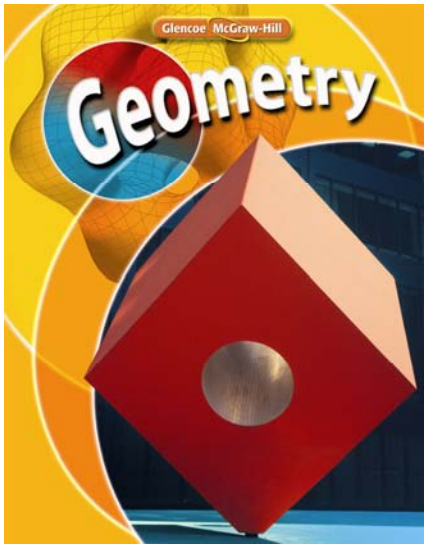
Academic Standards in Mathematics
Grades 8-11

Minnesota




# Geometry



| STANDARDS | PAGE REFERENCES |
|---|---|
| **GRADES 8-11** | |
| Geometry & Measurement | |
| Solve problems involving right triangles using the Pythagorean Theorem and its converse. | |
| 8.3.1.1 | |
| Use the Pythagorean Theorem to solve problems involving right triangles. | **Student Edition:**<br>440-446, 454 #42-#47, 462 #62-#63, 463 #4, 487 #15-#17, 491 #7-#8, 492 #3, 493 #8<br>*Geometry Lab* 439<br>**Teacher Wraparound Edition:**<br>A 439, 446; AE 441, 442, 443; PA 443; T 439 |
| 8.3.1.2 | |
| Determine the distance between two points on a horizontal or vertical line in a coordinate system. Use the Pythagorean Theorem to find the distance between any two points in a coordinate system. | **Student Edition:**<br>21-29, 38 #49-#51, 39 #7-#11, 47 #44-#49, 70 #15-#21, 73 #8-#10, 75 #7, 204 ex 4, 205 #7-#8, 206 #17-#20, 207 #37, 227 ex 2, 229 #2-#3, 230 #9-#12, 252 ex 3<br>**Teacher Wraparound Edition:**<br>AE 22, 23, 24, 204, 227, 252; DI 24; I 23 |

**Codes used for Teacher Wraparound Edition pages are the initial caps of headings on that page.**

| STANDARDS | PAGE REFERENCES |
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| 8.3.1.3 | |
| Informally justify the Pythagorean Theorem by using measurements, diagrams and computer software. | **Student Edition:**<br>440-446, 454 #42-#47, 462 #62-#63, 463 #4, 487 #15-#17, 491 #7-#8, 492 #3, 493 #8<br>*Geometry Lab* 439<br>**Teacher Wraparound Edition:**<br>A 439, 446; AE 441, 442, 443; PA 443; T 439 |
| Solve problems involving parallel and perpendicular lines on a coordinate system. | |
| 8.3.2.1 | |
| Understand and apply the relationships between the slopes of parallel lines and between the slopes of perpendicular lines. Dynamic graphing software may be used to examine the relationships between lines and their equations. | **Student Edition:**<br>142-147, 149-154<br>**Teacher Wraparound Edition:**<br>A 147; AE 143, 144; PA 147 |
| Solve problems involving parallel and perpendicular lines on a coordinate system. | |
| 8.3.2.2 | |
| Analyze polygons on a coordinate system by determining the slopes of their sides. | **Student Edition:**<br>142-147, 149-154, 329 #31-#33, 336 ex 5, 343 ex 4, 344 #6, 345 #30-#31, 347 #12-#13, 350 ex 3, 354 #45-#46, 357 ex 3, 359 #3-#4, 360 #13-#16, 361 #25-#26, 364 ex 3<br>**Teacher Wraparound Edition:**<br>AE 336, 343, 350, 357, 364 |
| 8.3.2.3 | |
| Given a line on a coordinate system and the coordinates of a point not on the line, find lines through that point that are parallel and perpendicular to the given line, symbolically and graphically. | **Student Edition:**<br>142-147, 149-154<br>**Teacher Wraparound Edition:**<br>A 147; AE 143, 144; PA 147 |
| Calculate measurements of plane and solid geometric figures; know that physical measurements depend on the choice of a unit and that they are approximations. | |
| 9.3.1.1 | |
| Determine the surface area and volume of pyramids, cones and spheres. Use measuring devices or formulas as appropriate. | **Student Edition:**<br>686-691, 693-697, 698 #9-#10, 699-705, 706-710, 728-735, 737-742<br>**Teacher Wraparound Edition:**<br>A 691, 697, 705; AE 687, 688, 694, 700, 701, 707, 708; DI 707; F 695; PA 694 |

| STANDARDS | PAGE REFERENCES |
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| 9.3.1.2 | |
| Compose and decompose two- and three-dimensional figures; use decomposition to determine the perimeter, area, surface area and volume of various figures. | **Student Edition:**<br>658-663, 671 #35-#36, 674 #20-#22, 675 #15, 676 #1, 682 ex 3, 683 #14-#19, 684 #33-#35, 691 #41-#43<br>*Geometry Lab* 681<br>**Teacher Wraparound Edition:**<br>AA 665; AE 632, 659, 660, 682; GL 681; PA 659 |
| 9.3.1.3 | |
| Understand that quantities associated with physical measurements must be assigned units; apply such units correctly in expressions, equations and problem solutions that involve measurements; and convert between measurement systems. | **Student Edition:**<br>776-777, 855 #2 |
| 9.3.1.4 | |
| Understand and apply the fact that the effect of a scale factor $k$ on length, area and volume is to multiply each by $k$, $k^2$ and $k^3$, respectively. | **Student Edition:**<br>646 #48, 655 #43-#46, 690 #30-#33, 716 #33-#35, 734 #26, 750-757, 767 #24, 769 #16-#18<br>*Spreadsheet Lab* 736<br>**Teacher Wraparound Edition:**<br>AE 753 |
| 9.3.1.5 | |
| Make reasonable estimates and judgments about the accuracy of values resulting from calculations involving measurements. | **Student Edition:**<br>14 ex 3, 17 #5-#6, 18 #16-#21, 19 #48-#51, 69 #14<br>*Study Tip* 14<br>**Teacher Wraparound Edition:**<br>AE 14; PA 14 |
| Construct logical arguments, based on axioms, definitions and theorems, to prove theorems and other results in geometry. | |
| 9.3.2.1 | |
| Understand the roles of axioms, definitions, undefined terms and theorems in logical arguments. | **Student Edition:**<br>78-82, 90 #56-#61, 97 #60-#62, 110 #1-#3, 133 #11-#13, 137 #1-#3<br>**Teacher Wraparound Edition:**<br>A 82; AE 79, 80; PA 82; T 78; TNT 79 |

| STANDARDS | PAGE REFERENCES |
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| 9.3.2.2 | |
| Accurately interpret and use words and phrases in geometric proofs such as "if…then," "if and only if," "all," and "not." Recognize the logical relationships between an "if…then" statement and its inverse, converse and contrapositive. | **Student Edition:**<br>84 ex 1, 85 ex 2, 91-97, 104 #36-#38, 109 #31, 110 #8, 117 #39-#40, 134 #17-#22, 137 #7<br>*Reading Math* 98<br>**Teacher Wraparound Edition:**<br>A 97; AE 84, 85, 92, 93; F 94; PA 97; T 98; TNT 92, 93 |
| 9.3.2.3 | |
| Assess the validity of a logical argument and give counterexamples to disprove a statement. | **Student Edition:**<br>47 #38, 79 ex 3, 80 #5-#6, 81 #25-#30, 109 #31, 110 #1-#2, 133 #11-#13, 134 #19-#22, 137 #1-#3, 138 #1<br>*Extra Practice Lesson 2-1* 802<br>*Reading Math* 98<br>**Teacher Wraparound Edition:**<br>AE 80, 82 |
| 9.3.2.4 | |
| Construct logical arguments and write proofs of theorems and other results in geometry, including proofs by contradiction. Express proofs in a form that clearly justifies the reasoning, such as two-column proofs, paragraph proofs, flow charts or illustrations. ˚. | **Student Edition:**<br>78-82, 90 #56-#61, 97 #60-#62, 110 #1-#3, 133 #11-#13, 137 #1-#3<br>**Teacher Wraparound Edition:**<br>A 82; AE 79, 80; PA 82; T 78; TNT 79 |
| 9.3.2.5 | |
| Use technology tools to examine theorems, test conjectures, perform constructions and develop mathematical reasoning skills in multi-step problems. The tools may include compass and straight edge, dynamic geometry software, design software or Internet applets. | **Student Edition:**<br>*Construction*: 16, 25, 33, 35, 48, 172, 182, 186, 225, 228, 234, 266, 267, 268, 341, 350, 409, 413, 576, 592, 594, 597 |
| Know and apply properties of geometric figures to solve real-world and mathematical problems and to logically justify results in geometry. | |
| 9.3.3.1 | |
| Know and apply properties of parallel and perpendicular lines, including properties of angles formed by a transversal, to solve problems and logically justify results. | **Student Edition:**<br>142-147, 149-154, 192 #9-#12, 195 #1, 196 #4<br>*Geometry Software Lab* 148<br>**Teacher Wraparound Edition:**<br>A 154; AE 144, 150, 151; PA 147; T 148; TNT 144 |

| STANDARDS | PAGE REFERENCES |
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| 9.3.3.2 | |
| Know and apply properties of angles, including corresponding, exterior, interior, vertical, complementary and supplementary angles, to solve problems and logically justify results. | **Student Edition:**<br>124-131, 136 #45, 137 #17-#18, 147 #56, 153 #26<br>**Teacher Wraparound Edition:**<br>A 131; AE 127; F 126; GL 128; PA 131 |
| 9.3.3.3 | |
| Know and apply properties of equilateral, isosceles and scalene triangles to solve problems and logically justify results. | **Student Edition:**<br>202-208, 216 #41-#43, 223 #42-#43, 233 #1-#2, 256 #1-#4, 257 #11, 261 #1-#3<br>*Geometry Lab* 209<br>*Reading Math* 224<br>**Teacher Wraparound Edition:**<br>A 208, 224; AE 203, 204; GL 203; PA 204; T 209 |
| 9.3.3.4 | |
| Apply the Pythagorean Theorem and its converse to solve problems and logically justify results. | **Student Edition:**<br>440-446, 454 #42-#47, 462 #62-#63, 463 #4, 487 #15-#17, 491 #7-#8, 492 #3, 493 #8<br>*Geometry Lab* 439<br>**Teacher Wraparound Edition:**<br>A 439, 446; AE 441, 442, 443; PA 443; T 439 |
| 9.3.3.5 | |
| Know and apply properties of right triangles, including properties of 45-45-90 and 30-60-90 triangles, to solve problems and logically justify results. | **Student Edition:**<br>448-454, 462 #62-#63, 463 #7-#8, 470 #33-#35, 488 #18-#22, 491 #7-#8, 509 #47<br>*Extra Practice Lesson 8-3* 815<br>*Geometry Lab* 447<br>**Teacher Wraparound Edition:**<br>A 454; AE 449, 450; DI 449; F 450; I 450 |
| 9.3.3.6 | |
| Know and apply properties of congruent and similar figures to solve problems and logically justify results. | **Student Edition:**<br>388-396, 397-403, 404 #11-#13, 422 #39-#40, 425 #12-#13, 427 #6-#8<br>**Teacher Wraparound Edition:**<br>A 396; AE 389, 390, 391, 398, 399; DI 389; F 398; PA 396, 403 |

| STANDARDS | PAGE REFERENCES |
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| 9.3.3.7 | |
| Use properties of polygons—including quadrilaterals and regular polygons—to define them, classify them, solve problems and logically justify results. | **Student Edition:**<br>325-330, 333-339, 340-346, 347 #12-#13, 348-354<br>*Graphing Calculator Lab* 332<br>*Reading Math* 331<br>**Teacher Wraparound Edition:**<br>A 331, 332, 339; AE 334, 335, 336, 343, 350; DI 335, 354; EA 346; PA 339, 351; T 331, 332 |
| 9.3.3.8 | |
| Know and apply properties of a circle to solve problems and logically justify results. | **Student Edition:**<br>578-586, 587 #14, 596 #40-#42, 606 #50-#52, 622 #35-#40, 625 #9, 627 #9<br>*Geometry Lab* 597-598<br>**Teacher Wraparound Edition:**<br>A 586; AE 579, 580, 581, 582; PA 586 |
| Solve real-world and mathematical geometric problems using algebraic methods. | |
| 9.3.4.1 | |
| Understand how the properties of similar right triangles allow the trigonometric ratios to be defined, and determine the sine, cosine and tangent of an acute angle in a right triangle. | **Student Edition:**<br>456-462, 463 #10-#13, 464-470, 471-477, 479-485<br>*Geometry Software Lab* 478<br>*Graphing Calculator Lab* 455<br>**Teacher Wraparound Edition:**<br>A 455, 470, 485; AE 457, 458, 459, 473, 474, 480, 481 |
| 9.3.4.2 | |
| Apply the trigonometric ratios sine, cosine and tangent to solve problems, such as determining lengths and areas in right triangles and in figures that can be decomposed into right triangles. Know how to use calculators, tables or other technology to evaluate trigonometric ratios. | **Student Edition:**<br>456-462, 463 #10-#13, 464-470, 471-477, 479-485<br>*Geometry Software Lab* 478<br>*Graphing Calculator Lab* 455<br>**Teacher Wraparound Edition:**<br>A 455, 470, 485; AE 457, 458, 459, 473, 474, 480, 481 |

| STANDARDS | PAGE REFERENCES |
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| 9.3.4.3 | |
| Use calculators, tables or other technologies in connection with the trigonometric ratios to find angle measures in right triangles in various contexts. | **Student Edition:**<br>456-462, 463 #10-#13, 464-470, 471-477, 479-485<br>*Geometry Software Lab* 478<br>*Graphing Calculator Lab* 455<br>**Teacher Wraparound Edition:**<br>A 455, 470, 485; AE 457, 458, 459, 473, 474, 480, 481 |
| 9.3.4.4 | |
| Use coordinate geometry to represent and analyze line segments and polygons, including determining lengths, midpoints and slopes of line segments. | **Student Edition:**<br>21-29, 38 #49-#51, 39 #7-#11, 47 #44-#49, 70 #15-#21, 73 #8-#10, 75 #7, 142-147, 149-154, 329 #31-#33, 336 ex 5, 343 ex 4, 344 #6, 345 #30-#31, 347 #12-#13, 350 ex 3, 354 #45-#46, 357 ex 3, 359 #3-#4, 360 #13-#16, 361 #25-#26, 364 ex 3<br>**Teacher Wraparound Edition:**<br>AE 336, 343, 350, 357, 364 |
| 9.3.4.5 | |
| Know the equation for the graph of a circle with radius r and center $(h,k)$, $(x-h)^2+(y-k)^2=r^2$, and justify this equation using the Pythagorean Theorem and properties of translations | **Student Edition:**<br>615 ex 3, 617 #6-#7, 624 #56, 625 #21, 627 #13<br>**Teacher Wraparound Edition:**<br>AE 616 |
| 9.3.4.6 | |
| Use numeric, graphic and symbolic representations of transformations in two dimensions, such as reflections, translations, scale changes and rotations about the origin by multiples of 90˚, to solve problems involving figures on a coordinate grid. | **Student Edition:**<br>497-503, 504-509, 510-517, 518 #10, 524 #38-#41, 525-532, 544 #11-#13, 546 #31-#32, 547 #7-#9, 548 #2, 549 #7<br>*Geometry Lab* 496<br>**Teacher Wraparound Edition:**<br>AE 498, 499, 505, 511, 527, 528; F 512 |
| 9.3.4.7 | |
| Use algebra to solve geometric problems unrelated to coordinate geometry, such as solving for an unknown length in a figure involving similar triangles, or using the Pythagorean Theorem to obtain a quadratic equation for a length in a geometric figure. | **Student Edition:**<br>388-396, 397-403, 404 #11-#13, 422 #39-#40, 425 #12-#13, 427 #6-#8, 440-446, 454 #42-#47, 462 #62-#63, 463 #4, 487 #15-#17, 491 #7-#8, 492 #3, 493 #8<br>*Geometry Lab* 439<br>**Teacher Wraparound Edition:**<br>A 439, 446; AE 441, 442, 443; PA 443; T 439 |