Mathematics
Geometry: Academic
Unit 2: Deductive Reasoning

Essential Understandings	▪ A geometric proof involves deductive reasoning and knowledge of definitions, postulates, properties, and theorems. ▪ Vertical, complementary, and supplementary angles form special pairs of angles. ▪ Perpendicular lines form right angles. ▪ There are relationships between the complements of congruent angles. ▪ There are relationships between the supplements of congruent angels. ▪ The properties of algebra apply to geometry. ▪ Perpendicular lines form congruent angles.
Essential Questions	▪ What are some relationships between special pairs of angles? ▪ What is the difference between deductive and inductive reasoning? ▪ What is the meaning of a conditional statement and its converse? ▪ What is a biconditional statement and what does it imply? ▪ What are perpendicular lines? ▪ What are the special pairs of angles? ▪ How is a geometric proof written? ▪ What theorems involve perpendicular lines?
Essential Knowledge	▪ A postulate is a true statement that is accepted without proof. ▪ A theorem is a true statement that must be proven using other true statements. ▪ Complementary angles are angles whose sum is 90. ▪ Supplementary angles are angles sum is 180. ▪ Vertical pairs of angles are congruent. ▪ Perpendicular lines form right angles. ▪ The sides of a right angle are perpendicular. ▪ An if-then statement is called a conditional statement. ▪ The hypothesis of a conditional statement is the “if” part the statement. ▪ The conclusion of a conditional statement is the “then” part the statement. ▪ The converse of a conditional statement is the statement formed by switching the hypothesis with the conclusion. ▪ The converse of a true conditional statement may or may not be true. ▪ Deductive reasoning is used to solve proofs.
Vocabulary	▪ <u>Terms</u>: ○ vertical angles, complementary angles, supplementary angles, perpendicular lines, conditional statement, biconditional statement, converse, hypothesis, conclusion, counterexample, and deductive reasoning

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Essential Skills	▪ Write a formal two-column proof. ▪ Find the measure of an angle from other known angle measures. ▪ Deduce which pairs of angles are congruent, vertical, complementary, or supplementary. ▪ Deduce which pairs of lines are perpendicular. ▪ Use definitions and theorems in writing a proof. ▪ Determine the truth value of a conditional statement and its converse. ▪ Determine the truth value of a biconditional statement. ▪ Find a counterexample for a false conditional.
Related Maine Learning Results	<u>Mathematics</u> C. Geometry Geometric Figures C1.Students justify statements about polygons and solve problems. a. Use the properties of triangles to prove theorems about figures and relationships among figures. b. Solve for missing dimensions based on congruence and similarity. c. Use the Pythagorean Theorem in situations where right triangles are created by adding segments to figures. d. Use the distance formula. C2.Students justify statements about circles and solve problems. a. Use the concepts of central and inscribed angles to solve problems and justify statements. b. Use relationships among arc length and circumference, and areas of circles and sectors to solve problems and justify statements. C3.Students understand and use basic ideas of trigonometry. a. Identify and find the value of trigonometric ratios for angles in right triangles. b. Use trigonometry to solve for missing lengths in right triangles. c. Use inverse trigonometric functions to find missing angles in right triangles. D. Algebra Symbols and Expressions D1.Students understand and use polynomials and expressions with rational exponents. a. Simplify expressions including those with rational numbers. b. Add, subtract, and multiply polynomials. c. Factor the common term out of polynomial expressions. d. Divide polynomials by (ax+b).

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Related Maine Learning Results	Equations and Inequalities D2.Students solve families of equations and inequalities. a. Solve systems of linear equations and inequalities in two unknowns and interpret their graphs. b. Solve quadratic equations graphically, by factoring in cases where factoring is efficient, and by applying the quadratic formula. c. Solve simple rational equations. d. Solve absolute value equations and inequalities and interpret the results. e. Apply the understanding that the solution(s) to equations of the form f(x) = g(x) are x-value(s) of the point(s) of intersection of the graphs of f(x) and g(x) and common outputs in table of values. f. Explain why the coordinates of the point of intersection of the lines represented by a system of equations is its solution and apply this understanding to solving problems. D3.Students understand and apply ideas of logarithms. a. Use and interpret logarithmic scales. b. Solve equations in the form of $x + b^y$ using the equivalent form $y = \log_b x$.
Sample Lessons And Activities	▪ Define and identify special pairs of angles: vertical angles, complementary angles, supplementary angles, etc.
Sample Classroom Assessment Methods	▪ Quizzes ▪ Take-home worksheets ▪ Tests
Sample Resources	▪ Publications: ○ Geometry, Jurgensen, Brown, and Jurgensen, McDougal Littell ○ Geometry: Concepts and Skills, Larson, Boswell, and Stiff, McDougal Littell