



Geometry

Concepts and Applications

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STANDARDS	PAGE REFERENCES
STANDARD L1: REASONING ABOUT NUMBERS, SYSTEMS, AND QUANTITATIVE SITUATIONS	
L1.1 Number Systems and Number Sense	
L1.1.6 Explain the importance of the irrational numbers $\sqrt{2}$ and $\sqrt{3}$ in basic right triangle trigonometry, the importance of π because of its role in circle relationships, and the role of e in applications such as continuously compounded interest.	Student Edition: 479-482, 483-487, 569 #22-#23 Teacher Wraparound Edition: 5MC 564; EC 487; TT 480
L1.2 Representations and Relationships	
L1.2.3 Use vectors to represent quantities that have magnitude and direction, interpret direction and magnitude of a vector numerically, and calculate the sum and difference of two vectors.	Student Edition: <i>Extending the Investigation 75</i> <i>Investigation 74-75</i> Teacher Wraparound Edition: A 75; ML 74
L2.1 Calculation Using Real and Complex Numbers	
L2.1.6 Recognize when exact answers aren't always possible or practical. Use appropriate algorithms to approximate solutions to equations (e.g., to approximate square roots).	Student Edition: 51, 530 Example 2, 555 Example 1, 561 Example 4 <i>Preparing for Standardized Tests</i> 582 Example 1 Teacher Wraparound Edition: IE 555

STANDARDS	PAGE REFERENCES
L3.1 Measurement Units, Calculations, and Scales	
<p>L3.1.1 Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly.</p>	<p>Student Edition: 57-58, 59 #8-#9, 60 #23-#28, 353 #23-#26, 367 #18, 611 #25 <i>Study Guide and Assessment</i> 83 #16 Teacher Wraparound Edition: 5MC 62, 361; IE 53</p>
L4.1 Mathematical Reasoning	
<p>L4.1.1 Distinguish between inductive and deductive reasoning, identifying and providing examples of each.</p>	<p>Student Edition: 4-9 #14, 458 #37, 639, 640 #1, 642-643 #21-#25, 646 #2, 653 #16 <i>Study Guide and Assessment</i> 42 Teacher Wraparound Edition: 5MC 644 #4-#5; IE 5, 7; RA 7</p>
<p>L4.1.2 Differentiate between statistical arguments (statements verified empirically using examples or data) and logical arguments based on the rules of logic.</p>	<p>Student Edition: 4-9, 133 #33, 267 #34, 632-637, 638-643, 644-648, 649-653, 654-659 <i>Investigation</i> 208-209 <i>Preparing for Standardized Tests</i> 347 #7, #10 Teacher Wraparound Edition: IE 634, 639; ML 4</p>
<p>L4.1.3 Define and explain the roles of axioms (postulates), definitions, theorems, counterexamples, and proofs in the logical structure of mathematics. Identify and give examples of each.</p>	<p>Student Edition: 4-9, 632-637, 638-643, 644-648, 649-653, 654-659 <i>Investigation</i> 208-209 Teacher Wraparound Edition: IE 634, 639; ML 4</p>
L4.2 Language and Laws of Logic	
<p>L4.2.1 Know and use the terms of basic logic (e.g., proposition, negation, truth and falsity, implication, if and only if, contrapositive, and converse).</p>	<p>Student Edition: 24-28, 34 #15-#17, 56, 121 #35-#36, 291, 632-633, 635, 637 <i>Study Guide and Assessment</i> 43 Lesson 1-4, 44 #32 <i>Vocabulary</i> 636 Teacher Wraparound Edition: ML 24</p>

STANDARDS	PAGE REFERENCES
<p>L4.2.2 Use the connectives “not,” “and,” “or,” and “if..., then,” in mathematical and everyday settings. Know the truth table of each connective and how to logically negate statements involving these connectives.</p>	<p>Student Edition: 24-28, 40 #34, 73 #43, 173 #34, 633-637, 643-644, 648 #28-#30 <i>Check Your Readiness</i> 631 <i>Investigation</i> 666 <i>Study Guide and Assessment</i> 43 Lesson 1-4, 668 Teacher Wraparound Edition: EC 637; IE 634, 635</p>
<p>L4.2.3 Use the quantifiers “there exists” and “all” in mathematical and everyday settings and know how to logically negate statements involving them.</p>	<p>The concepts of “there exists” and “all” are used in the following examples. Student Edition: 642 #19-#20, 644, 649</p>
<p>L4.2.4 Write the converse, inverse, and contrapositive of an “If..., then...” statement. Use the fact, in mathematical and everyday settings, that the contrapositive is logically equivalent to the original while the inverse and converse are not.</p>	<p>Student Edition: 25, 26 Example 4, #7-#9, 27 #22-#27, 28 #30-#31, 34 #15, 121 #35-#36 <i>Study Guide and Assessment</i> 43 Lesson 1-4, 44 #32 Teacher Wraparound Edition: EC 28; IE 26</p>
<p>L4.3 Proof</p>	
<p>L4.3.1 Know the basic structure for the proof of an “If..., then...” statement (assuming the hypothesis and ending with the conclusion) and that proving the contrapositive is equivalent.</p>	<p>Student Edition: 646 #3-#4, #6-#7, 647 #8-#13 Teacher Wraparound Edition: 5MC 649; IE 645; OA 648</p>
<p>L4.3.2 Construct proofs by contradiction. Use counterexamples, when appropriate, to disprove a statement.</p>	<p>Student Edition: 6 #4, 8 #14, 9 #35, #37, 17 #37, 25, 281 #33, 638 <i>Extending the Investigation</i> 209 <i>Study Guide and Assessment</i> 44 #32 <i>Test</i> 45 #16-#18 Teacher Wraparound Edition: IE 6</p>
<p>L4.3.3 Explain the difference between a necessary and a sufficient condition within the statement of a theorem. Determine the correct conclusions based on interpreting a theorem in which necessary or sufficient conditions in the theorem or hypothesis are satisfied.</p>	<p>Student Edition: 644-648, 649-653, 654-659, 660-665 <i>Investigation</i> 666-667 Teacher Wraparound Edition: 5MC 654; EA 646; EC 648, 653, 665; IE 645, 650, 651, 655, 662, 663</p>

STANDARDS	PAGE REFERENCES
STANDARD G1: FIGURES AND THEIR PROPERTIES	
G1.1 Lines and Angles; Basic Euclidean and Coordinate Geometry	
<p>G1.1.1 Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles, supplementary angles, complementary angles, and right angles.</p>	<p>Student Edition: 98 Example 7, 106, 109, 118, 121 #28-#31, 126-127 #21-#23, 130 Example 3, 132-133 #25-#28, 151 Example 5, 157, 194-195, 197 #21-#23, 255 #20-#22, 364 Example 2, 470, 589 Example 5, 593 Example 1, 640 Example 3b, 655 <i>Preparing for Standardized Tests</i> 450, 544 Example 2, 545 #3 Teacher Wraparound Edition: IE 655</p>
<p>G1.1.2 Solve multistep problems and construct proofs involving corresponding angles, alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles.</p>	<p>Student Edition: 150-153, 157-161, 164-165 Example 3, 167 #22-#23 <i>Hands-On Geometry</i> 149 <i>Investigation</i> 154-155 Teacher Wraparound Edition: EC 153, 161, 167; IE 157</p>
<p>G1.1.3 Perform and justify constructions, including midpoint of a line segment and bisector of an angle, using straightedge and compass.</p>	<p>Student Edition: 242 #2 <i>Graphing Calculator Exploration</i> 112 <i>Hands-On Geometry</i> 99, 104, 107, 328 <i>Investigation</i> 102-103 Teacher Wraparound Edition: H-OG 99</p>
<p>G1.1.4 Given a line and a point, construct a line through the point that is parallel to the original line using straightedge and compass. Given a line and a point, construct a line through the point that is perpendicular to the original line. Justify the steps of the constructions.</p>	<p>Student Edition: 167 #24 <i>Extending the Investigation</i> 461 <i>Graphing Calculator Exploration</i> 170, 316 <i>Hands-On Geometry</i> 130-131, 162, 474-475 Teacher Wraparound Edition: H-OG 130, 163, 170, 317; ML 162</p>

STANDARDS	PAGE REFERENCES
<p>G1.1.5 Given a line segment in terms of its endpoints in the coordinate plane, determine its length and midpoint.</p>	<p>Student Edition: 52, 53 Example 3, 63, 66 #4, #11-#13, 77-81, 101 #36, 276 Example 1 <i>Hands-On Geometry</i> 76 <i>Quiz</i> 73 #3 <i>Study Guide and Assessment</i> 84 Lesson 2-5 Teacher Wraparound Edition: A 67, 81; IE 78; RA 80</p>
<p>G1.1.6 Recognize Euclidean geometry as an axiom system. Know the key axioms and understand the meaning of and distinguish between undefined terms (e.g., point, line, and plane), axioms, definitions, and theorems.</p>	<p>Student Edition: 12-17, 18, 20, 68 <i>Investigation</i> 154-155 Teacher Wraparound Edition: EC 17; FA 16; M 155; ML 12; O 154</p>
<p>G1.2 Triangles and Their Properties</p>	
<p>G1.2.1 Prove that the angle sum of a triangle is 180° and that an exterior angle of a triangle is the sum of the two remote interior angles.</p>	<p>Student Edition: 193-197, 283-287 <i>Study Guide and Assessment</i> 303 Lesson 7-2 Teacher Wraparound Edition: A 197; EC 197, 287; ML 193; RA 196, 285</p>
<p>G1.2.2 Construct and justify arguments and solve multistep problems involving angle measure, side length, perimeter, and area of all types of triangles.</p>	<p>Student Edition: 193-194, 295, 296-300, 419-420, 422-423, 430 #16b, 563 #18 <i>Graphing Calculator Exploration</i> 290 <i>Hands-On Geometry</i> 425 <i>Preparing for Standardized Tests</i> 545 #7 Teacher Wraparound Edition: EC 295; GCE 291; IE 420; RA 298</p>
<p>G1.2.3 Know a proof of the Pythagorean Theorem and use the Pythagorean Theorem and its converse to solve multistep problems.</p>	<p>Student Edition: 256-261, 292 #2, 470, 519 Example 3, 524 Example 2, 593 Example 1, 594 Example 2 <i>Hands-On Geometry</i> 388, 554 #2, 559 #3 <i>Investigation</i> 432-433 <i>Study Guide and Assessment</i> 270 Lesson 6-6 Teacher Wraparound Edition: A 261, 267; EC 261; IE 257-258</p>

STANDARDS	PAGE REFERENCES
<p>G1.2.4 Prove and use the relationships among the side lengths and the angles of 30°- 60°- 90° triangles and 45°- 45°- 90° triangles.</p>	<p>Student Edition: 555-558, 559-563 <i>Hands-On Geometry</i> 554</p> <p>Teacher Wraparound Edition: A 558; EC 563; IE 555-556, 560-561; ML 559; RA 557, 562</p>
<p>G1.2.5 Solve multistep problems and construct proofs about the properties of medians, altitudes, perpendicular bisectors to the sides of a triangle, and the angle bisectors of a triangle. Using a straightedge and compass, construct these lines.</p>	<p>Student Edition: 228-233, 234-239, 240-243, 250 #19-#20, 412 #25 <i>Graphing Calculator Exploration</i> 290 <i>Investigation</i> 244-245</p> <p>Teacher Wraparound Edition: A 239; EC 233, 243; FA 238; IE 229-230, 236, 241; RA 231</p>
<p>G1.3 Triangles and Trigonometry</p>	
<p>G1.3.1 Define the sine, cosine, and tangent of acute angles in a right triangle as ratios of sides. Solve problems about angles, side lengths, or areas using trigonometric ratios in right triangles.</p>	<p>Student Edition: 564-569, 572-577 <i>Investigation</i> 570-571 <i>Preparing for Standardized Tests</i> 673 #3</p> <p>Teacher Wraparound Edition: EC 569; IE 565-567, 573; ML 572</p>
<p>G1.3.2 Know and use the Law of Sines and the Law of Cosines and use them to solve problems. Find the area of a triangle with sides a and b and included angle θ using the formula $\text{Area} = (1/2) a b \sin \theta$.</p>	<p>Student Edition: 572-577</p> <p>Teacher Wraparound Edition: A 577; IE 573-574; ML 572</p>
<p>G1.3.3 Determine the exact values of sine, cosine, and tangent for 0°, 30°, 45°, 60°, and their integer multiples and apply in various contexts.</p>	<p>Student Edition: 576 #22-#30 <i>Graphing Calculator Exploration</i> 574</p> <p>Teacher Wraparound Edition: GCE 574</p>
<p>G1.4 Quadrilaterals and Their Properties</p>	
<p>G1.4.1 Solve multistep problems and construct proofs involving angle measure, side length, diagonal length, perimeter, and area of squares, rectangles, parallelograms, kites, and trapezoids.</p>	<p>Student Edition: 35-40, 114 #27, 260 #37, 318 Example 4, 329, 331 #46, 421-424, 426-430, 658 #15-#16 <i>Hands-On Geometry</i> 6, 420-421, 425 <i>Math In the Workplace</i> 41</p> <p>Teacher Wraparound Edition: A 40; EC 321; IE 36-37; RA 38</p>

STANDARDS	PAGE REFERENCES
<p>G1.4.2 Solve multistep problems and construct proofs involving quadrilaterals (e.g., prove that the diagonals of a rhombus are perpendicular) using Euclidean methods or coordinate geometry.</p>	<p>Student Edition: 26 #3, 310-315, 316-321, 322-326, 327-332, 333-338, 378 #37, 402, 408-412, 438 #30-#32, 467 #42, 474 <i>Investigation</i> 103, 340-341 <i>Preparing for Standardized Tests</i> 582 Example 2 Teacher Wraparound Edition: EC 315, 338; IE 312, 323-324, 409-410; ML 317</p>
<p>G1.4.3 Describe and justify hierarchical relationships among quadrilaterals (e.g., every rectangle is a parallelogram).</p>	<p>Student Edition: 310, 316, 327, 329, 336 #3 <i>Hands-On Geometry</i> 328 Teacher Wraparound Edition: A 315, 321, 332; ML 327; T 310</p>
<p>G1.4.4 Prove theorems about the interior and exterior angle sums of a quadrilateral.</p>	<p>Student Edition: 312, 313 #10-#11, 314 #22-#28 Teacher Wraparound Edition: A 315</p>
<p>G1.5 Other Polygons and Their Properties</p>	
<p>G1.5.1 Know and use subdivision or circumscription methods to find areas of polygons (e.g., regular octagon, nonregular pentagon).</p>	<p>Finding areas of polygons is introduced in the following examples. Student Edition: 413-418, 419-424, 425-430, 438 #30-#32 Teacher Wraparound Edition: A 418; IE 414; RA 416; TT 415</p>
<p>G1.5.2 Know, justify, and use formulas for the perimeter and area of a regular n-gon and formulas to find interior and exterior angles of a regular n-gon and their sums.</p>	<p>Student Edition: 409-410, 411 #1-#3, #5-#6, #11-#13 <i>Hands-On Geometry</i> 408 Teacher Wraparound Edition: EC 412; H-OG 409; IE 409</p>
<p>G1.6 Circles and Their Properties</p>	
<p>G1.6.1 Solve multistep problems involving circumference and area of circles.</p>	<p>Student Edition: 478-482, 483-487 <i>Graphing Calculator Exploration</i> 478 <i>Study Guide and Assessment</i> 490 Lesson 11-5, Lesson 11-6 Teacher Wraparound Edition: EC 487; GCE 479; IE 479-480; 484-485; RA 480</p>

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<p>G1.6.2 Solve problems and justify arguments about chords (e.g., if a line through the center of a circle is perpendicular to a chord, it bisects the chord) and lines tangent to circles (e.g., a line tangent to a circle is perpendicular to the radius drawn to the point of tangency).</p>	<p>Student Edition: 454, 457 #9, #19, 458 #31, 468-473, 477 #17, 528, 592-597</p> <p>Teacher Wraparound Edition: EC 473, 597; IE 470-471, 593-594</p>
<p>G1.6.3 Solve problems and justify arguments about central angles, inscribed angles, and triangles in circles.</p>	<p>Student Edition: 462-467, 474-477, 484-486</p> <p><i>Study Guide and Assessment</i> 490 #39</p> <p>Teacher Wraparound Edition: IE 463-464, 485; RA 465</p>
<p>G1.6.4 Know and use properties of arcs and sectors and find lengths of arcs and areas of sectors.</p>	<p>Student Edition: 462-473, 482 #27, 484-487, 591 #30, 625</p> <p><i>Preparing for Standardized Tests</i> 544</p> <p><i>Study Guide and Assessment</i> 625 Lesson 14-4</p> <p>Teacher Wraparound Edition: EC 466, 487; IE 485; RA 464</p>
<p>G1.8 Three-dimensional Figures</p>	
<p>G1.8.1 Solve multistep problems involving surface area and volume of pyramids, prisms, cones, cylinders, hemispheres, and spheres.</p>	<p>Student Edition: 504-509, 510-515, 516-521, 522-527, 528-533</p> <p>Teacher Wraparound Edition: EC 515, 527; IE 507-508, 511-512, 517-519, 523-524; ML 517, 528</p>
<p>G1.8.2 Identify symmetries of pyramids, prisms, cones, cylinders, hemispheres, and spheres.</p>	<p>Symmetries of three-dimensional figures can be introduced with the following examples.</p> <p>Student Edition: 530</p> <p><i>Investigation</i> 502-503</p>
<p>STANDARD G2: RELATIONSHIPS BETWEEN FIGURES</p>	
<p>G2.1 Relationships Between Area and Volume Formulas</p>	
<p>G2.1.1 Know and demonstrate the relationships between the area formula of a triangle, the area formula of parallelogram, and the area formula of a trapezoid.</p>	<p>Student Edition: 37, 419-424, 430 #18, 482 #30, 521 #20, 563 #19, 605 #30, 648 #23</p> <p><i>Hands-On Geometry</i> 425</p> <p><i>Study Guide and Assessment</i> 44 #31</p> <p>Teacher Wraparound Edition: ML 419</p>

STANDARDS	PAGE REFERENCES
<p>G2.1.2 Know and demonstrate the relationships between the area formulas of various quadrilaterals (e.g., explain how to find the area of a trapezoid based on the areas of parallelograms and triangles).</p>	<p>Student Edition: 413, 419-424, 426 <i>Hands-On Geometry</i> 420, 425 Teacher Wraparound Edition: A 424; ML 419</p>
<p>G2.1.3 Know and use the relationship between the volumes of pyramids and prisms (of equal base and height) and cones and cylinders (of equal base and height).</p>	<p>Student Edition: 511-515, 522-527 <i>Hands-On Geometry</i> 510 <i>Preparing for Standardized Tests</i> 672 Example 1 Teacher Wraparound Edition: A 527; EA 513; RA 525; T 523</p>
<p>G2.2 Relationships Between Two-dimensional and Three-dimensional Representations</p>	
<p>G2.2.1 Identify or sketch a possible three-dimensional figure, given two-dimensional views (e.g., nets, multiple views). Create a two-dimensional representation of a three dimensional figure.</p>	<p>Student Edition: 507, 509 #20, 516 <i>Hands-On Geometry</i> 522 Teacher Wraparound Edition: H-OG 523; ML 517; TT 518</p>
<p>G2.2.2 Identify or sketch cross sections of three-dimensional figures. Identify or sketch solids formed by revolving two-dimensional figures around lines.</p>	<p>Student Edition: 513 #1, 537 #2 <i>Hands-On Geometry</i> 522 Teacher Wraparound Edition: A 527</p>
<p>G2.3 Congruence and Similarity</p>	
<p>G2.3.1 Prove that triangles are congruent using the SSS, SAS, ASA, and AAS criteria and that right triangles are congruent using the hypotenuse-leg criterion.</p>	<p>Student Edition: 211-214, 215-219 <i>Study Guide and Assessment</i> 221 <i>Test</i> 223 Teacher Wraparound Edition: EC 219; IE 216; RA 212</p>
<p>G2.3.2 Use theorems about congruent triangles to prove additional theorems and solve problems, with and without use of coordinates.</p>	<p>Student Edition: 203-207, 215-219, 233 #24-#25, 252-254, 267 #31, 287 #25, 482 #32, 642 #12 <i>Investigation</i> 208-209 Teacher Wraparound Edition: EC 207, 255; IE 204-205, 216</p>

STANDARDS	PAGE REFERENCES
<p>G2.3.3 Prove that triangles are similar by using SSS, SAS, and AA conditions for similarity.</p>	<p>Student Edition: 356, 357 Example 2, 359 #6, 360 #13, #16-#18</p> <p>Teacher Wraparound Edition: IE 357</p>
<p>G2.3.4 Use theorems about similar triangles to solve problems with and without use of coordinates.</p>	<p>Student Edition: 357 Example 2, 362-367, 371 Example 3, 373 #18-#25, 378 #34-#35, 389-393, 418 #28, 533 #27</p> <p><i>Hands-On Geometry</i> 388</p> <p>Teacher Wraparound Edition: EC 367; IE 357, 364-365, 371</p>
<p>G2.3.5 Know and apply the theorem stating that the effect of a scale factor of k relating one two-dimensional figure to another or one three-dimensional figure to another, on the length, area, and volume of the figures is to multiply each by k, k^2, and k^3, respectively.</p>	<p>Student Edition: 389-392, 407 #37, 533 #27, 534-539</p> <p>Teacher Wraparound Edition: EC 539; IE 390, 535-536</p>
<p>G3.1 Distance-preserving Transformations: Isometries</p>	
<p>G3.1.1 Define reflection, rotation, translation, and glide reflection and find the image of a figure under a given isometry.</p>	<p>Student Edition: 687-689, 692-696, 697-701</p> <p><i>Investigation</i> 708-709</p> <p>Teacher Wraparound Edition: EC 696; IE 366, 693, 699</p>
<p>G3.1.2 Given two figures that are images of each other under an isometry, find the isometry and describe it completely.</p>	<p>Student Edition: 687-689, 692-696, 697-701</p> <p><i>Investigation</i> 708-709</p> <p>Teacher Wraparound Edition: EC 696; IE 366, 693, 699; RA 688</p>
<p>G3.1.3 Find the image of a figure under the composition of two or more isometries and determine whether the resulting figure is a reflection, rotation, translation, or glide reflection image of the original figure.</p>	<p>Student Edition: 687-689, 692-696, 697-701</p> <p><i>Investigation</i> 708-709</p> <p>Teacher Wraparound Edition: EC 696; IE 693</p>

STANDARDS	PAGE REFERENCES
G3.2 Shape-preserving Transformations: Dilations and Isometries	
<p>G3.2.1 Know the definition of dilation and find the image of a figure under a given dilation.</p>	<p>Student Edition: 703-707 <i>Study Guide and Assessment</i> 712 Lesson 16-6 <i>Test</i> 713 #14 Teacher Wraparound Edition: EC 707; FA 706; IE 703-704; RA 704</p>
<p>G3.2.2 Given two figures that are images of each other under some dilation, identify the center and magnitude of the dilation.</p>	<p>Student Edition: 704-707 <i>Study Guide and Assessment</i> 712 Lesson 16-6 <i>Test</i> 713 #14 Teacher Wraparound Edition: EC 707; IE 704; RA 704</p>