



Algebra 1

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STANDARDS

PAGE REFERENCES

Strand 1: Number and Operations

Number sense is the understanding of numbers and how they relate to each other and how they are used in specific context or real-world application. It includes an awareness of the different ways in which numbers are used, such as counting, measuring, labeling, and locating. It includes an awareness of the different types of numbers such as, whole numbers, integers, fractions, and decimals and the relationships between them and when each is most useful. Number sense includes an understanding of the size of numbers, so that students should be able to recognize that the volume of their room is closer to 1,000 than 10,000 cubic feet. Students develop a sense of what numbers are, i.e., to use numbers and number relationships to acquire basic facts, to solve a wide variety of real-world problems, and to estimate to determine the reasonableness of results.

Concept 1: Number Sense

Understand and apply numbers, ways of representing numbers, and the relationships among numbers and different number systems.

In Grades 9 and 10, students apply the skills they have learned about the real number system to subsets of the real number system for problem solving. By extending number systems to solve problems, students lay a foundation for problem solving with complex numbers in the College Work Readiness Standard.

PO 1. Justify with examples the relation between the number system being used (natural numbers, whole numbers, integers, rational numbers and irrational numbers) and the question of whether or not an equation has a solution in that number system.

Student Edition:

P7-P10, 553-557, 558-564

Study Tip P8, 559, 561

Teacher Edition:

AE 561; DI 557; FMC 555, 559; MR 556;

SQ 558-559; TD 561; TOD 564; TWT P7; WO 559

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PO 2. Sort sets of numbers as finite or infinite, and justify the sort.	Student Edition: P7-P10 <i>Study Tip</i> P8 Teacher Edition: TNT P7
PO 3. Express that the distance between two numbers is the absolute value of their difference.	Student Edition: P11-P12, P15, 103-108 Teacher Edition: AE P11, P15, 104-105; SQ 103; T P11; WO 108
<p>Concept 2: Numerical Operations</p> <p>Understand and apply numerical operations and their relationship to one another.</p> <p>In Grades 9 and 10, students build on their understanding of rational numbers. Students apply that understanding to solve problems through operations with powers and roots of real numbers. Students use their understanding of operations with roots of real numbers and extend that understanding to operations with complex numbers in grades 11 and 12.</p>	
PO 1. Solve word problems involving absolute value, powers, roots, and scientific notation. Connections: MHS-S4C3-06, MHS-S4C3-07, MHS-S4C3-08	Student Edition: P12, 311-313, 401, 405-406, 408, 411-415, 418-422, 438 #54, 554, 556, 563, 568-571, 573-577 <i>Problem-Solving Tip</i> 417 Teacher Edition: AE 313, 412, 418, 554, 569, 574-575; DI 407
PO 2. Summarize the properties of and connections between real number operations; justify manipulations of expressions using the properties of real number operations.	Student Edition: 16-22, 23-29, 30, 31-37, 64, 67, 815 Teacher Edition: AE 17-19, 24-26; DI 18, 22, 25, 28; FMC 17, 18, 24; SQ 16, 23-24; ST 17; TNT 21, 24, 27
PO 3. Calculate powers and roots of rational and irrational numbers.	Student Edition: P7-P10, 10-15, 22, 401-407, 408-415, 416-422, 552-557, 558-564, 567-572, 573-577 <i>Study Tip</i> P9, 409 Teacher Edition: AE P7-P9, 11, 402-404, 409-411, 417-418, 553-554, 559-561, 568-570; DI 557, 572; FMC 409

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PO 4. Compute using scientific notation.	<p>Student Edition: 416-422, 429, 438 #54, 461, 463, 572, 713, 830 <i>Problem-Solving Tip</i> 417 <i>Study Tip</i> 418 <i>Watch Out</i> 417</p> <p>Teacher Edition: AE 417-418; DI 417, 420; EA 420; FMC 418; NTM 422; SQ 416; TNT 418, 419; TWT 418; WO 420</p>
<p>Concept 3: Estimation</p> <p>Use estimation strategies reasonably and fluently while integrating content from each of the other strands.</p> <p>In Grades 9 and 10, students apply estimation skills mastered in the middle grades to effectively solve problems with less common rational numbers. Students analyze problems in context to determine when it is more appropriate to use estimates and approximations in order to extend that analysis to recognize the limitations of estimations in grades 11 and 12.</p>	
PO 1. Determine rational approximations of irrational numbers.	<p>Student Edition: P7-P10, P13, P16, 539-541, 552-557, 558-564, 567-572, 573-578, 594-595, 597</p> <p>Teacher Edition: AE P7-P9, P13, 539, 553-554, 559, 568-570, 574-575; DI 557, 572; ES 539; FMC 555, 559; TNT 554</p>
PO 2. Use estimation to determine the reasonableness of a solution.	<p>Student Edition: P5-P6, 68-69, 163, 206-207, 416-421, 539, 554-557, 558-564, 630-634, 636-641, 812 <i>Problem-Solving Tip</i> 417</p> <p>Teacher Edition: AE 163, 539, 554, 631, 637; DI 539, 557; TNT P6, 163, 554</p>
PO 3. Determine when an estimate is more appropriate than an exact answer.	<p>Student Edition: P6, P13, P16, 163, 554-557, 558-564, 567-572, 630-634, 636-641, 812</p> <p>Teacher Edition: AE 13, 163, 554, 631, 637; DI 539, 557; ES 539; FMC 555; TNT P6, 163</p>
PO 4. Estimate the location of the rational or irrational numbers on a number line.	<p>Student Edition: P7-P10, P11-P12, P15, 161-166, 537-541 <i>Study Tip</i> 163</p> <p>Teacher Edition: AE P8, P11, P15, 163, 538-539; ES 539; SQ 161; TNT 163, 539; WO 538</p>

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Strand 2: Data Analysis, Probability, and Discrete Mathematics

This strand requires students to use data collection, data analysis, statistics, probability, systematic listing and counting, and the study of graphs. This prepares students for the study of discrete functions as well as to make valid inferences, decisions, and arguments. Discrete mathematics is a branch of mathematics that is widely used in business and industry. Combinatorics is the mathematics of systematic counting. Vertex-edge graphs are used to model and solve problems involving paths, networks, and relationships among a finite number of objects.

Concept 1: Data Analysis (Statistics)

Understand and apply data collection, organization, and representation to analyze and sort data.

In Grades 9 and 10, students build on their understanding of data collection and measures of center from the middle grades to effectively represent, analyze, interpret, and make inferences from multiple data sets using multiple summary statistics. In grades 11 and 12 students draw from this deeper analysis to compare and investigate statistical design and more advanced statistical measures.

<p>PO 1. Draw inferences about data sets from lists, tables, matrices, and plots.</p> <p>Connections: SCHS-S1C4-02</p>	<p>Student Edition: 406, 463, 739, 744 #20, 746-755, 756-762, 763, 794-795, 797, 798-799, 842-843, 856 <i>Algebra Lab 739</i> <i>Graphing Technology Lab 785-786</i></p> <p>Teacher Edition: AE 747-749, 757-759; DI 755, 758; FMC 747, 757; WCG 739, 785</p>
<p>PO 2. Organize collected data into an appropriate graphical representation with or without technology.</p>	<p>Student Edition: P40-P43, 245-251, 253-260, 273, 275, 739, 744 #20, 779-784, 798-799 <i>Algebra Lab 739</i></p> <p>Teacher Edition: AE P40-P42, 246-247, 254-255, 780-781, 799; DI 249, 780; SQ 798; TWT P42; WCG 739</p>
<p>PO 3. Display data, including paired data, as lists, tables, matrices, and plots with or without technology; make predictions and observations about patterns or departures from patterns.</p>	<p>Student Edition: P40-P43, 245-251, 252, 253-260, 273, 275, 744 #20, 746-755, 756-762, 785-786 <i>Algebra Lab 252</i> <i>Graphing Technology Lab 785-786</i></p> <p>Teacher Edition: AE 246-247, 254-255, 747-749, 757-759; DI 249, 258, 752; WCG 252, 785</p>

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<p>PO 4. Make inferences by comparing data sets using one or more summary statistics.</p> <p>Connections: SCHS-S1C3-06</p>	<p>Student Edition: P37-P39, P42-P43, 258, 744 #20, 746-755, 756-762, 770, 794-795, 842-843 <i>Study Tip</i> P38, P39</p> <p>Teacher Edition: AE P37-P38, P42, 747-749, 757-759; DI 258, 755, 758; FMC 747, 757; WO P43, 751, 755</p>
<p>PO 5. Determine which measure of center is most appropriate in a given situation and explain why.</p>	<p>Student Edition: P37-P39, 746-755, 756-762, 763, 770 #48, 794-795, 797, 842-843, 856 <i>Study Tip</i> P38</p> <p>Teacher Edition: AE P37-P38, 747-749; FMC 747, 757; NTM 755; SQ 746, 756; TWT 748; WO 751, 754</p>
<p>PO 6. Evaluate the reasonableness of conclusions drawn from data analysis.</p> <p>Connections: SCHS-S1C3-02</p>	<p>Student Edition: 740-745, 746-755, 756-762, 763, 794-795, 797, 842-843, 856 <i>Watch Out</i> 747</p> <p>Teacher Edition: AE 741-742, 747-749; DI 752, 758; FMC 747, 757; SQ 746, 756; TWT 748; WO 751</p>
<p>PO 7. Identify misrepresentations and distortions in displays of data and explain why they are misrepresentations or distortions.</p>	<p>Student Edition: 249, 740-745, 746-755, 756-762, 763, 780, 794-795, 797, 842-843, 856, 866-867 <i>Watch Out</i> 747</p> <p>Teacher Edition: AE 741, 747-749, 757-759, 866; DI 249, 745, 752, 755, 780</p>
<p>PO 8. Design simple experiments or investigations and collect data to answer questions.</p>	<p>Student Edition: 740-745, 746-755, 756-762, 763, 794-795, 797, 842-843, 856</p> <p>Teacher Edition: AE 741-742, 747-749, 757-759; DI 745, 752; FMC 741; SQ 740, 746, 756; TOD 745; TWT 741</p>

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<p>Concept 2: Probability Understand and apply the basic concepts of probability. In Grades 9 and 10, students apply the law of large numbers to their knowledge of theoretical and experimental probability. Students investigate probability of independent and dependent events, and apply concepts area to determine the geometric probability of a simulation. Students deepen their understanding of probability and experimentation in order to prepare for advanced problem solving with estimations and exact calculations for probability with independent and dependent events; and univariate and bivariate data in grades 11 and 12.</p>	
<p>PO 1. Make predictions and solve problems based on theoretical probability models.</p> <p>Connections: MHS-S2C3-01</p>	<p>Student Edition: P33-P36, 766-770, 771-778, 779-784, 787-792, 796-797, 798-799</p> <p>Teacher Edition: AE P33-P35, 767, 772-774, 780-781, 788-789, 799; DI 770, 778, 780, 789, 792; SQ 779, 787, 798; TWT 792</p>
<p>PO 2. Determine the theoretical probability of events, estimate probabilities using experiments, and compare the two.</p>	<p>Student Edition: P33-P36, 766-770, 771-778, 779-784, 787-792, 796, 797, 798-799</p> <p><i>Reading Math 789</i></p> <p>Teacher Edition: AE P33-P35, 767, 770, 772-775, 780-781, 788-789, 799; DI 789, 792; FMC 773, 788; SQ 787, 798</p>
<p>PO 3. Use simulations to model situations involving independent and dependent events.</p>	<p>Student Edition: P33-P36, 771-778, 784, 796, 797, 798-799, 844, 856</p> <p><i>Problem-Solving Tip 772</i> <i>Reading Math 775</i> <i>Study Tip 773</i> <i>Watch Out 775</i></p> <p>Teacher Edition: AE P33-P35, 772-774, 799; DI 773; FMC 773; SQ 771, 798; TWT 772; WO 775, 777</p>
<p>PO 4. Explain and use the law of large numbers (that experimental results tend to approach theoretical probabilities after a large number of trials).</p>	<p>Student Edition: 787-792</p> <p><i>Reading Math 789</i></p> <p>Teacher Edition: AE 789; DI 792</p>

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<p>PO 5. Use concepts and formulas of area to calculate geometric probabilities.</p> <p>Connections: MHS-S4C1-01, MHS-S4C4-02, MHS-S4C4-03, MHS-S4C4-04, MHS-S4C4-05</p>	<p>See <i>Geometry</i> © 2010</p> <p>Student Edition: 915-921, 922 #16, 930 #30-#31, 937 #33-#36, 949 #16-#17, 951 #1-#2</p> <p>Teacher Edition: A 917, 921; AE 916, 917; DI 916, 920; TWT 917</p>
<p>Concept 3: Systematic Listing and Counting</p> <p>Understand and demonstrate the systematic listing and counting of possible outcomes.</p> <p>In Grades 9 and 10, students use the counting techniques learned in the middle grades to calculate and solve problems related to combinations and permutations. Students represent problems and solutions using algebraic symbols in order to lay a foundation for work with Pascal's Triangle and the binomial theorem in College Work Readiness.</p>	
<p>PO 1. Apply the addition and multiplication principles of counting, representing these principles algebraically using factorial notation.</p> <p>Connections: MHS-S2C2-01, MHS-S5C1-01, MHS-S5C1-02</p>	<p>Student Edition: P33-P36, 764-770, 778, 792, 795-796, 797, 843, 844, 856</p> <p>Teacher Edition: AE P33-P35, 765-767; DI 792; FMC 765, 766</p>
<p>PO 2. Apply appropriate means of computing the number of possible arrangements of items using permutations where order matters, and combinations where order does not matter.</p> <p>Connections: MHS-S5C1-01, MHS-S5C1-02</p>	<p>Student Edition: 764-770, 778, 784, 795, 797, 843</p> <p><i>Study Tip</i> 765, 766</p> <p><i>Watch Out</i> 767</p> <p>Teacher Edition: AE 765-767; CB 770; DI 766, 770; FMC 765, 766; SQ 764; TNT 766, 767; TWT 765; WO 768</p>
<p>PO 3. Determine the number of possible outcomes of an event.</p> <p>Connections: MHS-S2C1-02, MHS-S2C4-01, MHS-S5C1-02</p>	<p>Student Edition: P33-P36, 764-770, 771-778, 787-792, 795-796, 797, 843, 844, 856</p> <p><i>Study Tip</i> P36</p> <p>Teacher Edition: AE P33-P35, 765-766, 772-774, 789; DI 766, 770, 773; FMC 765, 773</p>

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<p>Concept 4: Vertex-Edge Graphs</p> <p>Understand and apply vertex-edge graphs.</p> <p>In Grades 9 and 10, students apply their understanding from grades 7 and 8 of Euler/Hamilton paths, directed graphs, and algorithmic reasoning to model and solve network problems. The understanding of networks students gain in grades 9 and 10 extends to problem solving using circuits, shortest paths, minimum weight spanning trees, and adjacency matrices in grades 11 and 12.</p>	
<p>PO 1. Solve network problems using graphs and matrices.</p> <p>Connections: MHS-S2C1-01, MHS-S2C1-03, MHS-S2C3-03, MHS-S3C3-15, MHS-S4C3-01, MHS-S4C3-03</p>	<p>See <i>Geometry</i> © 2010</p> <p>Student Edition: <i>Geometry Lab</i> 946-947</p>
<p>Strand 3: Patterns, Algebra, and Functions</p> <p>Patterns occur everywhere in nature. Algebraic methods are used to explore, model and describe patterns, relationships, and functions involving numbers, shapes, iteration, recursion, and graphs within a variety of real-world problem solving situations. Iteration and recursion are used to model sequential, step-by-step change. Algebra emphasizes relationships among quantities, including functions, ways of representing mathematical relationships, and the analysis of change.</p>	
<p>Concept 1: Patterns</p> <p>Identify patterns and apply pattern recognition to reason mathematically while integrating content from each of the other strands.</p> <p>In Grades 9 and 10, students recognize sequences as arithmetic or geometric and use their algebraic skills to model, represent, and extend sequences. The representation and modeling of sequences will lead students to use their skills to solve problems in context in grades 11 and 12.</p>	
<p>PO 1. Recognize, describe, and analyze sequences using tables, graphs, words, or symbols; use sequences in modeling.</p>	<p>Student Edition: 187-193, 194, 201, 204, 205, 485, 578-583, 596, 822, 836, 847 <i>Algebra Lab</i> 194 <i>Study Tip</i> 188, 189</p> <p>Teacher Edition: AE 188-190, 579-580; DI 188, 193; SQ 187, 579; TNT 188, 581</p>
<p>PO 2. Determine a specific term of a sequence.</p>	<p>Student Edition: 187-193, 194, 201, 204, 485, 578-583, 596, 822, 847 <i>Algebra Lab</i> 194 <i>Study Tip</i> 189</p> <p>Teacher Edition: AE 188-190, 579-580; DI 193; FMC 189; NTM 193; SQ 187, 579; TWT 189</p>

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<p>PO 3. Create sequences using explicit and recursive formulas involving both subscripts and function notation.</p> <p>Connections: MHS-S3C4-03, MHS-S5C1-01, MHS-S5C1-02</p>	<p>Student Edition: 187-193, 194, 201, 204, 485, 578-583, 596, 822, 836, 847 <i>Algebra Lab</i> 194 <i>Study Tip</i> 189</p> <p>Teacher Edition: AE 188-190, 579-580; DI 188, 193; FCA 194; FMC 189; NTM 193; SQ 187, 579; TNT 188; TWT 189; WO 189</p>
<p>Concept 2: Functions and Relationships Describe and model functions and their relationships.</p> <p>In Grades 9 and 10, students deepen their understanding of functions, both linear and quadratic, and they learn the practical and mathematical limitations of modeling functions. In grades 9 and 10 linear and quadratic functions begin students' formal instruction to the library of functions, while in grades 11 and 12 students investigate many other functions.</p>	
<p>PO 1. Sketch and interpret a graph that models a given context, make connections between the graph and the context, and solve maximum and minimum problems using the graph.</p> <p>Connections: MHS-S4C3-05, MHS-S4C3-06, MHS-S4C3-07, MHS-S4C3-08, SSHA-S1C1-04, SSHA-S2C1-04</p>	<p>Student Edition: 153-160, 161-166, 167-168, 180-186, 195-200, 202-204, 205, 214-221, 222-223, 525-535, 536, 537-542, 543, 544-549, 567-572 <i>Algebra Lab</i> 536 <i>Graphing Technology Lab</i> 167-168, 222-223, 543 <i>Study Tip</i> 156</p> <p>Teacher Edition: AE 154-156, 526-530</p>
<p>PO 2. Determine if a relationship represented by an equation, graph, table, description, or set of ordered pairs is a function.</p> <p>Connections: MHS-S3C3-03</p>	<p>Student Edition: 45-52, 59, 66, 67, 261-268, 817 <i>Study Tip</i> 47</p> <p>Teacher Edition: AE 46-47; FMC 46, 263; TWT 47; WO 50</p>
<p>PO 3. Use function notation; evaluate a function at a specified value in its domain.</p> <p>Connections: MHS-S3C3-03, MHS-S3C3-04, MHS-S3C3-07</p>	<p>Student Edition: 45-52, 66, 67, 197-200, 204, 260, 261-268, 301, 444, 533 #66, 544-548, 593-594, 597, 817, 835 <i>Study Tip</i> 48</p> <p>Teacher Edition: AE 48, 197, 545-546; FMC 546; SQ 45; WO 48</p>

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<p>PO 4. Use equations, graphs, tables, descriptions, or sets of ordered pairs to express a relationship between two variables.</p>	<p>Student Edition: 53, 153-160, 161-166, 167-168, 180-186, 187-193, 195-200, 202-204, 205, 222-223, 245-251, 253-260, 261-268, 269, 525-535, 536, 544-549, 567-572 <i>Algebra Lab</i> 536 <i>Graphing Technology Lab</i> 53, 167-168, 222-223, 269</p> <p>Teacher Edition: DI 549; TOD 549</p>
<p>PO 5. Recognize and solve problems that can be modeled using a system of two equations in two variables.</p> <p>Connections: MHS-S4C3-08</p>	<p>Student Edition: 333-339, 340-341, 342-347, 348-354, 355-360, 361, 362-367, 368, 376-381, 382-386, 387, 389-392, 393, 550-551, 827-829 <i>Graphing Technology Lab</i> 340-341, 387, 550-552 <i>Spreadsheet Lab</i> 368</p> <p>Teacher Edition: AE 343-344, 349-350</p>
<p>PO 6. Recognize and solve problems that can be modeled using a quadratic function.</p> <p>Connections: MHS-S4C3-08</p>	<p>Student Edition: 478-482, 488-491, 492, 495-498, 501-504, 507-512, 514-516, 517, 525-535, 537-542, 552-557, 558-564, 566, 584-589, 590-591, 593-596, 597 <i>Graphing Technology Lab</i> 590-591</p> <p>Teacher Edition: AE 478-479, 488, 495, 507-508</p>
<p>PO 7. Determine domain and range of a function from an equation, graph, table, description, or set of ordered pairs.</p> <p>Connections: MHS-S3C3-12, MHS-S3C3-13, MHS-S3C3-14</p>	<p>Student Edition: 38-44, 45-52, 53, 65, 67, 80, 131 #54, 138, 243, 251, 261-268, 295, 525-533, 567-577, 605-610, 611, 816, 834 <i>Graphing Technology Lab</i> 53, 611 <i>Review Vocabulary</i> 526</p> <p>Teacher Edition: AE 39-40, 262-263, 526, 528, 568-570, 606-608</p>

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Concept 3: Algebraic Representations

Represent and analyze mathematical situations and structures using algebraic representations.

In Grades 9 and 10, students extend their understanding of algebraic expressions with rational numbers to polynomial, rational, and square root expressions. Students deepen their understanding of the structure of algebra to analyze equations, solve systems of equations, perform operations on matrices, and generalize solution strategies to solve polynomial equations and problems. This lays the groundwork for students in grades 11 and 12 to perform operations on these expressions and extend their work with matrices and systems of equations.

<p>PO 1. Create and explain the need for equivalent forms of an equation or expression.</p>	<p>Student Edition: 38-44, 126-131, 138, 143, 145, 160, 200, 231-236, 237-243 <i>Review Vocabulary</i> 232 <i>Study Tip</i> 39, 233</p> <p>Teacher Edition: AE 39, 127-128, 232-233; DI 236; FMC 233, 236, 632; SQ 126; WO 232</p>
<p>PO 2. Solve formulas for specified variables.</p>	<p>Student Edition: 126-131, 138, 143, 145, 160, 200, 215-221, 230, 232-236, 237-243, 251, 320 #65, 558-563 <i>Study Tip</i> 127, 128</p> <p>Teacher Edition: AE 127-128, 215, 232-233, 239; DI 131; FMC 632</p>
<p>PO 3. Write an equation given a table of values, two points on the line, the slope and a point on the line, or the graph of the line.</p>	<p>Student Edition: 75-80, 214-221, 224-230, 231-236, 237-243, 244, 245-251, 253-260, 271-273, 275</p> <p>Teacher Edition: AE 76-77, 215, 225-226, 232-233, 238-239, 246-247, 254-255; DI 80, 230, 236</p>
<p>PO 4. Determine from two linear equations whether the lines are parallel, perpendicular, coincident, or intersecting but not perpendicular.</p> <p>Connections: MHS-S4C3-04, MHS-S4C3-07</p>	<p>Student Edition: 228 #44, 237-243, 244, 251, 260 #28, 334-337, 339, 345, 354 #51, 381 <i>Review Vocabulary</i> 238, 334 <i>Study Tip</i> 239</p> <p>Teacher Edition: AE 238-239, 334-335; DI 243; EC 341; FMC 197, 238, 335; SQ 237; TWT 238</p>
<p>PO 5. Solve linear equations and equations involving absolute value, with one variable.</p> <p>Connections: MHS-S1C2-01</p>	<p>Student Edition: 31-37, 81-82, 83-89, 90, 91-96, 97-102, 103-109, 110, 132-138, 140-144, 145, 193, 288, 295 <i>Algebra Lab</i> 81-82, 90</p> <p>Teacher Edition: AE 32-33, 84-85, 92-93, 98-99, 104-105, 133-135</p>

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<p>PO 6. Solve linear inequalities in one variable.</p>	<p>Student Edition: 283-288, 289, 290-295, 296-301, 302, 304-309, 310-314, 320, 323-324, 325, 326-327, 347 <i>Algebra Lab</i> 289</p> <p>Teacher Edition: AE 284-285, 291-292, 297-298, 305-306, 311-312, 327; DI 301; SQ 326</p>
<p>PO 7. Solve systems of two linear equations in two variables.</p> <p>Connections: MHS-S4C3-05</p>	<p>Student Edition: 333-339, 340-341, 342-347, 348-354, 355-360, 361, 362-367, 376-381, 389-392, 393, 395, 396, 407 <i>Graphing Technology Lab</i> 340-341</p> <p>Teacher Edition: AE 334-335, 343-344, 349-350, 356-357, 363-364, 377-378; DI 334, 360</p>
<p>PO 8. Simplify and evaluate polynomials, rational expressions, expressions containing absolute value, and radicals.</p>	<p>Student Edition: P14-P16, P17-P19, 10-15, 16-22, 23-29, 30, 433-438, 439-444, 445-446, 447-452, 461-462, 463, 612-617, 618, 619-623, 677, 684-690, 691, 692-698, 699 <i>Algebra Lab</i> 445-446, 677 <i>Graphing Technology Lab</i> 618, 691</p>
<p>PO 9. Multiply and divide monomial expressions with integer exponents.</p>	<p>Student Edition: 401-407, 408-415, 416-422, 429, 438, 444, 452, 460-461, 463, 829-830 <i>Study Tip</i> 403, 404, 409, 410, 411</p> <p>Teacher Edition: AE 402-404, 409-412, 417-418; DI 403, 415; FMC 402, 409, 418</p>
<p>PO 10. Add, subtract, and multiply polynomial and rational expressions.</p>	<p>Student Edition: 431-432, 433-438, 439-444, 445-446, 447-452, 453-458, 461-462, 463, 692-698, 699, 706-713 <i>Algebra Lab</i> 431-432, 445-446</p> <p>Teacher Edition: AE 434-435, 440-441, 448-449, 454-455, 693, 707-709; WCG 431-432, 445-446</p>

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<p>PO 11. Solve square root equations involving only one radical.</p>	<p>Student Edition: 605-610, 624-628, 629, 630-635, 636-641, 658-659, 661, 676, 705, 778 <i>Study Tip</i> 625 <i>Watch Out</i> 625 Teacher Edition: AE 605-608, 625, 631, 637; DI 607, 625, 628; FMC 625; SQ 605, 624</p>
<p>PO 12. Factor quadratic polynomials in the form of $ax^2 + bx + c$ where a, b, and c are integers.</p> <p>Connections: MHS-S3C3-13, MHS-S4C3-08, MHS-S5C1-01, MHS-S5C1-02</p>	<p>Student Edition: 483-484, 485-491, 492, 493-498, 515, 517, 520 <i>Algebra Lab</i> 483-484 <i>Problem-Solving Tip</i> 486 <i>Study Tip</i> 486, 487, 494 Teacher Edition: AE 486-488, 494-495; DI 488, 498; FMC 487, 495; SQ 485-486, 493-494; WCG 483; WO 489, 491</p>
<p>PO 13. Solve quadratic equations.</p> <p>Connections: MHS-S3C2-07, MHS-S3C3-12, MHS-S4C3-08</p>	<p>Student Edition: 478-482, 488-491, 492, 495-498, 501-504, 507-512, 514-516, 517, 537-542, 552-557, 558-564, 566, 593-595, 597 Teacher Edition: AE 478-479, 488, 495, 507-508, 538-539, 553-554, 559-561; DI 557</p>
<p>PO 14. Factor higher order polynomials.</p> <p>Connections: MHS-S3C3-12</p>	<p>Student Edition: 475, 476-482, 493-498, 499-504, 507-512, 514-516, 517, 520 <i>Algebra Lab</i> 475 <i>Study Tip</i> 477, 494, 500 Teacher Edition: AE 477-479, 494, 500, 507; DI 482, 504, 512; FCA 475; TOD 504</p>
<p>PO 15. Solve problems using operations with matrices.</p>	<p>Student Edition: 369-375, 376-381, 386, 391-392, 393, 407, 474, 491, 828-829, 850 <i>Study Tip</i> 370, 371, 377 <i>Watch Out</i> 371 Teacher Edition: AE 370-372, 377-378; DI 375, 377, 381; SQ 369, 376-377</p>

STANDARDS

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Concept 4: Analysis of Change

Analyze how changing the values of one quantity corresponds to change in the values of another quantity.

In Grades 9 and 10, students apply their understanding of rate change and simple rates in grades 7 and 8 to linear functions. Students use rates and rate of change to solve problems, including interest problems. Students in grades 11 and 12 solve problems using rate of change and analyze and interpret rate of change in financial contexts.

<p>PO 1. Determine the slope and intercepts of the graph of a linear function, interpreting slope as a constant rate of change.</p> <p>Connections: MHS-S3C3-04, MHS-S4C3-06, MHS-S5C1-01, MHS-S5C1-02</p>	<p>Student Edition: 154-160, 161-166, 167-168, 169, 170-178, 179, 180-186, 203, 205 <i>Algebra Lab</i> 169 <i>Graphing Technology Lab</i> 167-168 <i>Study Tip</i> 174, 181</p> <p>Teacher Edition: AE 171-174, 181-182; DI 173, 178; FCA 168; FMC 173, 174; WO 176</p>
<p>PO 2. Solve problems involving rate of change.</p> <p>Connections: MHS-S4C2-01, MHS-S4C2-02, MHS-S4C2-04</p>	<p>Student Edition: 169, 170-178, 179, 180-186, 187-193, 195-200, 203-204, 205, 536 <i>Algebra Lab</i> 169, 536 <i>Study Tip</i> 174, 181</p> <p>Teacher Edition: AE 171-174, 181-182, 190, 196-197; ETC 169; FCA 536; SQ 170; WCG 169, 536</p>
<p>PO 3. Solve interest problems.</p> <p>Connections: MHS-S3C1-03, SSHS-S5C5-04</p>	<p>Student Edition: 126, 131 #41, 574-576, 853 #10</p> <p>Teacher Edition: AE 574; FMC 574; SQ 126</p>

STANDARDS

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Strand 5: Structure and Logic

This strand emphasizes the core processes of problem solving. Students draw from the content of the other four strands to devise algorithms and analyze algorithmic thinking. Strand One and Strand Three provide the conceptual and computational basis for these algorithms. Logical reasoning and proof draws its substance from the study of geometry, patterns, and analysis to connect remaining strands. Students use algorithms, algorithmic thinking, and logical reasoning (both inductive and deductive) as they make conjectures and test the validity of arguments and proofs. Concept two develops the core processes as students evaluate situations, select problem solving strategies, draw logical conclusions, develop and describe solutions, and recognize their applications.

Concept 1: Algorithms and Algorithmic Thinking

Use reasoning to solve mathematical problems.

In Grades 9 and 10, students apply their understanding of algorithms and algebraic structure from grades 7 and 8 to analyze, determine the equivalence of, and use algorithms to solve problems. Students deepen these analysis skills in grades 11 and 12.

PO 1. Select an algorithm that explains a particular mathematical process; determine the purpose of a simple mathematical algorithm.

Connections: MHS-S2C1-02, MHS-S2C3-01, MHS-S2C3-02, MHS-S2C3-03, MHS-S3C3-12, MHS-S3C3-13, MHS-S3C4-01, MHS-S4C1-10, MHS-S4C1-11, MHS-S4C3-01, MHS-S4C3-02, MHS-S4C3-03, MHS-S4C4-02, MHS-S5C1-02

Student Edition:

253-259, 552-556, 564, 584-589, 590-591, 594
Graphing Technology Lab 590-591
Study Tip 553

Teacher Edition:

AE 254-255, 553-554, 586; DI 586; FCA 591;
 FMC 254; NTM 557; SQ 253, 552, 584; T 590;
 TNT 255; TWT 255

PO 2. Analyze algorithms for validity and equivalence recognizing the purpose of the algorithm.

Connections: MHS-S2C1-04, MHS-S2C3-01, MHS-S2C3-02, MHS-S2C3-03, MHS-S3C1-03, MHS-S3C3-12, MHS-S3C3-13, MHS-S3C4-01, MHS-S4C1-10, MHS-S4C1-11, MHS-S4C3-01, MHS-S4C3-02, MHS-S4C3-03, MHS-S4C4-02

Student Edition:

253-259, 552-556, 564, 584-589, 590-591, 594
Graphing Technology Lab 590-591
Study Tip 553

Teacher Edition:

AE 254-255, 553-554, 586; DI 586; FCA 591;
 FMC 254; NTM 557; SQ 253, 552, 584; T 590;
 TNT 255; TWT 255

STANDARDS	PAGE REFERENCES
<p>Concept 2: Logic, Reasoning, Problem Solving, and Proof Evaluate situations, select problem-solving strategies, draw logical conclusions, develop and describe solutions, and recognize their applications.</p> <p>In Grades 9 and 10, students formalize the development of inductive, deductive, and proportional reason, introduced in grades 7 and 8, as they make and defend generalizations and justify their reasoning using accepted standards of mathematical evidence and proof. Students' grasp of logical structure is extended to mathematical modeling in grades 11 and 12.</p>	
<p>PO 1. Analyze a problem situation, determine the question(s) to be answered, organize given information, determine how to represent the problem, and identify implicit and explicit assumptions that have been made.</p>	<p>Student Edition: P5-P6, 54-59, 68-69, 206-207, 213, 269, 732-733, 798-799, 804-814 <i>Graphing Technology Lab</i> 213, 269 <i>Study Tip</i> 55</p> <p>Teacher Edition: AE P5-P6, 207, 733, 799; FCA 213, 269; SQ 206, 732, 798; TNT P6; TWT P5; WCG 269</p>
<p>PO 2. Solve problems by formulating one or more strategies, applying the strategies, verifying the solution(s), and communicating the reasoning used to obtain the solution(s).</p>	<p>Student Edition: P5-P6, 54-59, 60-61, 68-69, 206-207, 261-267, 598-599, 804-814 <i>Algebra Lab</i> 60-61 <i>Study Tip</i> 55</p> <p>Teacher Edition: AE P5-P6, 55-56; FCA 61; SQ 276, 598; TNT P6; TWT P5; WCG 60-61</p>
<p>PO 3. Evaluate a solution for reasonableness and interpret the meaning of the solution in the context of the original problem.</p>	<p>Student Edition: P5-P6, 68-69, 163, 206-207, 416-421, 539, 554-557, 558-564, 630-634, 636-641, 812 <i>Problem-Solving Tip</i> 417</p> <p>Teacher Edition: AE 163, 539, 554, 631, 637; DI 539, 557; TNT P6, 163, 554</p>
<p>PO 4. Generalize a solution strategy for a single problem to a class of related problems; explain the role of generalizations in inductive and deductive reasoning.</p>	<p>Student Edition: 54-59, 60-61, 68-69, 194, 195-200, 206-207, 598-599 <i>Algebra Lab</i> 60-61, 194 <i>Study Tip</i> 55</p> <p>Teacher Edition: AE 55-56, 195-197; DI 200; SQ 195, 198; TT 194; WCG 60-61, 194</p>

STANDARDS	PAGE REFERENCES
<p>PO 5. Summarize and communicate mathematical ideas using formal and informal reasoning.</p>	<p>Student Edition: 54-59, 60-61, 68-69, 552-557, 558-564, 630-635, 636-641, 732-733 <i>Algebra Lab</i> 60-61 <i>Study Tip</i> 55 <i>Watch Out</i> 560</p> <p>Teacher Edition: AE 55-56, 559-560; DI 557, 635; FMC 56, 632; NTM 557; SQ 630, 732; WCG 60-61</p>
<p>PO 6. Synthesize mathematical information from multiple sources to draw a conclusion, make inferences based on mathematical information, evaluate the conclusions of others, analyze a mathematical argument, and recognize flaws or gaps in reasoning.</p>	<p>Student Edition: P5-P6, 54-59, 60-61, 68-69, 194, 195-200, 732-733, 787-792, 798-799 <i>Algebra Lab</i> 60-61 <i>Study Tip</i> 55</p> <p>Teacher Edition: AE P5-P6, 55-56, 196-197, 788-789, 799; DI 200; FMC 788; SQ 787, 798; WCG 60-61</p>
<p>PO 7. Find structural similarities within different algebraic expressions and geometric figures.</p>	<p>Student Edition: 54-59, 60-61, 187-193, 578-583, 584-589, 648, 649-655 <i>Algebra Lab</i> 60-61, 648</p> <p>Teacher Edition: AE 55-56, 188-190, 579-580, 586, 650-651; DI 583; FMC 189, 193, 579; SQ 187, 578, 649</p>
<p>PO 8. Use inductive reasoning to make conjectures, use deductive reasoning to analyze and prove a valid conjecture, and develop a counterexample to refute an invalid conjecture.</p>	<p>Student Edition: 54-59, 80, 194, 195-200, 534 #73, 598-599, 787-792, 798-799 <i>Algebra Lab</i> 194 <i>Study Tip</i> 55</p> <p>Teacher Edition: AE 55-56, 196-197, 599, 789, 799; DI 200; FMC 57; TT 194; WCG 194; WO 57</p>
<p>PO 9. State the inverse, converse, and contrapositive of a given statement and state the relationship between the truth value of these statements and the original statement.</p>	<p>Student Edition: 43 #41, 631-634</p> <p>Teacher Edition: AE 631; TNT 43; WO 632</p>

STANDARDS	PAGE REFERENCES
PO 10. List related <i>if... then</i> statements in logical order.	Student Edition: 54-59, 89, 166, 309, 817 <i>Reading Math</i> 55 <i>Study Tip</i> 55 Teacher Edition: AE 55-56; FMC 56; SQ 54; WO 57
PO 11. Draw a simple valid conclusion from a given <i>if...then</i> statement and a minor premise.	Student Edition: 54-59, 89, 309, 817 <i>Study Tip</i> 55 Teacher Edition: AE 55-56; FMC 56; SQ 54; TNT 59; TWT 56; WO 57
PO 12. Construct a simple formal deductive proof.	Student Edition: 17-20, 21 #53, 23-29 <i>Study Tip</i> 21 Teacher Edition: AE 19, 24
PO 13. Identify and explain the roles played by definitions, postulates, propositions and theorems in the logical structure of mathematics, including Euclidean geometry.	Student Edition: 21 #53, 54-59, 630-635, 636-641, 642-647, 648, 649-655 <i>Algebra Lab</i> 648 <i>Study Tip</i> 55 Teacher Edition: AE 55-56; DI 635, 641, 647, 655; FMC 56, 637, 651; SQ 630, 636, 642, 649; WCG 648