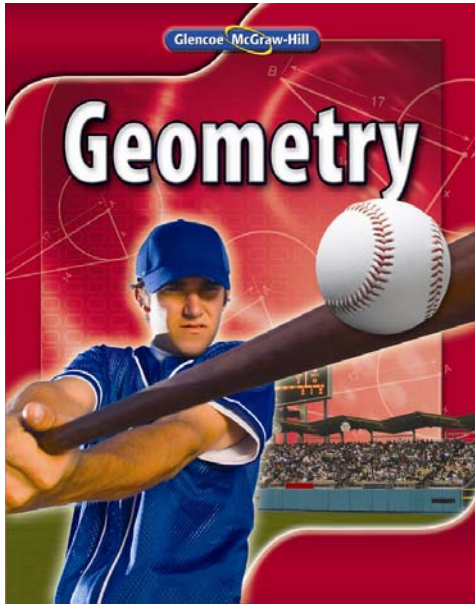




**Glencoe**

Mathematics Standard  
Articulated by Grade Level  
High School Grades 9 and 10



# Geometry

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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.

See *Algebra 1* © 2009

**Student Edition:**

P7-P10, 553-557, 558-564

*Study Tip* P8, 559, 561

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| PO 2. Sort sets of numbers as finite or infinite, and justify the sort.   | See <i>Algebra 1</i> © 2009<br><b>Student Edition:</b><br>P7-P10<br><i>Study Tip</i> P8  |
| PO 3. Express that the distance between two numbers is the absolute value of their difference.  | <b>Student Edition:</b><br><i>Key Concept</i> 25<br><i>Study Tip</i> 729<br><b>Teacher Edition:</b><br>AE 26   |
| <p><b>Concept 2: Numerical Operations</b></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.<br><br>Connections: MHS-S4C3-06, MHS-S4C3-07, MHS-S4C3-08   | <b>Student Edition:</b><br><i>Study Tip</i> 729  |
| PO 2. Summarize the properties of and connections between real number operations; justify manipulations of expressions using the properties of real number operations.  | <b>Student Edition:</b><br>P3 #60-#63, P19-P20, P21 #54-#59<br><b>Teacher Edition:</b><br>AE P19, P20  |
| PO 3. Calculate powers and roots of rational and irrational numbers.  | <b>Student Edition:</b><br>P3 #60-#63, P19-P20, P21 #54-#59<br><b>Teacher Edition:</b><br>P19, P20   |
| PO 4. Compute using scientific notation.  | See <i>Algebra 1</i> © 2009<br><b>Student Edition:</b><br>416-422, 429, 438 #54, 461, 463, 572, 713, 830<br><i>Problem-Solving Tip</i> 417<br><i>Study Tip</i> 418<br><i>Watch Out</i> 417 |

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**Concept 3: Estimation**

Use estimation strategies reasonably and fluently while integrating content from each of the other strands.

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.

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| PO 1. Determine rational approximations of irrational numbers.                      | See <i>Algebra 1</i> © 2009<br><b>Student Edition:</b><br>P7-P10, P13, P16, 539-541, 552-557, 558-564, 567-572, 573-578, 594-595, 597                             |
| PO 2. Use estimation to determine the reasonableness of a solution.                 | <b>Student Edition:</b><br>497 ex 2, 498 #3, 499 #10, 569 #56<br><i>Problem-Solving Tip</i> 661<br><i>Study Tip</i> 832, 917<br><b>Teacher Edition:</b><br>AE 497 |
| PO 3. Determine when an estimate is more appropriate than an exact answer.          | <b>Student Edition:</b><br>497 ex 2, 498 #3, 499 #10, 569 #56<br><i>Problem-Solving Tip</i> 661<br><i>Study Tip</i> 832, 917<br><b>Teacher Edition:</b><br>AE 497 |
| PO 4. Estimate the location of the rational or irrational numbers on a number line. | <b>Student Edition:</b><br>497 ex 2, 498 #3, 499 #10, 569 #56<br><i>Problem-Solving Tip</i> 661<br><i>Study Tip</i> 832, 917<br><b>Teacher Edition:</b><br>AE 497 |

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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.

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| PO 1. Draw inferences about data sets from lists, tables, matrices, and plots.<br><br>Connections: SCHS-S1C4-02  | <b>Student Edition:</b><br>91 ex 3, 952-953   |
| PO 2. Organize collected data into an appropriate graphical representation with or without technology.   | <b>Student Edition:</b><br>91 ex 3, 952-953   |
| 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. | <b>Student Edition:</b><br>91 ex 3, 952-953   |
| PO 4. Make inferences by comparing data sets using one or more summary statistics.<br><br>Connections: SCHS-S1C3-06  | <b>Student Edition:</b><br>91 ex 3, 952-953   |
| PO 5. Determine which measure of center is most appropriate in a given situation and explain why.  | See <i>Algebra 1</i> © 1010<br><b>Student Edition:</b><br>P37-P39, 746-755, 756-762, 763, 770 #48, 794-795, 797, 842-843, 856<br><i>Study Tip</i> P38 |
| PO 6. Evaluate the reasonableness of conclusions drawn from data analysis.<br><br>Connections: SCHS-S1C3-02  | <b>Student Edition:</b><br>91 ex 3, 952-953   |

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| <p>PO 7. Identify misrepresentations and distortions in displays of data and explain why they are misrepresentations or distortions.</p>   | <p>See <i>Algebra 1</i> © 1010</p> <p><b>Student Edition:</b><br/>249, 740-745, 746-755, 756-762, 763, 780, 794-795, 797, 842-843, 856, 866-867</p> <p><i>Watch Out</i> 747</p>   |
| <p>PO 8. Design simple experiments or investigations and collect data to answer questions.</p>   | <p>See <i>Algebra 1</i> © 1010</p> <p><b>Student Edition:</b><br/>740-745, 746-755, 756-762, 763, 794-795, 797, 842-843, 856</p>  |
| <p><b>Concept 2: Probability</b></p> <p>Understand and apply the basic concepts of probability.</p> <p>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><b>Student Edition:</b><br/>906-914, 915-921, 922 #7-#15, 930 #30-#31, 931-937, 938-945</p> <p><b>Teacher Edition:</b><br/>A 914; AE 907, 908, 909, 910, 916, 917, 932, 933, 934, 939, 940, 941; DI 909, 913, 916, 932, 934; TWT 933</p> |
| <p>PO 2. Determine the theoretical probability of events, estimate probabilities using experiments, and compare the two.</p>   | <p><b>Student Edition:</b><br/>906-914, 915-921, 922 #7-#15, 930 #30-#31, 931-937, 938-945</p> <p><b>Teacher Edition:</b><br/>A 914; AE 907, 908, 909, 910, 916, 917, 932, 933, 934, 939, 940, 941; DI 909, 913, 916, 932, 934; TWT 933</p> |
| <p>PO 3. Use simulations to model situations involving independent and dependent events.</p>   | <p><b>Student Edition:</b><br/>923-930, 937 #32, 945 #41, 950 #18-#20, 951 #17</p> <p><b>Teacher Edition:</b><br/>A 930; AE 924, 925, 926; DI 926, 929, 937; F 925; T 923; TWT 924</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>See <i>Algebra 1</i> © 1010</p> <p><b>Student Edition:</b><br/>787-792</p> <p><i>Reading Math</i> 789</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><b>Student Edition:</b><br/>915-921, 922 #16, 930 #30-#31, 937 #33-#36, 949 #16-#17, 951 #1-#2</p> <p><b>Teacher Edition:</b><br/>A 917, 921; AE 916, 917; DI 916, 920; TWT 917</p> |
| <p><b>Concept 3: Systematic Listing and Counting</b></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><b>Student Edition:</b><br/>899-905</p> <p><b>Teacher Edition:</b><br/>A 905; AE 900, 901; DI 900, 904; F 901; TNT 901</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><b>Student Edition:</b><br/>899-905</p> <p><i>Key Concept</i> 907, 910</p> <p><b>Teacher Edition:</b><br/>A 905; AE 900, 901; DI 900, 904, 909; F 901; TNT 901</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><b>Student Edition:</b><br/>899-905</p> <p><b>Teacher Edition:</b><br/>A 905; AE 900, 901; DI 900, 904; F 901; TNT 901</p>  |
| <p><b>Concept 4: Vertex-Edge Graphs</b></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><b>Student Edition:</b><br/><i>Geometry Lab</i> 946-947</p> <p><b>Teacher Edition:</b><br/>A 947</p>  |

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**Strand 4: Geometry and Measurement**

Geometry is a natural place for the development of students' reasoning, higher thinking, and justification skills culminating in work with proofs. Geometric modeling and spatial reasoning offer ways to interpret and describe physical environments and can be important tools in problem solving. Students use geometric methods, properties and relationships, transformations, and coordinate geometry as a means to recognize, draw, describe, connect, analyze, and measure shapes and representations in the physical world. Measurement is the assignment of a numerical value to an attribute of an object, such as the length of a pencil. At more sophisticated levels, measurement involves assigning a number to a characteristic of a situation, as is done by the consumer price index. A major emphasis in this strand is becoming familiar with the units and processes that are used in measuring attributes.

**Concept 1: Geometric Properties**

Analyze the attributes and properties of 2- and 3-dimensional shapes and develop mathematical arguments about their relationships.

In Grades 9 and 10, students develop their reasoning skills, both inductive and deductive. Students employ their understanding of the properties of two- and three-dimension figures, investigated in the middle grades, to solve problems. Students investigate trigonometric ratios and their application to triangles in preparation for the advanced trigonometric study undertaken in College Work Readiness.

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| <p>PO 1. Use the basic properties of a circle (relationships between angles, radii, intercepted arcs, chords, tangents, and secants) to prove basic theorems and solve problems.</p>  | <p><b>Student Edition:</b><br/>692-700, 701-708, 709-716, 717 #7-#14, 718-725, 727-735, 736-742</p> <p><b>Teacher Edition:</b><br/>A 700, 708, 716; AE 693, 694, 695, 702, 703, 710, 711, 712; DI 694, 695, 710, 711; F 704; TWT 693, 702</p>                          |
| <p>PO 2. Visualize solids and surfaces in 3-dimensional space when given 2-dimensional representations and create 2-dimensional representations for the surfaces of 3-dimensional objects.</p>                                | <p><b>Student Edition:</b><br/>823-828, 837 #49-#50, 846 #47-#48, 851 #23-#24, 856 #1-#3, 888 #11-#13, 891 #1-#2</p> <p><i>Geometry Lab</i> 821-822, 829</p> <p><b>Teacher Edition:</b><br/>A 822, 828; DI 824, 828; F 825; T 823, 824, 825</p>                        |
| <p>PO 3. Create and analyze inductive and deductive arguments concerning geometric ideas and relationships.</p> <p>Connections: MHS-S4C1-01, MHS-S4C1-04, MHS-S4C1-05, MHS-S4C1-07, MHS-S4C1-08, MHS-S4C3-02, MHS-S4C3-04</p> | <p><b>Student Edition:</b><br/>89-96, 104 #54, 113 #77-#80, 115-123, 132 #55-#56, 133 #16-#17, 141 #49, 159 #11-#13, 160 #21-#23, 163 #1-#2</p> <p><b>Teacher Edition:</b><br/>A 96, 123; AE 90, 91, 116, 117, 118; DI 92, 96, 117; F 93, 121; TWT 90, 118; WO 118</p> |

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| <p>PO 4. Apply properties, theorems, and constructions about parallel lines, perpendicular lines, and angles to prove theorems.</p> <p>Connections: MHS-S4C1-01, MHS-S4C1-05, MHS-S4C1-06, MHS-S4C1-07, MHS-S4C1-08, MHS-S4C1-09, MHS-S4C1-10, MHS-S4C1-11</p> | <p><b>Student Edition:</b><br/>149-157, 162 #43, 205-212, 222 #52, 226 #34-#39</p> <p><b>Teacher Edition:</b><br/>A 157, 212; AE 150, 152, 153, 206, 207, 208; DI 207, 208, 221; F 151, 207; TNT 150, 152, 206</p>  |
| <p>PO 5. Explore Euclid's five postulates in the plane and their limitations.</p>  | <p><b>Student Edition:</b><br/>5-12, 21 #46-#50, 35 #79-#80, 45 #1-#3, 77 #5-#10, 81 #1-#3, 84 #3</p> <p><i>Geometry Lab</i> 13</p> <p><i>Key Concept</i> 873</p> <p><b>Teacher Edition:</b><br/>A 12, 13; AE 6, 7; DI 10, 11, 874; T 5, 13; TNT 7; TWT 7</p> |
| <p>PO 6. Solve problems using angle and side length relationships and attributes of polygons.</p> <p>Connections: MHS-S4C1-04, MHS-S4C1-07, MHS-S4C2-04, MHS-S4C3-04, MHS-S4C4-01, MHS-S4C4-03, MHS-S4C4-04, MHS-S4C4-05</p>                                   | <p><b>Student Edition:</b><br/>36-44, 45 #13-#15, 46-54, 56-64</p> <p><i>Geometry Software Lab</i> 65-66</p> <p><b>Teacher Edition:</b><br/>A 44, 54; AE 37, 38, 40, 47, 48, 49, 50, 57, 58, 59, 60; DI 37, 39, 48; F 48; T 36, 46; TNT 37, 49</p>            |
| <p>PO 7. Use the hierarchy of quadrilaterals in deductive reasoning.</p> <p>Connections: MHS-S4C1-03, MHS-S4C1-04, MHS-S4C1-06</p>   | <p><b>Student Edition:</b><br/>430 ex 4, 431 #5-#6, 432 #31-#33, 433 #46</p> <p><i>Concept Summary</i> 427</p> <p><b>Teacher Edition:</b><br/>AE 430; DI 433</p>  |
| <p>PO 8. Prove similarity and congruence of triangles.</p> <p>Connections: MHS-S4C1-03, MHS-S4C1-04, MHS-S4C1-10, MHS-S4C1-11, MHS-S4C2-01, MHS-S4C2-03, MHS-S4C2-04, MHS-S4C3-04, MHS-S4C4-04</p>   | <p><b>Student Edition:</b><br/>253-261, 262-270, 273-280, 301-307</p> <p><b>Teacher Edition:</b><br/>A 261, 270, 280, 307; AE 254, 255, 263, 264, 265, 266, 274, 275, 302, 303; DI 255, 263, 307; TNT 256; TWT 256</p>  |
| <p>PO 9. Solve problems using the triangle inequality property.</p> <p>Connections: MHS-S4C1-04</p>  | <p><b>Student Edition:</b><br/>360-366, 376 #47-#49, 380 #26-#30, 381 #14, 383 #5, 384 #2</p> <p><b>Teacher Edition:</b><br/>AE 361, 362; DI 361, 362; T 360; TWT 361</p>   |

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| <p>PO 10. Solve problems using right triangles, including special triangles.</p> <p>Connections: MHS-S1C2-02, MHS-S1C3-01, MHS-S3C3-11, MHS-S4C1-04, MHS-S4C1-08, MHS-S4C1-11, MHS-S4C3-01, MHS-S4C3-02, MHS-S4C3-03, MHS-S5C1-01, MHS-S5C1-02</p>   | <p><b>Student Edition:</b><br/>552-560, 571 #70-#72, 573 #21, 604 #22-#24, 607 #9<br/><i>Geometry Lab</i> 281-282<br/><i>Graphing Technology Lab</i> 281-282</p> <p><b>Teacher Edition:</b><br/>A 282, 560; AE 553, 554, 555; DI 553; F 554; TNT 555; TWT 554</p> |
| <p>PO 11. Solve problems using the sine, cosine, and tangent ratios of the acute angles of a right triangle.</p> <p>Connections: MHS-S3C3-02, MHS-S3C4-02, MHS-S4C1-04, MHS-S4C1-08, MHS-S4C1-10, S4C4-05, MHS-S5C1-01, MHS-S5C1-02</p>  | <p><b>Student Edition:</b><br/>562-571, 573 #17-#20, 574-581, 582-591<br/><i>Graphing Technology</i> 572</p> <p><b>Teacher Edition:</b><br/>AE 563, 564, 565, 566, 575, 576, 584, 585; DI 564, 566, 575, 576; FS 84; TNT 563; TWT 563</p>                         |
| <p><b>Concept 2: Transformation of Shapes</b></p> <p>Apply spatial reasoning to create transformations and use symmetry to analyze mathematical situations.</p> <p>In Grades 9 and 10, students analyze the effect of transformations on the attributes of geometric figures. Students extend the analysis in grades 9 and 10 to analyze the effects of transformations on the library of functions in grades 11 and 12.</p> |   |
| <p>PO 1. Determine whether a transformation of a 2-dimensional figure on a coordinate plane represents a translation, reflection, rotation, or dilation and whether congruence is preserved.</p> <p>Connections: MHS-S4C1-08, MHS-S4C2-02, MHS-S4C2-03, MHS-S4C2-04, MHS-S4C4-04</p>   | <p><b>Student Edition:</b><br/>612-623, 624-630, 632-638, 639 #1-#2, 659 #59-#61, 660-667<br/><i>Geometry Lab</i> 631</p> <p><b>Teacher Edition:</b><br/>A 623; AE 616, 617, 618, 625, 626, 633, 634, 662, 663; DI 617, 625, 630; T 615; TWT 616, 626</p>         |
| <p>PO 2. Determine the new coordinates of a point when a single transformation is performed on a 2-dimensional figure.</p> <p>Connections: MHS-S3C4-02, MHS-S4C1-06, MHS-S4C1-08, MHS-S4C2-01, MHS-S4C2-03, MHS-S4C3-03, MHS-S4C4-04</p>   | <p><b>Student Edition:</b><br/>612-623, 624-630, 632-638, 639 #1-#2, 659 #59-#61, 660-667<br/><i>Geometry Lab</i> 631</p> <p><b>Teacher Edition:</b><br/>A 623; AE 616, 617, 618, 625, 626, 633, 634, 662, 663; DI 617, 625, 630; T 615; TWT 616, 626</p>         |
| <p>PO 3. Sketch and describe the properties of a 2-dimensional figure that is the result of two or more transformations.</p> <p>Connections: MHS-S4C1-03, MHS-S4C1-06, MHS-S4C1-08, MHS-S4C2-01, MHS-S4C2-02, MHS-S4C2-04</p>  | <p><b>Student Edition:</b><br/>622 #47, 637 #33, 641-649, 659 #55-#56, 667 #49-#50, 672 #23-#25, 675 #6, 677 #1, 678 #2<br/><i>Geometry Software Lab</i> 640</p> <p><b>Teacher Edition:</b><br/>A 640; AE 642, 643, 644, 677; DI 630, 644, 647; T 641; WO 648</p> |

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| <p>PO 4. Determine the effects of a single transformation on linear or area measurements of a 2-dimensional figure.</p> <p>Connections: MHS-S3C4-02, MHS-S4C1-06, MHS-S4C1-08, MHS-S4C2-01, MHS-S4C2-02, MHS-S4C2-03, MHS-S4C4-04</p>  | <p><b>Student Edition:</b><br/>506 ex 2, 769 #38, 779 #37, 787 #49, 797 #33, 802-808, 812 #30-#35, 817 #6, 828 #44-#46</p> <p><b>Teacher Edition:</b><br/>A 808; AE 506, 803, 804; DI 804, 807, 808; F 804; T 802; TWT 803</p>   |
| <p><b>Concept 3: Coordinate Geometry</b></p> <p>Specify and describe spatial relationships using rectangular and other coordinate systems while integrating content from each of the other strands.</p> <p>In Grades 9 and 10, students make connections between algebra and geometry by investigating the attributes of algebraic functions and geometric figures. Students explore the relationships between the figure/function and its graph, laying the foundation for deeper investigation of representations of functions and their attributes in grades 11 and 12.</p> |  |
| <p>PO 1. Determine how to find the midpoint between two points in the coordinate plane.</p> <p>Connections: MHS-S1C1-03, MHS-S1C2-03, MHS-S3C3-02, MHS-S4C1-03, MHS-S4C1-10, MHS-S5C1-01, MHS-S5C1-02</p>  | <p><b>Student Edition:</b><br/>27 ex 3, 28 ex 4, 29 ex 6, 30 #9-#10, 31 #11, 32 #33-#38, 33 #63, 34 #67, 45 #9-#10, 54 #60-#62, 78 #18-#19<br/><i>Geometry Lab</i> 550-551<br/><i>Key Concept</i> 27</p> <p><b>Teacher Edition:</b><br/>A 35, 551; AE 27, 28, 29; DI 27, 28; F 550; T 550; WO 27</p>             |
| <p>PO 2. Illustrate the connection between the distance formula and the Pythagorean Theorem.</p> <p>Connections: MHS-S1C1-03, MHS-S3C3-01, MHS-S3C3-08, MHS-S4C1-03, MHS-S4C1-10, MHS-S5C1-01, MHS-S5C1-02</p>   | <p><b>Student Edition:</b><br/>25 ex 1, 26 ex 2, 30 #3-#5, 31 #19-#30, 34 #68, 44 #58-#63, 45 #9-#10, 78 #16-#17, 81 #10-#12, 85 #8, 216 ex 3, 218 #7-#8, 219 #21-#29<br/><i>Geometry Lab</i> 550-551<br/><i>Key Concept</i> 25, 26</p> <p><b>Teacher Edition:</b><br/>A 35, 551; AE 26, 216; TNT 26; TWT 26</p> |
| <p>PO 3. Determine the distance between two points in the coordinate plane.</p> <p>Connections: MHS-S1C1-03, MHS-S1C2-02, MHS-S1C2-03, MHS-S3C3-02, MHS-S3C3-08, MHS-S4C1-03, MHS-S4C1-10, MHS-S4C1-11, MHS-S4C2-02, MHS-S5C1-01, MHS-S5C1-02</p>  | <p><b>Student Edition:</b><br/>25 ex 1, 26 ex 2, 30 #3-#5, 31 #19-#30, 34 #68, 44 #58-#63, 45 #9-#10, 78 #16-#17, 81 #10-#12, 85 #8, 216 ex 3, 218 #7-#8, 219 #21-#29<br/><i>Geometry Lab</i> 550-551<br/><i>Key Concept</i> 25, 26</p> <p><b>Teacher Edition:</b><br/>A 35, 551; AE 26, 216; TNT 26; TWT 26</p> |

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| <p>PO 4. Verify characteristics of a given geometric figure using coordinate formulas for distance, midpoint, and slope to confirm parallelism, perpendicularity, and congruence.</p> <p>Connections: MHS-S3C3-04, MHS-S3C3-08, MHS-S4C1-03, MHS-S4C1-04, MHS-S4C1-06, MHS-S4C1-07, MHS-S4C1-08, MHS-S4C2-01, MHS-S4C3-01, MHS-S4C3-03</p>   | <p><b>Student Edition:</b><br/>25 ex 1, 26 ex 2, 30 #3-#5, 31 #19-#30, 34 #68, 44 #58-#63, 45 #9-#10, 78 #16-#17, 81 #10-#12, 85 #8, 216 ex 3, 218 #7-#8, 219 #21-#29<br/><i>Geometry Lab</i> 550-551<br/><i>Key Concept</i> 25, 26</p> <p><b>Teacher Edition:</b><br/>A 35, 551; AE 26, 216; TNT 26; TWT 26</p> |
| <p>PO 5. Graph a linear equation or linear inequality in two variables.</p> <p>Connections: MHS-S3C2-01, MHS-S3C4-01</p>   | <p><b>Student Edition:</b><br/>190 #9-#11, 192 #34-#39, 193 #51, 225 #24-#25</p> <p><b>Teacher Edition:</b><br/>AE 190</p>   |
| <p>PO 6. Describe how changing the parameters of a linear function affect the shape and position of its graph.</p> <p>Connections: MHS-S3C2-02</p>   | <p><b>Student Edition:</b><br/>203 #61, 231 #13</p>  |
| <p>PO 7. Determine the solution to a system of linear equations in two variables from the graphs of the equations.</p> <p>Connections: MHS-S3C3-04</p>   | <p><b>Student Edition:</b><br/>P3 #54-#59, P17-P18, P21 #48-#53</p> <p><b>Teacher Edition:</b><br/>A P18; AE P17, P18</p>  |
| <p>PO 8. Graph a quadratic function and interpret x-intercepts as zeros.</p> <p>Connections: MHS-S3C2-06</p>   | <p>See <i>Algebra 2</i> © 2010</p> <p><b>Student Edition:</b><br/>249-257, 259-266</p>   |
| <p><b>Concept 4: Measurement</b></p> <p>Understand and apply appropriate units of measure, measurement techniques, and formulas to determine measurements.</p> <p>In Grades 9 and 10, students extend work from grades 7 and 8 with proportional reasoning and geometric formulas for perimeter, area, surface area, and volume of two- and three-dimensional figures to analyze change in dimensions and solve problems in context.</p> |  |
| <p>PO 1. Use dimensional analysis to keep track of units of measure when converting.</p> <p>Connections: MHS-S1C2-03, MHS-S3C3-01, MHS-S3C3-02, MHS-S3C3-09, MHS-S3C4-02, MHS-S4C1-06, MHS-S4C4-02, MHS-S4C4-03, MHS-S4C4-05, SCHS5C2-02, SCHS5C2-04</p>   | <p><b>Student Edition:</b><br/>P4 ex 3, P7 ex 4, 869 #38, 883 #14, 884 #22, 885 #23</p> <p><b>Teacher Edition:</b><br/>AE P4, P7</p>   |

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| <p>PO 2. Find the length of a circular arc; find the area of a sector of a circle.</p> <p>Connections: MHS-S2C2-05, MHS-S4C1-01, MHS-S4C1-06, MHS-S4C4-01, MHS-S5C1-01</p>                      | <p><b>Student Edition:</b><br/>693 ex 2, 694 ex 4, 695 ex 5, 701 ex 1, 702 ex 2, 704 #4-#5, 705 #18, 783 ex 3, 784 #5-#6, 785 #18-#23, 786 #27-#29, 787 #44, 788 #50, 789 #14-#17, 811 #21-#22<br/><i>Key Concept</i> 695, 783</p> <p><b>Teacher Edition:</b><br/>A 708; AE 694, 695, 702, 703, 783; DI 783</p> |
| <p>PO 3. Determine the effect that changing dimensions has on the perimeter, area, or volume of a figure.</p> <p>Connections: MHS-S2C2-05, MHS-S4C1-01, MHS-S4C4-01, MHS-S4C4-02</p>            | <p><b>Student Edition:</b><br/>506 ex 2, 769 #38, 779 #37, 787 #49, 797 #33, 802-808, 812 #30-#35, 817 #6, 828 #44-#46</p> <p><b>Teacher Edition:</b><br/>A 808; AE 506, 803, 804; DI 804, 807, 808; F 804; T 802; TWT 803</p>  |
| <p>PO 4. Solve problems involving similar figures using ratios and proportions.</p> <p>Connections: MHS-S2C2-05, MHS-S4C1-01, MHS-S4C1-06, MHS-S4C1-08, MHS-S4C2-04</p>                         | <p><b>Student Edition:</b><br/>477 ex 4, 478 ex 5, 479 #8, 480 #16-#21, 483 #43, 495-502, 511 #32, 802-808, 812 #30-#32, 813 #20, 882 ex 3, 883 #14, 884 #18</p> <p><b>Teacher Edition:</b><br/>A 502, 808; AE 477, 478, 496, 497, 498, 803, 804; DI 497; F 498, 804; T 802; TWT 497, 803</p>                   |
| <p>PO 5. Calculate the surface area and volume of 3-dimensional figures and solve for missing measures.</p> <p>Connections: MHS-S2C2-05, MHS-S4C1-06, MHS-S4C1-11, MHS-S4C4-01, MHS-S4C4-04</p> | <p><b>Student Edition:</b><br/>830-837, 838-846, 847-854, 857-863, 864-871</p> <p><b>Teacher Edition:</b><br/>A 837; AE 831, 832, 833, 839, 840, 841, 842, 848, 849, 858, 859; DI 832, 852; F 832, 840, 849; TNT 831</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:**

*Geometry Lab* 55, 75, 204, 243, 271, 281-282, 321, 332, 540, 550-551, 572, 592, 601, 631, 726, 790, 800-801

**Teacher Edition:**

A 55, 204, 243

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:**

73 #37, 131 #45, 147 #17, 193 #53, 202 #59, 251 #46, 279 #23, 340 #37, 357 #43, 396 #49, 424 #46, 433 #46, 443 #65, 462 #44, 492 #48, 501 #31, 538 #49, 559 #46, 580 #23, 590 #54

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**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.

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.

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| 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.                                    | <b>Student Edition:</b><br><i>Problem-Solving Tip</i> 127, 199, 245, 369, 430, 478, 555, 661, 719, 737, 787, 853, 924  |
| 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).   | <b>Student Edition:</b><br>73 #37, 131 #45, 147 #17, 193 #53, 202 #59, 251 #46, 279 #23, 340 #37, 357 #43, 396 #49, 424 #46, 433 #46, 443 #65, 462 #44, 492 #48, 501 #31, 538 #49, 559 #46, 580 #23, 590 #54 |
| PO 3. Evaluate a solution for reasonableness and interpret the meaning of the solution in the context of the original problem.  | <b>Student Edition:</b><br>73 #37, 131 #45, 147 #17, 193 #53, 202 #59, 251 #46, 279 #23, 340 #37, 357 #43, 396 #49, 424 #46, 433 #46, 443 #65, 462 #44, 492 #48, 501 #31, 538 #49, 559 #46, 580 #23, 590 #54 |
| 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.   | <b>Student Edition:</b><br>73 #37, 131 #45, 147 #17, 193 #53, 202 #59, 251 #46, 279 #23, 340 #37, 357 #43, 396 #49, 424 #46, 433 #46, 443 #65, 462 #44, 492 #48, 501 #31, 538 #49, 559 #46, 580 #23, 590 #54 |
| PO 5. Summarize and communicate mathematical ideas using formal and informal reasoning.   | <b>Student Edition:</b><br>53 #52, 63 #49, 73 #42, 95 #54, 103 #48, 112 #68, 122 #46, 131 #50, 140 #41, 147 #22, 156 #35, 175 #50, 183 #42, 193 #57, 202 #58, 211 #43, 221 #42, 241 #64, 251 #51, 260 #43    |
| 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. | <b>Student Edition:</b><br>73 #37, 131 #45, 147 #17, 193 #53, 202 #59, 251 #46, 279 #23, 340 #37, 357 #43, 396 #49, 424 #46, 433 #46, 443 #65, 462 #44, 492 #48, 501 #31, 538 #49, 559 #46, 580 #23, 590 #54 |

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| PO 7. Find structural similarities within different algebraic expressions and geometric figures.  | <p><b>Student Edition:</b><br/>36-44, 45 #13-#15, 46-54, 56-64<br/><i>Geometry Software Lab</i> 65-66</p> <p><b>Teacher Edition:</b><br/>A 44, 54; AE 37, 38, 40, 47, 48, 49, 50, 57, 58, 59, 60; DI 37, 39, 48; F 48; T 36, 46; TNT 37, 49</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><b>Student Edition:</b><br/>89-96, 104 #54, 113 #77-#80, 115-123, 132 #55-#56, 133 #16-#17, 141 #49, 159 #11-#13, 160 #21-#23, 163 #1-#2</p> <p><b>Teacher Edition:</b><br/>A 96, 123; AE 90, 91, 116, 117, 118; DI 92, 96, 117; F 93, 121; TWT 90, 118; WO 118</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><b>Student Edition:</b><br/>105-113, 123 #51, 132 #57-#58, 133 #12-#13, 157 #45-#48, 160 #18-#20<br/><i>Geometry Lab</i> 114</p> <p><b>Teacher Edition:</b><br/>A 113; AE 106, 107, 108; DI 111; F 108; TWT 107</p>   |
| PO 10. List related <i>if... then</i> statements in logical order.  | <p><b>Student Edition:</b><br/>97-104, 105-113, 115-123</p> <p><b>Teacher Edition:</b><br/>A 104, 114; AE 98, 99, 100, 106, 107, 116, 117, 118; DI 104, 111, 117; F 100; T 114; TNT 99, 106, 107; TWT 98; WO 112, 118</p>  |
| PO 11. Draw a simple valid conclusion from a given <i>if...then</i> statement and a minor premise.  | <p><b>Student Edition:</b><br/>97-104, 105-113, 115-123</p> <p><b>Teacher Edition:</b><br/>A 104, 114; AE 98, 99, 100, 106, 107, 116, 117, 118; DI 104, 111, 117; F 100; T 114; TNT 99, 106, 107; TWT 98; WO 112, 118</p>  |
| PO 12. Construct a simple formal deductive proof.   | <p><b>Student Edition:</b><br/>89-96, 104 #54, 113 #77-#80, 115-123, 132 #55-#56, 133 #16-#17, 141 #49, 159 #11-#13, 160 #21-#23, 163 #1-#2</p> <p><b>Teacher Edition:</b><br/>A 96, 123; AE 90, 91, 116, 117, 118; DI 92, 96, 117; F 93, 121; TWT 90, 118; WO 118</p> |

| STANDARDS  | PAGE REFERENCES   |
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| <p>PO 13. Identify and explain the roles played by definitions, postulates, propositions and theorems in the logical structure of mathematics, including Euclidean geometry.</p> | <p><b>Student Edition:</b><br/>           5-12, 21 #46-#50, 35 #79-#80, 45 #1-#3,<br/>           77 #5-#10, 81 #1-#3, 84 #3<br/> <i>Geometry Lab</i> 13<br/> <i>Key Concept</i> 873</p> <p><b>Teacher Edition:</b><br/>           A 12, 13; AE 6, 7; DI 10, 11, 874; T 5, 13; TNT 7;<br/>           TWT 7</p> |