



Geometry

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Lessons in which the standard is the primary focus are indicated in **bold**.

Number	Content Expectation Standard	Student Edition Lesson(s)	Page Numbers
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, and the importance of π because of its role in circle relationships.	8-3, 10-1, 11-3	552-560, 683-691, 763-770
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.	8-7, Extend 8-7	593-600, 601
Standard L2: Calculation, Algorithms, and Estimation			
L2.3 Measurement Units, Calculations, and Scales			
L2.3.1	Convert units of measurement within and between systems; explain how arithmetic operations on measurements affect units, and carry units through calculations correctly.	0-1, 0-2	P4-P5, P6-P7

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Standard L3: Mathematical Reasoning, Logic, and Proof			
L3.1 Mathematical Reasoning			
L3.1.1	Distinguish between inductive and deductive reasoning, identifying and providing examples of each.	2-1, 2-4	89-96, 115-123
L3.1.2	Differentiate between statistical arguments (statements verified empirically using examples or data) and logical arguments based on the rules of logic.	2-4	115-123
L3.1.3	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.	2-1, 2-5, 2-6	89-96, 125-132, 134-141
L3.2 Language and Laws of Logic			
L3.2.1	Know and use the terms of basic logic.	2-2, 2-3, Extend 2-3	97-104, 105-113, 114
L3.2.2	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.	2-2, 2-3	97-104, 105-113
L3.2.3	Use the quantifiers “there exists” and “all” in mathematical and everyday settings and know how to logically negate statements involving them.	2-2	97-104
L3.2.4	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.	2-3	105-113
L3.3 Proof			
L3.3.1	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.	2-3, 2-5	105-113, 125-132
L3.3.2	Construct proofs by contradiction. Use counter-examples, when appropriate, to disprove a statement.	2-1, 5-4	89-96, 351-358
L3.3.3	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.	Explore 2-5	124
Standard G1: Figures and Their Properties			
G1.1 Lines and Angles; Basic Euclidean and Coordinate Geometry			
G1.1.1	Solve multistep problems and construct proofs involving vertical angles, linear pairs of angles, supplementary angles, complementary angles, and right angles.	1-5, 2-8, 3-2, 3-5, 4-2	46-54, 149-157, 178-184, 205-212, 244-252

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G1.1.2	Solve multistep problems and construct proofs involving corresponding angles, alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles.	3-1, 3-2, 3-5	171-176, 178-184, 205-212
G1.1.3	Perform and justify constructions, including midpoint of a line segment and bisector of an angle, using straightedge and compass.	1-2, 1-3, 1-4, Extend 1-5, 2-6, 2-7, 3-5, 3-6, 4-1, 4-4, Extend 4-4, 4-5, 4-6, Explore 5-1, Explore 5-2, 6-3, 6-4, 6-5, 7-4, 9-1, 10-3, 10-5, Extend 10-5	14-21, 25-35, 36-44, 55, 134-141, 142-148, 205-212, 213-222, 235-242, 262-270, 271, 273-280, 283-291, 321, 332, 409-417, 419-425, 426-434, 484-493, 615-623, 701-708, 718-725, 726
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.	Extend 1-5	55
G1.1.5	Given a line segment in terms of its endpoints in the coordinate plane, determine its length and midpoint.	1-3	25-35
G1.1.6	Recognize Euclidean geometry as an axiom system. Know the key axioms and understand the meaning of and distinguish between undefined terms, axioms, definitions, and theorems.	1-1, 2-5	5-12, 125-132
G1.2 Triangles and Their Properties			
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.	Explore 4-2, 4-2	243, 244-252
G1.2.2	Construct and justify arguments and solve multistep problems involving angle measure, side length, perimeter, and area of all types of triangles.	1-4, 1-5, 1-6, 4-2, 4-3, 4-8, 11-1	36-44, 46-54, 56-64, 244-252, 253-261, 301-307, 763-770
G1.2.3	Know a proof of the Pythagorean Theorem, and use the Pythagorean Theorem and its converse to solve multi-step problems.	Explore 8-2, 8-2	540, 541-549
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.	8-3	552-560

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G1.2.5	Solve multistep problems and construct proofs about the properties of medians, altitudes and perpendicular bisectors to the sides of a triangle, and the angle bisectors of a triangle. Using a straightedge and compass, construct these lines.	Explore 5-1, 5-1, Explore 5-2, 5-2	321, 322-331, 332, 333-341
G1.3 Triangles and Trigonometry			
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.	Explore 8-4, 8-4, Extend 8-4, 8-5, 8-6	561, 562-571, 572, 574-581, 582-591
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 q using the formula $\text{Area} = (1/2) ab \sin q$.	8-6, Extend 8-6	582-591, 592
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.	8-4	562-571
G1.4 Quadrilaterals and Their Properties			
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.	1-6, Extend 1-6, 6-1, Extend 6-1, 6-2, Explore 6-3, 6-3, 6-4, 6-5, 6-6	56-64, 65-66, 389-397, 398, 399-407, 408, 409-417, 419-425, 426-434, 435-444
G1.4.2	Solve multistep problems and construct proofs involving quadrilaterals using Euclidean methods or coordinate geometry.	6-1, 6-2, 6-3, 6-4, 6-5, 6-6	389-397, 399-407, 409-417, 419-425, 426-434, 435-444
G1.4.3	Describe and justify hierarchical relationships among quadrilaterals.	6-5, 6-6	426-434, 435-444
G1.4.4	Prove theorems about the interior and exterior angle sums of a quadrilateral.	6-1	389-397
G1.5 Other Polygons and Their Properties			
G1.5.1	Know and use subdivision or circumscription methods to find areas of polygons.	11-1, 11-2, Extend 11-2, 11-4, Extend 11-4	763-770, 773-780, 781, 791-799, 800-801
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.	6-1, Explore 11-4, 11-4	389-397, 790, 791-799
G1.6 Circles and Their Properties			
G1.6.1	Solve multistep problems involving circumference and area of circles.	1-6, 10-1, 11-3	56-64, 683-691, 782-788
G1.6.2	Solve problems and justify arguments about chords and lines tangent to circles.	10-3, 10-5, 10-6, 10-7	701-708, 718-725, 727-735, 736-742

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G1.6.3	Solve problems and justify arguments about central angles, inscribed angles, and triangles in circles.	10-1, 10-2, 10-4	683-691, 692-700, 709-716
G1.6.4	Know and use properties of arcs and sectors, and find lengths of arcs and areas of sectors.	10-2, 10-3, 11-3	692-700, 701-708, 782-788
G1.8 Three-dimensional Figures			
G1.8.1	Solve multistep problems involving surface area and volume of pyramids, prisms, cones, cylinders, hemispheres, and spheres.	1-7, 12-2, 12-3, 12-4, Extend 12-4, 12-5, 12-6	67-74, 830-837, 838-846, 847-854, 855, 857-863, 864-871
G1.8.2	Identify symmetries of pyramids, prisms, cones, cylinders, hemispheres, and spheres.	9-5, 12-6	653-659, 864-871
Standard G2: Relationships Between Figures			
G2.1 Relationships Between Area and Volume Formulas			
G2.1.1	Know and demonstrate the relationships between the area formula of a triangle, the area formula of a parallelogram, and the area formula of a trapezoid.	11-1, Explore 11-2, 11-2	763-770, 771-772, 773-780
G2.1.2	Know and demonstrate the relationships between the area formulas of various quadrilaterals.	11-1, 11-2	763-770, 773-780
G2.1.3	Know and use the relationship between the volumes of pyramids and prisms.	12-4, 12-5	847-854, 857-863
G2.2 Relationships Between Two-dimensional and Three-dimensional Representations			
G2.2.1	Identify or sketch a possible three-dimensional figure, given two-dimensional views. Create a two-dimensional representation of a three-dimensional figure.	Extend 1-7, Explore 12-1, 12-1	75, 821-822, 823-828
G2.2.2	Identify or sketch cross sections of three-dimensional figures. Identify or sketch solids formed by revolving two-dimensional figures around lines.	12-1	823-828
G2.3 Congruence and Similarity			
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.	4-4, 4-5, Extend 4-5	262-270, 273-280, 281-282
G2.3.2	Use theorems about congruent triangles to prove additional theorems and solve problems, with and without use of coordinates.	4-3, 4-4, 4-5, Extend 4-5	253-261, 262-270, 273-280, 281-282
G2.3.3	Prove that triangles are similar by using SSS, SAS, and AA conditions for similarity.	7-3	474-483
G2.3.4	Use theorems about similar triangles to solve problems with and without use of coordinates.	7-3, 7-4, 7-5, 7-6	474-483, 484-493, 495-502, 505-511
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.	11-5, Extend 12-4, 12-8	802-808, 855, 880-886
Standard G3: Transformations of Figures in the Plane			
G3.1 Distance-preserving Transformation Isometries			

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G3.1.1	Define reflection, rotation, translation, and glide reflection and find the image of a figure under a given isometry.	9-1, 9-2, Explore 9-3, 9-3, 9-4, Extend 9-6	615-623, 624-630, 631, 632-638, 641-649, 668-669
G3.1.2	Given two figures that are images of each other under an isometry, find the isometry and describe it completely.	Explore 4-7, 4-7, 9-1, 9-2, 9-4	292-293, 294-300, 615-623, 624-630, 641-649
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.	Explore 9-4, 9-4	640, 641-649
G3.2 Shape-preserving Transformations: Dilations and Isometries			
G3.2.1	Know the definition of dilation and find the image of a figure under a given dilation.	9-6, Extend 9-6	660-667, 668-669
G3.2.2	Given two figures that are images of each other under some dilation, identify the center and magnitude of the dilation.	9-6	660-667