td>
<td>1</td>
<td>• Construct and interpret frequency and frequency marginal distributions displayed in two-way tables for two-variable categorical data.</td>
<td>912.S-ID.2.5</td>
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<td>• Create and interpret graphs of frequency distributions displayed in two-way tables.</td>
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<td>10.2</td>
<td>Relative Frequency Distribution</td>
<td>1</td>
<td>• Construct and interpret relative frequency distribution and relative frequency marginal distributions displayed in two-way tables for categorical data.</td>
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<td>• Analyze and use relative frequency marginal distributions to make decisions for a problem situation.</td>
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<tr>
<td>10.3</td>
<td>Relative Frequency Conditional</td>
<td>1</td>
<td>• Construct and interpret relative frequency conditional distributions displayed in two-way tables for categorical data.</td>
<td>912.S-ID.2.5</td>
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<td>Distribution</td>
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<td>10.4</td>
<td>Drawing Conclusions from Data</td>
<td>1</td>
<td>• Analyze different categorical data.</td>
<td>912.S-ID.2.5</td>
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<tr>
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<td></td>
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<td>• Use categorical data to make decisions.</td>
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Chapter 11: Introduction to Quadratic Functions

This chapter examines the graphical behavior of quadratic functions, including domain, range, increasing and decreasing, absolute maximum and absolute minimum, symmetry, and zeros. The relationship between the form of a quadratic function and the graph of a quadratic function is discussed, especially the key graphical characteristics identified from the form of the quadratic function. Transformations and dilations of quadratic functions are explored.
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</table>
| 11.1    | Exploring Quadratic Functions | 1   | • Model real-world problems using quadratic functions.  
• Analyze tables, graphs, and equations for quadratic functions.  
• Use the Distributive Property to write a quadratic equation in standard form.  
• Compare graphs of quadratic functions.  
• Use a graphing calculator to determine the absolute minimum or absolute maximum of a quadratic function. | 912.A-CED.1.1  
912.A-CED.1.2  
912.F-IF.2.4 |
| 11.2    | Comparing Linear and Quadratic Functions | 2   | • Identify linear and quadratic functions from multiple representations.  
• Compare graphs, tables, and equations for linear and quadratic functions.  
• Analyze graphs of linear and quadratic functions.  
• Determine if a function is linear or quadratic by analyzing the first and second differences | 912.A-SSE.1.1  
912.A-CED.1.1  
912.A-CED.1.2  
912.F-IF.2.4  
912.F-IF.2.6  
912.F-LE.1.1 |
| 11.3    | Domain, Range, Zeros, and Intercepts | 1   | • Describe the domain and range of quadratic functions.  
• Determine the x-intercept(s) of a graph of a quadratic function.  
• Understand the relationship of the zeros of a quadratic function and the x-intercepts of its graph.  
• Analyze quadratic functions to determine intervals of increase and decrease.  
• Solve a quadratic function graphically. | 912.A-SSE.1.1  
912.A-CED.1.1  
912.A-CED.1.2  
912.F-IF.2.4  
912.F-IF.3.7a |
| 11.4    | Factored Form of a Quadratic Function | 2   | • Factor the greatest common factor from an expression.  
• Write a quadratic function in factored form.  
• Determine the x-intercepts from a quadratic function written in factored form.  
• Determine an equation of a quadratic function given its x-intercepts. | 912.A-SSE.1.1  
912.A-SSE.2.3  
912.A-CED.1.1  
912.A-CED.1.2  
912.F-IF.2.4  
912.F-IF.3.7a |
| 11.5    | Investigating the Vertex of a Quadratic Function | 1   | • Interpret parts of a quadratic function in terms of a problem situation.  
• Use a calculator to determine the x-intercept(s), y-intercept, and absolute maximum or minimum of a quadratic function.  
• Solve a quadratic function graphically.  
• Determine the vertex of a quadratic function.  
• Use symmetric points to determine the location of the vertex of a parabola.  
• Use the vertex to determine symmetric points on a parabola. | 912.A-SSE.1.1  
912.F-IF.2.4  
912.F-IF.3.7a |
## Chapter 12: Polynomials and Quadratics

This chapter introduces operations with polynomials, including factoring quadratic trinomials. Quadratic equations are solved graphically, by factoring, and by completing the square.

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</table>
| 11.6    | Vertex Form of a Quadratic Function | 2 | • Determine key characteristics of parabolas using a graphing calculator.  
• Determine key characteristics of parabolas given their equations in standard form.  
• Determine key characteristics of parabolas given their equations in factored form.  
• Determine key characteristics of parabolas given their equations in vertex form.  
• Write equations of parabolas given key characteristics of their graphs. | 912.A-SSE.1.1  
912.F-IF.2.4  
912.F-IF.3.7 |
| 11.7    | Transformations of Quadratic Functions | 2 | • Translate quadratic functions.  
• Reflect quadratic functions.  
• Dilate quadratic functions.  
• Write equations of quadratic functions given multiple transformations.  
• Graph quadratic functions given multiple transformations.  
• Identify multiple transformations given equations of quadratic functions | 912.F-BF.2.3  
912.F-IF.3.7a |

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</table>
| 12.1    | Adding and Subtracting Polynomials | 2 | • Recognize polynomial expressions.  
• Identify monomials, binomials, and trinomials.  
• Identify the degree of a term and the degree of a polynomial.  
• Write polynomial expressions in standard form.  
• Add and subtract polynomial expressions.  
• Graph polynomial functions and understand the connection between the graph of the solution and the algebraic solution. | 912.A-SSE.1.1  
912.A-APR.1.1  
912.A-CED.1.1  
912.A-CED.1.2  
912.F-BF.1.1 |
| 12.2    | Multiplying Polynomials | 1 | • Model the multiplication of a binomial by a binomial using algebra tiles.  
• Use multiplication tables to multiply binomials.  
• Use the Distributive Property to multiply polynomials. | 912.A-APR.1.1 |
| 12.3    | Factoring Polynomials | 2 | • Factor polynomials by determining the greatest common factor.  
• Factor polynomials by using multiplication tables. | 912.A-SSE.2.3  
912.A-APR.1.1 |
| 12.4    | Solving Quadratics by Factoring | 1 | • Solve quadratic equations and functions using factoring.  
• Connect the zeros of a function to the x-intercepts of a graph.  
• Determine the roots of quadratic equations. | 912.A-SSE.2.3  
912.A-REI.2.4 |
| 12.5    | Special Products | 1 | • Identify and factor the difference of two squares.  
• Identify and factor perfect square trinomials.  
• Solve quadratic equations and functions using factoring.  
• Identify and factor the difference of two cubes.  
• Identify and factor the sum of cubes | 912.A-SSE.1.2  
912.A-SSE.2.3 |
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</table>
| 12.6    | Approximating and Rewriting Radicals | 1    | • Determine the square root of perfect squares.  
• Determine the approximate square root of given values.  
• Determine the exact value of a square root of given values.  
• Rewrite radicals by extracting perfect squares. | 912.N-RN.1.2  
912.A-CED.1.1  
912.A-REI.2.4 |
| 12.7    | Completing the Square | 2    | • Determine the roots of a quadratic equation by completing the square.  
• Complete the square geometrically and algebraically. | 912.A-SSE.2.3  
912.A-REI.2.4 |

**Chapter 13: Solving Quadratic Equations and Inequalities**

This chapter introduces the quadratic formula and emphasizes choosing an appropriate method to solve quadratic equations. Quadratic inequalities are solved using a coordinate plane, and then an algebraic strategy is introduced. Systems of equations involving one or more quadratic equations are solved.

| 13.1    | The Quadratic Formula | 2    | • Use the Quadratic Formula to determine roots and zeros.  
• Derive the Quadratic Formula from a quadratic equation written in standard form.  
• Use the discriminant of a Quadratic Formula to determine the number of roots or zeros.  
• Determine the most efficient method of calculating roots or zeros | 912.A-CED.1.1  
912.A-CED.1.2  
912.A-REI.2.4 |
| 13.2    | Using a Calculator-Based Ranger to Model Quadratic Motion | 2    | • Predict the graph of a ball being tossed.  
• Use a calculator-based ranger (CBR) to graph the trajectory of an item.  
• Attempt to replicate a trajectory that is very similar to the graph of a quadratic function | 912.A-REI.2.4  
912.F-IF.3.7 |
| 13.3    | Solving Quadratic Inequalities | 1    | • Use the Quadratic Formula to solve quadratic inequalities. | 912.A-CED.1.1  
912.A-CED.1.2  
912.A-REI.2.4 |
| 13.4    | Systems of Quadratic Equations | 1    | • Solve systems of a linear equation and a quadratic equation.  
• Solve systems of two quadratic equations | 912.A-CED.1.1  
912.A-CED.1.2  
912.A-REI.3.7 |

**Chapter 14: Real Number System**

This chapter begins by reviewing the real number system and then move to introducing the imaginary and ultimately the complex number system. Using the powers of exponents rules, students discover the necessity of the number \( i \). This discovery leads to students exploring whether quadratic functions have one, two, or no real roots.

| 14.1    | The Numbers of the Real Number System | 1    | • Define sets of natural numbers, whole numbers, integers, rational numbers, irrational numbers, and real numbers.  
• Determine under which operations different sets of number are closed.  
• Create a Venn diagram to show how different number sets are related.  
• Determine which equations can be solved using different number sets.  
• Write repeating decimals as fractions. | 912.N-RN.2.3 |
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| 14.2    | Real Number Properties | 1 | • Learn set notation.  
• Make statements about real number properties using set notation.  
• Identify the properties of the real number system including: commutative, associative, distributive, additive identity, multiplicative identity, additive inverse, and multiplicative inverse. | 912.N-RN.2.3 |
| 14.3    | Imaginary and Complex Numbers | 1 | • Determine powers of i.  
• Simplify expressions involving imaginary numbers.  
• Understand properties of the set of complex numbers.  
• Determine the number sets to which numbers belong. | 912.N-RN.1.1  
912.N-RN.1.2 |
| 14.4    | Solving Quadratics with Complex Solutions | 2 | • Calculate complex roots of quadratic equations and complex zeros of quadratic functions.  
• Interpret complex roots of quadratic equations and complex zeros of quadratic functions.  
• Determine whether a function has complex solutions from a graph and from an equation in radical form.  
• Determine the number of roots of a quadratic equation from a graph and from an equation in radical form. | 912.A-REI.2.4 |

Chapter 15: Other Functions and Inverses

This chapter focuses on piecewise functions, absolute value functions, and step functions. Inverses of linear functions are introduced graphically, numerically, and algebraically, which is then extended to include non-linear functions.

| 15.1    | Linear Piecewise Functions | 1 | • Create graphs of linear piecewise functions.  
• Write linear piecewise functions from scenarios, tables, and graphs.  
• Compare a linear absolute value function to a linear piecewise function. | 912.F-IF.2.4  
912.F-IF.2.5  
912.F-IF.3.7b |
| 15.2    | Step Functions | 1 | • Write and graph step function problem situations.  
• Analyze the graphs of step functions.  
• Use technology to graph a step function. | 912.F-IF.2.4  
912.F-IF.2.5  
912.F-IF.3.7b |
| 15.3    | Inverses of Linear Functions | 2 | • Determine the inverse of a given situation using words.  
• Determine the inverse of a function numerically using a table.  
• Determine the inverse of a function using algebra.  
• Determine the inverse of a function using graphical representations.  
• Calculate compositions of functions.  
• Use compositions of functions to determine whether functions are inverses. | 912.A-CED.1.1  
912.A-CED.1.4  
912.F-IF.1.1  
912.F-IF.1.2  
912.F-BF.1.1  
912.F-BF.2.4 |
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| 15.4    | Inverses of Non-Linear Functions | 1    | • Determine the inverse of a linear or non-linear function using a table of values.  
• Determine the inverse of a linear or non-linear function using a graph.  
• Determine whether given functions are one-to-one functions.  
• Identify types of functions that are always, sometimes, or never one-to-one functions.  
• Determine the equation of the inverse of a quadratic function.  
• Determine the inverse of a quadratic function in terms of a problem situation. | 912.A-CED.1.4  
912.F-IF.1.1  
912.F-IF.1.2  
912.F-IF.2.5  
912.F-IF.3.7  
912.F-BF.2.4 |

**Chapter 16: Mathematical Modeling**

This chapter presents opportunities to model real-world data using linear, exponential, quadratic, and piecewise functions. The focus is on determining the appropriate function or functions for a given data set.

| 16.1    | Modeling Using Exponential Functions | 1    | • Write exponential models from data sets.  
• Use models to solve problems. | 912.F-IF.2.4  
912.F-IF.2.5  
912.F-BF.1.1  
912.F-LE.1.1  
912.F-LE.1.2  
912.F-IF.3.7  
912.F-BF.2.4 |
| 16.2    | Modeling Stopping Distances and Reaction Times | 1    | • Use a function to model a problem situation.  
• Interpret characteristics of a function in terms of a problem situation.  
• Interpret the inverse of a function in terms of a problem situation.  
• Compare graphs of functions.  
• Interpret the graphs of functions in terms of a problem situation.  
• Analyze results to write a report. | 912.F-IF.2.4  
912.F-IF.2.5  
912.F-BF.1.1  
912.F-LE.1.1  
912.F-LE.1.2  
912.F-IF.3.7  
912.F-BF.2.4 |
| 16.3    | Using Quadratic Functions to Model Data | 1    | • Use quadratic functions to model data.  
• Use graphs of quadratic functions to make predictions.  
• Determine whether predicted values make sense in terms of various problem situations. | 912.F-IF.2.4  
912.F-IF.2.5  
912.F-BF.1.1  
912.F-LE.1.1  
912.F-LE.1.2  
912.F-IF.3.7  
912.F-BF.2.4 |
| 16.4    | Choosing a Function to Model BAC | 2    | • Determine the type of regression equation that best fits a graph.  
• Use a function to model a problem situation.  
• Interpret characteristics of a function in terms of a problem situation.  
• Analyze results to write a report. | 912.F-IF.2.4  
912.F-IF.2.5  
912.F-BF.1.1  
912.F-LE.1.1  
912.F-LE.1.2  
912.F-IF.3.7  
912.F-BF.2.4 |
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<tr>
<td>16.5</td>
<td>Modeling with Piecewise Functions</td>
<td>2</td>
<td>• Write a scenario to model a graph.</td>
<td>912.F-IF.2.4</td>
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<td>• Determine a linear piecewise function to model a graph.</td>
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<td>• Interpret parts of a graph in terms of a problem situation.</td>
<td>912.F-BF.1.1</td>
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<td>• Determine a non-linear piecewise function to model data.</td>
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<td>• Graph a non-linear piecewise function to model a problem situation.</td>
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<td>• Determine intervals for a non-linear piecewise function to best model data.</td>
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