

**Mathematics**  
**Geometry: Academic**  
**Unit 5: Quadrilaterals and Polygons**

<b>Essential Understandings</b>	<ul style="list-style-type: none"> <li>Parallelograms and trapezoids have unique properties (or characteristics) that can be derived using congruent triangles.</li> </ul>
<b>Essential Questions</b>	<ul style="list-style-type: none"> <li>What are the properties of parallelograms?</li> <li>What are the properties of rectangles?</li> <li>What are the properties of rhombi?</li> <li>What are the properties of squares?</li> <li>What are the properties of trapezoids?</li> <li>What are the properties of isosceles trapezoids?</li> </ul>
<b>Essential Knowledge</b>	<ul style="list-style-type: none"> <li>Parallelograms, rectangles, rhombi, squares, trapezoids and other quadrilaterals have special properties.</li> </ul>
<b>Vocabulary</b>	<ul style="list-style-type: none"> <li><u>Terms</u>: <ul style="list-style-type: none"> <li>parallelogram, rectangle, rhombus, square, trapezoid and isosceles trapezoid; opposite sides, opposite angles, diagonals, diagonals that bisect each other; bases, legs, base angles, and medians of trapezoids</li> </ul> </li> </ul>
<b>Essential Skills</b>	<ul style="list-style-type: none"> <li>Name the properties of each type of quadrilateral.</li> <li>Determine if a quadrilateral with certain properties is a parallelogram or not.</li> <li>Identify the type of parallelogram based on given properties.</li> <li>Find the lengths of sides and measures of angles of each type of quadrilateral.</li> <li>Solve algebraic equations using properties of parallelograms, rectangles, rhombi, squares, and trapezoids.</li> </ul>
<b>Related Maine Learning Results</b>	<p><u>Mathematics</u>  C. Geometry  Geometric Figures  C1.Students justify statements about polygons and solve problems.</p> <ol style="list-style-type: none"> <li>Use the properties of triangles to prove theorems about figures and relationships among figures.</li> <li>Solve for missing dimensions based on congruence and similarity.</li> <li>Use the Pythagorean Theorem in situations where right triangles are created by adding segments to figures.</li> <li>Use the distance formula.</li> </ol> <p>C2.Students justify statements about circles and solve problems.</p> <ol style="list-style-type: none"> <li>Use the concepts of central and inscribed angles to solve problems and justify statements.</li> <li>Use relationships among arc length and circumference, and areas of circles and sectors to solve problems and justify statements.</li> </ol>

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<p style="text-align: center;"><b>Related Maine Learning Results</b></p>	<p>C3.Students understand and use basic ideas of trigonometry.</p> <ol style="list-style-type: none"> <li>Identify and find the value of trigonometric ratios for angles in right triangles.</li> <li>Use trigonometry to solve for missing lengths in right triangles.</li> <li>Use inverse trigonometric functions to find missing angles in right triangles.</li> </ol> <p>D. Algebra</p> <p>Symbols and Expressions</p> <p>D1.Students understand and use polynomials and expressions with rational exponents.</p> <ol style="list-style-type: none"> <li>Simplify expressions including those with rational numbers.</li> <li>Add, subtract, and multiply polynomials.</li> <li>Factor the common term out of polynomial expressions.</li> <li>Divide polynomials by <math>(ax+b)</math>.</li> </ol> <p>Equations and Inequalities</p> <p>D2.Students solve families of equations and inequalities.</p> <ol style="list-style-type: none"> <li>Solve systems of linear equations and inequalities in two unknowns and interpret their graphs.</li> <li>Solve quadratic equations graphically, by factoring in cases where factoring is efficient, and by applying the quadratic formula.</li> <li>Solve simple rational equations.</li> <li>Solve absolute value equations and inequalities and interpret the results.</li> <li>Apply the understanding that the solution(s) to equations of the form <math>f(x) = g(x)</math> are x-value(s) of the point(s) of intersection of the graphs of <math>f(x)</math> and <math>g(x)</math> and common outputs in table of values.</li> <li>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.</li> </ol> <p>D3.Students understand and apply ideas of logarithms.</p> <ol style="list-style-type: none"> <li>Use and interpret logarithmic scales.</li> <li>Solve equations in the form of <math>x + b^y</math> using the equivalent form <math>y = \log_b x</math>.</li> </ol>
<p style="text-align: center;"><b>Sample Lessons And Activities</b></p>	<ul style="list-style-type: none"> <li>▪ Prove the 3 basic properties of parallelograms: Opposite sides of a parallelogram are congruent; Opposite angles of a parallelogram are congruent; and The diagonals of a parallelogram bisect each other</li> <li>▪ Use these 3 properties to solve problems involving measurements in parallelograms</li> </ul>

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<b>Sample Classroom Assessment Methods</b>	<ul style="list-style-type: none"><li>▪ Quizzes</li><li>▪ Take-home worksheets</li><li>▪ Tests</li></ul>
<b>Sample Resources</b>	<ul style="list-style-type: none"><li>▪ <u>Publications:</u><ul style="list-style-type: none"><li>○ <u>Geometry</u>, Jurgensen, Brown, Jurgensen (McDougal Littell)</li><li>○ <u>Geometry: Concepts and Skills</u>, Larson, Boswell, Stiff (McDougal Littell)</li></ul></li></ul>