

# Pre-Algebra

UNIT TITLE	CORE TOPICS (Key Concepts & Real World Context)	MATH BENCHMARKS	MATH DISTRICT BENCHMARKS
<b>CHAPTER 1</b> <b>Algebraic</b> <b>Expressions and</b> <b>Integers</b>	1. Variables and Expressions 2. Order of Operations 3. Evaluating Expressions 4. Integers and Absolute Value 5. Adding Integers 6. Subtracting Integers 7. Inductive Reasoning 8. Look For A Pattern 9. Multiplying and Dividing Integers 10. Coordinate Plane		<p><b>V-1-3 (H)</b> Describe the properties of operations with numbers, algebraic expressions, vectors and matrices, and make generalizations about the properties of given mathematical systems. (M.S. V-1-1)</p> <p><b>V-2-1 (H)</b> Identify important variables in a context, symbolize them and express their relationships algebraically. (M.S. V-2-1)</p> <p><b>V-1-4 (H)</b> Efficiently and accurately apply operations with real numbers, complex numbers, algebraic expressions, matrices and vectors in solving problems. (M.S. V-1-4, V-1-3)</p> <p><b>III-3-2 (H)</b> Design investigations to model and solve problems; also employ confidence intervals and curve fitting in analyzing the data.</p> <p><b>IV-1-1 (H)</b> Develop an understanding of irrational, real and complex numbers.</p> <p><b>IV-1-4 (H)</b> Apply their understanding of number systems to model, and solve mathematical and applied problems.</p> <p><b>IV-2-1 (H)</b> Give decimal representations of rational and irrational numbers and coordinate and vector representations of complex numbers.</p> <p><b>I-1-1 (H)</b> Analyze and generalize mathematical patterns including sequences, series, and recursive patterns. (M.S. I-1-1)</p>

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			<p><b>I-1-2 (H)</b> Analyze, interpret, and translate among representations of patterns including tables, charts, graphs, matrices, and vectors. (M.S. I-1-2)</p> <p><b>I-1-3 (H)</b> Study and employ mathematical models of patterns to make inference, predictions and decisions. (M.S. I-1-3)</p> <p><b>I-1-4 (H)</b> Explore patterns (graphic, numeric, etc.) characteristic of families of functions; explore structural patterns within systems of objects, operations or relations. (M.S. I-1-4)</p> <p><b>I-1-5 (H)</b> Use patterns and reasoning to solve problems and explore new content. (M.S. I-1-5)</p> <p><b>II-2-1 (H)</b> Locate and describe objects in terms of their position, including polar coordinates, three-dimensional Cartesian coordinates, vectors and limits. (M.S. II-2-1)</p>
<p><b>CHAPTER 2</b> <b>Solving One-Step Equations and Inequalities</b></p>	<ol style="list-style-type: none"> <li>1. Properties of Numbers</li> <li>2. Distributive Property</li> <li>3. Simplifying Variable Expressions</li> <li>4. Variables and Equations</li> <li>5. Solving Equations by Adding and Subtracting</li> <li>6. Solving Equations by Multiplying and Dividing</li> <li>7. Try, Test, and Revise</li> <li>8. Inequalities and Their Graphs</li> </ol>		<p><b>IV-1-4 (H)</b> Apply their understanding of number systems to model, and solve mathematical and applied problems.</p> <p><b>V-1-3 (H)</b> Describe the properties of operations with numbers, algebraic expressions, vectors and matrices, and make generalizations about the properties of given mathematical systems. (M.S. V-1-1, V-1-3)</p> <p><b>V-1-1 (H)</b> Present and explain geometric and symbolic models for operations with real and complex numbers and algebraic expressions. (M.S. V-1-1)</p> <p><b>V-1-2 (H)</b></p>

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	9. Solving One-Step Inequalities by Adding and Subtracting  10. Solving One-Step Inequalities by Multiplying and Dividing		<p>Computer with real numbers, complex numbers, algebraic expressions, matrices and vectors using technology and for simple instance, with paper-and-pencil algorithms. (M.S. V-1-2, V-1-4)</p> <p><b>V-2-1 (H)</b> Identify important variables in a context, symbolize them and express their relationships algebraically. (M.S. V-2-1)</p> <p><b>V-2-2 (H)</b> Represent algebraic concepts and relationships with matrices, spreadsheets, diagrams, graphs, tables, physical models, vectors, equations, and inequalities; and translate among the various representations. (M.S. V-2-2)</p> <p><b>V-2-3 (H)</b> Solve linear equations and inequalities algebraically and non-linear equations using graphing, symbol-manipulating or spreadsheet technology; and solve linear and non-linear systems using appropriate methods. (M.S. V-2-3)</p> <p><b>V-2-4 (H)</b> Analyze problems that can be modeled by functions, determine strategies for solving the problems and evaluate the adequacy of the solutions in the context of the problems. (M.S. V-2-4)</p>
<b>CHAPTER 3 Decimals and Equations</b>	1. Rounding and Estimating  2. Estimating Products and Quotients  3. Mean, Median, Mode  4. Using Formulas  5. Solving Equations by Adding and Subtracting Decimals  6. Solving Equations by Multiplying and Dividing Decimals		<p><b>IV-2-4 (H)</b> Apply estimation in increasingly complex situations (M.S. IV-2-4)</p> <p><b>III-1-1 (H)</b> Collect and explore data through observation, measurement, surveys, sampling techniques and simulations. (M.S. III-1-1)</p> <p><b>III-1-2 (H)</b> Organize data using tables, charts, graphs,</p>

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	7. Using the Metric System  8. Simplify the Problem		<p>spreadsheets and data bases. (M.S. III-1-2)</p> <p><b>III-1-3 (H)</b> Present data using the most appropriate representation and give a rationale for their choice; show how certain representation may skew the data or bias the presentation (III-1-3)</p> <p><b>III-1-4 (H)</b> Identify what data are needed to answer a particular question or solve a given problem and design and implement strategies to obtain, organize, and present those data. (III-1-4)</p> <p><b>III-2-1 (H)</b> Critically read data from tables, charts or graphs and explain the source of the data and what the data represent (III-2-1)</p> <p><b>III-2-2 (H)</b> Describe the shape of a data distribution and determine measures of central tendency, variability and correlation. (M.S. III-2-2)</p> <p><b>III-2-3 (H)</b> Use the data and their characteristics to draw and support conclusions. (M.S. III-2-3)</p> <p><b>V-2-3 (H)</b> Solve linear equations and inequalities algebraically and non-linear equations using graphing, symbol-manipulating or spreadsheet technology; and solve linear and non-linear systems using appropriate methods. (M.S. V-2-3)</p> <p><b>IV-3-5 (H)</b> Apply their understanding of number relationships in solving problems.</p> <p><b>V-2-4 (H)</b> Analyze problems that can be modeled by functions, determine strategies for solving the problems and evaluate the adequacy of the solutions in the context</p>

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			<p>of the problems. (M.S. V-2-4)</p> <p><b>V-2-5 (H)</b> Explore problems that reflect the contemporary uses of mathematics in significant contexts and use the power of technology and algebraic and analytic reasoning to experience the ways mathematics is used in society. (M.S. V-2-5)</p> <p><b>II-3-1 (H)</b> Select and use appropriate tools; make accurate measurements using both metric and common units, and measure angles in degrees and radians. (M.S. II-3-1)</p> <p><b>II-3-2 (H)</b> Continue to make and apply measurements of length, mass (weight), time, temperature, area, volume, angle; classify objects according to their dimensions. (M.S. II-3-2)</p> <p><b>II-3-3 (H)</b> Estimate measures with a specified degree of accuracy and evaluate measurements for accuracy, precision, and tolerance. (M.S. II-3-3)</p> <p><b>II-3-6 (H)</b> Apply measurement to describe the real world to solve problems.</p>
<p><b>CHAPTER 4</b> <b>Factors, Fractions, and Exponents</b></p>	<ol style="list-style-type: none"> <li>1. Divisibility and Factors</li> <li>2. Exponents</li> <li>3. Prime Factorization and Greatest Common Factor</li> <li>4. Simplifying Fractions</li> <li>5. Account For All Possibilities</li> <li>6. Rational Numbers</li> </ol>		<p><b>IV-3-3 (H)</b> Extend the relationships of primes, factors, multiples and divisibility in an algebraic setting.</p> <p><b>IV-3-4 (H)</b> Express number relationships using positive and negative rational exponents, logarithms and radicals.</p> <p><b>IV-2-2 (H)</b> Developing an understanding of more complex representations of numbers, including exponential and logarithmic expressions, and select an appropriate</p>

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	7. Exponents and Multiplication 8. Exponents and Division 9. Scientific Notation		<p>representation to facilitate problem solving.</p> <p><b>IV-3-1 (H)</b> Compare and order real numbers and compare rational approximations to exact values.</p> <p><b>IV-3-2 (H)</b> Extend the relationships of primes, factors, multiples and divisibility in an algebraic setting.</p> <p><b>V-2-5 (H)</b> Explore problems that reflect the contemporary uses of mathematics in significant contexts and use the power of technology and algebraic and analytic reasoning to experience the ways mathematics is used in society. (M.S. V -2-5)</p> <p><b>IV-1-1 (M.S.)</b> Describe the difference between rational and irrational numbers (e.g. use technology to show that some numbers (rational) can be expressed as terminating or repeating decimals and or repeating decimals and others (irrational) as non-terminating and non-repeating decimals.</p> <p><b>IV-1-2 (M.S.)</b> Use scientific notation to express large numbers and small numbers between 0 and 1.</p> <p><b>IV-3-5 (H)</b> Apply their understanding of number relationships in solving problems.</p>
<b>CHAPTER 5</b> <b>Operations With</b> <b>Fractions</b>			<p><b>I-1-4 (H)</b> Explore patterns (graphic, numeric, etc.) characteristic of families of functions; explore structural patterns within systems of objects, operations or relations. (M.S. I-1-4)</p>

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			<p><b>I-1-5 (H)</b> Use patterns and reasoning to solve problems and explore new content. (M.S. I-1-5)</p> <p><b>IV-1-1 (H)</b> Develop an understanding of irrational, real and complex numbers.</p> <p><b>II-3-1 (H)</b> Select and use appropriate tools; make accurate measurements using both metric and common units, and measure angles in degrees and radians. (M.S. II-3-1)</p> <p><b>II-3-2 (H)</b> Continue to make and apply measurements of length, mass (weight), time, temperature, area, volume, angle; classify objects according to their dimensions. (M.S. II-3-2)</p> <p><b>II-3-3 (H)</b> Estimate measures with a specified degree of accuracy and evaluate measurements for accuracy, precision, and tolerance. (M.S. II-3-3)</p> <p><b>II-3-6 (H)</b> Apply measurement to describe the real world and to solve problems. (M.S. II-3-6)</p> <p><b>IV-3-1 (H)</b> Compare and order real numbers and compare rational approximations to exact values.</p> <p><b>IV-2-4 (H)</b> Apply estimation in increasingly complex situations. (M.S. IV-2-4)</p> <p><b>IV-2-3 (H)</b> Determine an understanding of more complex representations of numbers, including exponential and logarithmic expressions, and select an appropriate representation to facilitate problem solving. (M.S. IV-2-3)</p>

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<p><b>CHAPTER 6</b> <b>Ratios, Proportions, and Percents</b></p>			<p><b>I-2-1 (H)</b> Identify and describe the nature of change and begin to use more formal language, such as: rate of change, continuity, limit, distribution and deviation.</p> <p><b>III-1-1 (H)</b> Collect and explore data through observation, measurement, surveys, sampling techniques and simulations.</p> <p><b>II-3-6 (H)</b> Apply measurement to describe the real world and to solve problems.</p> <p><b>II-3-5 (H)</b> Use proportional reasoning and indirect measurements, including applications of trigonometric ratios, to measure inaccessible distances and to determine derived measures, such as density.</p> <p><b>II-1-6 (H)</b> Compare and analyze shapes and formally establish the relationships among them, including: congruence, similarity, parallelism, perpendicularity, and incidence.</p> <p><b>III-1-2 (H)</b> Organize data using tables, charts, graphs, spreadsheets, and databases. (M.S. III-1-2)</p> <p><b>III-3-1 (H)</b> Make and test hypotheses.</p> <p><b>III-3-2 (H)</b> Design investigations to model and solve problems; also employ confidence intervals and curve fitting in analyzing the data.</p> <p><b>III-3-3 (H)</b> Formulate and communicate arguments and</p>

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			<p>conclusions based on data and evaluate their arguments and those of others.</p> <p><b>III-3-4 (H)</b> Make predictions and decisions based on data, including interpolations and extrapolations.</p> <p><b>III-3-5 (H)</b> Employ investigations, mathematical models, and simulations to make inferences and predictions to answer questions and solve problems.</p> <p><b>IV-2-1 (H)</b> Give decimal representations of rational and irrational numbers and coordinate and vector representations of complex numbers.</p> <p><b>VI-1-1 (H)</b> Develop an understanding of randomness and chance variation and describe chance and certainty in the language of probability.</p> <p><b>VI-1-2 (H)</b> Give a mathematical definition of probability and determine the probabilities of more complex events, and generate and interpret probability distributions.</p> <p><b>VI-1-3 (H)</b> Analyze events to determine their dependence or independence and calculate probabilities of compound events.</p> <p><b>VI-1-4 (H)</b> Use sampling and simulations to determine empirical probabilities; and, when appropriate, compare them to the corresponding theoretical probabilities; understand and apply the law of large numbers.</p> <p><b>VI-1-5 (H)</b> Conduct probability experiments and simulations to</p>

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			model and solve problems, including compound events.
<b>CHAPTER 7</b> <b>Solving Equations</b> <b>and Inequalities</b>			<p><b>V-1-1 (H)</b>  Present and explain geometric and symbolic models for operations with real and complex numbers and algebraic expressions. (M.S. V-1-1)</p> <p><b>V-1-2 (H)</b>  Compute with real numbers, complex numbers, algebraic expressions, matrices and vectors using technology and for simple instance, with paper-and-pencil algorithms. (M.S. V-1-2, V-1-4)</p> <p><b>V-1-3 (H)</b>  Describe the properties of operations with numbers, algebraic expressions, vectors and matrices, and make generalizations about the properties of given mathematical systems. (M.S. V-1-1)</p> <p><b>V-1-4 (H)</b>  Efficiently and accurately apply operations with real numbers, complex numbers, algebraic expressions, matrices, and vectors in solving problems. (M.S. V-1-4, V-1-3)</p> <p><b>V-2-1 (H)</b>  Identify important variables in a context, symbolize them and express their relationships algebraically. (M.S. V-2-1)</p> <p><b>V-2-2 (H)</b>  Represent algebraic concepts and relationships with matrices, spreadsheets, diagrams, graphs, tables, physical models, vectors, equations, and inequalities; and translate among the various representations. (M.S. V-2-2)</p> <p><b>V-2-3 (H)</b>  Solve linear equations and inequalities algebraically and non-linear equations using graphing, symbo-</p>

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			<p>manipulating or spreadsheet technology; and solve linear and non-linear systems using appropriate methods (M.S. V-2-3)</p> <p><b>V-2-4 (H)</b> Analyze problems that can be modeled by functions, determine strategies for solving the problems and evaluate the adequacy of the solutions in the context of the problems. (M.S. V-2-4)</p> <p><b>V-2-5 (H)</b> Explore problems that reflect the contemporary uses of mathematics in significant contexts and use the power of technology and algebraic and analytic reasoning to experience the ways mathematics is used in society. (M.S. V-2-5)</p>
<p><b>CHAPTER 8</b> <b>Linear Functions and Graphing</b></p>			<p><b>III-1-1 (H)</b> Collect and explore data through observation, measurement, surveys, sampling techniques and simulations.</p> <p><b>III-1-2 (H)</b> Organize data using tables, charts, graphs, spreadsheets and databases. (M.S. III-1-2)</p> <p><b>III-1-3 (H)</b> Present data using the most appropriate representation and give a rationale for their choice; show how certain representation may skew the data or bias the presentation. (III-1-3)</p> <p><b>III-1-4 (H)</b> Identify what data are needed to answer a particular question or solve a given problem and design and implement strategies to obtain, organize and present those data. (III-1-4)</p> <p><b>III-2-1 (H)</b> Critically read data from tables, charts or graphs and explain the source of the data and what the data represent. (III-2-1)</p>

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			<p><b>III-2-2 (H)</b> Describe the shape of a data distribution and determine measures of central tendency, variability and correlation. (M.S. III-2-2)</p> <p><b>III-2-3 (H)</b> Use the data and their characteristics to draw and support conclusions. (M.S. III.2-3)</p> <p><b>III-2-4 (H)</b> Critically question the sources of data; the techniques used to collect, organize and present data; the inferences drawn from the data; and the sources of bias and measures taken to eliminate such bias.</p> <p><b>III-3-4 (H)</b> Make predictions and decisions based on data, including interpolations and extrapolations.</p> <p><b>III-3-5 (H)</b> Employ investigations, mathematical models, and simulations to make inferences and predictions to answer questions and solve problems.</p> <p><b>I-1-4 (H)</b> Explore patterns (graphic, numeric, etc.) characteristic of families of functions; explore structural patterns within systems of objects, operations or relations. (M.S. I-1-4)</p> <p><b>I-2-2 (H)</b> Develop a mathematical concept of function and recognize that functions display characteristic patterns of change (e.g. linear, quadratic, exponential)</p> <p><b>I-2-4 (H)</b> Represent functions using symbolism, such as: matrices, vectors and functional representations <math>f(x)</math>.</p> <p><b>I-2-6 (H)</b> Increase their use of functions and mathematical</p>

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			<p>models to solve problems in context.</p> <p><b>II-2-2 (H)</b> Locate and describe objects in terms of their orientation and relative position, including displacement (vectors), phase shift, maxima, minima and inflection points; give precise mathematical descriptions of symmetries.</p> <p><b>II-2-3 (H)</b> Give precise mathematical descriptions of transformations and describe the effects of transformations on size, shape, position and orientation.</p> <p><b>II-1-6 (H)</b> Compare and analyze shapes and formally establish the relationships among them, including: congruence, similarity, parallelism, perpendicularity and incidence.</p> <p><b>II-1-7 (H)</b> Use shape, shape properties and shape relationships to describe the physical world and to solve problems.</p> <p><b>V-1-1 (H)</b> Present and explain geometric and symbolic models for operations with real and complex numbers and algebraic expressions. (M.S. V-1-1)</p> <p><b>V-1-2 (H)</b> Compute with real numbers, complex numbers, algebraic expressions, matrices and vectors using technology and for simple instance, with paper-and-pencil algorithms. (M.S. V-1-2, V-1-4)</p> <p><b>V-2-1 (H)</b> Identify important variables in a context, symbolize them and express their relationships algebraically. (M.S. V-2-1)</p> <p><b>V-2-2 (H)</b></p>

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			<p>Represent algebraic concepts and relationships with matrices, spreadsheets, diagrams, graphs, tables, physical models, vectors, equations and inequalities; and translate among the various representations. (M.S. V -2-2)</p> <p><b>V-2-3 (H)</b> Solve linear equations and inequalities algebraically and non-linear equations using graphing, symbol-manipulating or spreadsheet technology; and solve linear and non-linear systems using appropriate methods. (M.S. V -2-3)</p> <p><b>V-2-4 (H)</b> Analyze problems that can be modeled by functions, determine strategies for solving the problems and evaluate the adequacy of the solutions in the context of the problems. (M.S. V -2-4)</p> <p><b>V-2-5 (H)</b> Explore problems that reflect the contemporary uses of mathematics in significant contexts and use the power of technology and algebraic and analytic reasoning to experience the ways mathematics is used in society. (M.S. V -2-5)</p>
<p><b>CHAPTER 9</b> <b>Spatial Thinking</b></p>			<p><b>II-1-1 (H)</b> Use shape to identify plane and solid figures, graphs, loci, functions, and data distributions.</p> <p><b>II-1-2 (H)</b> Determine necessary and sufficient conditions for the existence of a particular shape and apply those conditions to analyze shapes.</p> <p><b>II-1-3 (H)</b> Use transformational, coordinate or synthetic methods to verify (prove) the generalizations they have made about properties of classes of shapes.</p>

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			<p><b>II-1-4 (H)</b> Draw and construct shapes in two and three dimensions and analyze and justify the steps of their constructions.</p> <p><b>II-1-5 (H)</b> Study transformations of shapes using isometrics, size transformations and coordinate mappings.</p> <p><b>II-1-6 (H)</b> Compare and analyze shapes and formally establish the relationships among them, including congruence, similarity, parallelism, perpendicularity and incidence.</p> <p><b>II-1-7 (H)</b> Use shape, shape properties and shape relationships to describe the physical world and to solve problems.</p> <p><b>II-2-1 (H)</b> Locate and describe objects in terms of their position, including polar coordinates, three-dimensional Cartesian coordinate, vectors and limits. (M.S. II-2-1)</p> <p><b>II-2-2 (H)</b> Locate and describe objects in terms of their orientation and relative position, including displacement (vectors), phase shift, maxima, minima and inflection points; give precise mathematical descriptions of symmetries.</p> <p><b>II-2-3 (H)</b> Give precise mathematical descriptions of transformations and describe the effects of transformations on size, shape, position and orientation.</p> <p><b>II-2-4 (H)</b> Describe the locus of a point by a rule or mathematical expression; trace the locus of a moving point.</p> <p><b>II-2-5 (H)</b> Use concepts of position, direction and physical world and to solve problems.</p>

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			<p><b>II-3-1 (H)</b> Select and use appropriate tools; make accurate measurements using both metric and common units, and measure angles in degrees and radians. (M.S. II-3-1)</p> <p><b>II-3-2 (H)</b> Continue to make and apply measurements of length, mass (weight), time, temperature, area, volume, angle; classify objects according to their dimensions. (M.S. II-3-2)</p> <p><b>II-3-3 (H)</b> Estimate measures with a specified degree of accuracy and evaluate measurements for accuracy, precision and tolerance. (M.S. II-3-3)</p> <p><b>II-3-6 (H)</b> Apply measurement to describe the real world and to solve problems.</p>
<p><b>CHAPTER 10</b> <b>Area and Volume</b></p>			<p><b>II-1-7 (H)</b> Use shape, shape properties, and shape relationships to describe the physical world and to solve problems.</p> <p><b>II-1-6 (H)</b> Compare and analyze shapes and formally establish the relationships among them, including congruence, similarity, parallelism, perpendicularity and incidence.</p> <p><b>II-1-4 (H)</b> Draw and construct shapes in two and three dimensions and analyze and justify the steps of their constructions.</p> <p><b>II-1-2 (H)</b></p>

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			<p>Determine necessary and sufficient conditions for the existence of a particular shape and apply those conditions to analyze shapes.</p> <p><b>II-1-1 (H)</b> Use shape to identify plane and solid figures, graphs, loci, functions, and data distributions.</p> <p><b>II-3-2 (H)</b> Continue to make and apply measurements of length, mass (weight), time, temperature, area, volume, angle; classify objects according to their dimensions. (M.S. II-3-2)</p> <p><b>II-3-6 (H)</b> Apply measurement to describe the real world and to solve problems.</p>
<p><b>CHAPTER 11</b> <b>Right Triangles in Algebra</b></p>			<p><b>I-1-5 (H)</b> Use patterns and reasoning to solve problems and explore new content. (M.S. I-1-5)</p> <p><b>I-1-4 (H)</b> Explore patterns (graphic, numeric, etc.) characteristic of families of functions; explore structural patterns within systems of objects, operations or relations. (M.S. I-1-4)</p> <p><b>I-1-3 (H)</b> Study and employ mathematical models of patterns to make inference, predictions, and decisions. (M.S. I-1-3)</p> <p><b>I-2-5 (H)</b> Differentiate and analyze classes of functions including</p>

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			<p>linear, power, quadratic, exponential, circular and trigonometric functions, and realize that many different situations can be modeled by a particular type of function.</p> <p><b>I-2-6 (H)</b> Increase their use of functions and mathematical models to solve problems in context.</p> <p><b>II-1-2 (H)</b> Determine necessary and sufficient conditions for the existence of a particular shape and apply those conditions to analyze shapes.</p> <p><b>II-3-5 (H)</b> Use proportional reasoning and indirect measurements, including applications of trigonometric ratios, to measure inaccessible distances and to determine derived measures such as density.</p> <p><b>II-3-6 (H)</b> Apply measurement to describe the real world and to solve problems.</p> <p><b>IV-1-1 (H)</b> Develop an understanding of irrational, real and complex numbers.</p> <p><b>IV-1-3 (H)</b> Develop an understanding of the properties of the real and complex number systems and of the properties of special numbers including <math>\pi</math>, <math>i</math>, <math>e</math>, and conjugates.</p> <p><b>IV-2-1 (H)</b> Give decimal representations of rational and irrational numbers and coordinate and vector representations of complex numbers.</p> <p><b>IV-3-4 (H)</b> Express number relationships using positive and negative rational exponents, logarithms and radicals.</p>

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			<p><b>IV-3-5 (H)</b> Apply their understanding of number relationships in solving problems.</p> <p><b>V-1-1 (H)</b> Present and explain geometric and symbolic models for operations with real and complex numbers and algebraic expressions. (M.S. V-1-1)</p> <p><b>V-1-2 (H)</b> Compute with real numbers, complex numbers, algebraic expressions, matrices and vectors using technology and for simple instance, with paper-and-pencil algorithms. (M.S. V-1-2, V-1-4)</p> <p><b>V-1-4 (H)</b> Efficiently and accurately apply operations with real numbers, complex numbers, algebraic expressions, matrices, and vectors in solving problems. (M.S. V-1-4, V-1-3)</p> <p><b>V-2-1 (H)</b> Identify important variables in a context, symbolize them and express their relationships algebraically. (M.S. V-2-1)</p> <p><b>V-2-3 (H)</b> Solve linear equations and inequalities algebraically and non-linear equations using graphing, symbol-manipulating or spreadsheet technology; and solve linear and non-linear systems using appropriate methods. (M.S. V-2-3)</p>
<p><b>CHAPTER 12</b> <b>Data Analysis and Probability</b></p>			<p><b>VI-1-1 (H)</b> Develop an understanding of randomness and chance variation and describe chance and certainty in the language of probability.</p> <p><b>VI-1-2 (H)</b> Give a mathematical definition of probability and determine the probabilities of more complex events, and generate and interpret probability distributions.</p>

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			<p><b>VI-1-3 (H)</b> Analyze events to determine their dependence or independence and calculate probabilities of compound events.</p> <p><b>VI-1-4 (H)</b> Use sampling and simulations to determine empirical probabilities and, when appropriate, compare them to the corresponding theoretical probabilities; understand and apply the law of large numbers.</p> <p><b>VI-1-5 (H)</b> Conduct probability experiments and simulations, to model and solve problems, including compound events.</p> <p><b>VI-2-1 (H)</b> Derive and use formulas for calculating permutations and combinations.</p> <p><b>VI-2-2 (H)</b> Use sets and set relationships to represent algebraic and geometric concepts.</p> <p><b>VI-2-6 (H)</b> Use discrete mathematics concepts as described above to model situations and solve problems; and look for whether or not there is a solution (existence problems), determine (counting problems), and decide upon a best solution (optimization problems).</p> <p><b>III-1-1 (H)</b> Collect and explore data through observation, measurement, surveys, sampling techniques and simulations.</p> <p><b>III-1-2 (H)</b> Organize data using tables, charts, graphs, spreadsheets and databases. (M.S. III-1-2)</p> <p><b>III-1-3 (H)</b> Present data using the most appropriate representation and give a rationale for their choice; show how certain</p>

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			<p>representation may skew the data or bias the presentation. (III-1-3)</p> <p><b>III-1-4 (H)</b> Identify what data is needed to answer a particular question or solve a given problem, and design and implement strategies to obtain, organize, and present data. (III-1-4)</p> <p><b>III-2-1 (H)</b> Critically read data from tables, charts or graphs and explain the source of the data and what the data represents. (III-2-1)</p> <p><b>III-2-2 (H)</b> Describe the shape of a data distribution and determine measures of central tendency, variability and correlation. (M.S. III-2-2)</p> <p><b>III-2-3 (H)</b> Use the data and their characteristics to draw and support conclusions. (M.S. III-2-3)</p> <p><b>III-2-4 (H)</b> Critically question the sources of data, the techniques used to collect, organize and present data; the inferences drawn from the data; and the sources of bias and measures taken to eliminate such bias.</p> <p><b>III-2-5 (H)</b> Formulate questions and problems and gather and interpret data to answer those questions.</p> <p><b>III-3-1 (H)</b> Make and test hypotheses.</p> <p><b>III-3-2 (H)</b> Design investigations to model and solve problems; also employ confidence intervals and curve fitting in analyzing the data.</p> <p><b>III-3-3 (H)</b> Formulate and communicate arguments and</p>

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			<p>conclusions based on data and evaluate their arguments and those of others.</p> <p><b>III-3-4 (H)</b> Make predictions and decisions based on data, including interpolations and extrapolations.</p> <p><b>III-3-5 (H)</b> Employ investigations, mathematical models, and simulations to make inferences and predictions to answer questions and solve problems.</p>
<p><b>CHAPTER 13</b> <b>Non-linear Functions</b> <b>and Polynomials.</b></p>			<p><b>I-1-1 (H)</b> Analyze and generalize mathematical patterns including sequences, series, and recursive patterns. (M.S. I-1-1)</p> <p><b>I-1-3 (H)</b> Study and employ mathematical models of patterns to make inference, predictions and decisions. (M.S. I-1-3)</p> <p><b>I-1-4 (H)</b> Explore patterns (graphic, numeric, etc.) characteristic of families of functions; explore structural patterns within systems of objects, operations of relations.</p> <p><b>I-1-5 (H)</b> Use patterns and reasoning to solve problems and explore new content. (M.S. I-1-5)</p> <p><b>I-2-2 (H)</b> Develop a mathematical concept of function and recognize that functions display characteristic patterns of change (e.g. linear, quadratic, exponential).</p>

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			<p><b>I-2-3 (H)</b> Expand their understanding of function to include non-linear functions, composition of functions, inverses of functions, the piecewise, and recursively-defined functions.</p> <p><b>I-2-5 (H)</b> Differentiate and analyze classes of functions including linear, power, quadratic, exponential, circular and trigonometric functions, and realize that many different situations can be modeled by a particular type of function.</p> <p><b>I-2-6 (H)</b> Increase their use of functions and mathematical models to solve problems in context.</p> <p><b>IV-2-2 (H)</b> Developing an understanding of more complex representations of numbers, including exponential and logarithmic expressions, and select an appropriate representation to facilitate problem solving.</p> <p><b>IV-3-4 (H)</b> Express number relationships using positive and negative rational exponents, logarithms and radicals.</p> <p><b>IV-3-5 (H)</b> Apply their understanding of number relationships in solving problems.</p>

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