**Mathematics** **Brunswick School Department**

# Geometry: Academic
# Unit 5: Quadrilaterals and Polygons

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| **Essential Understandings** | ▪ Parallelograms and trapezoids have unique properties (or characteristics) that can be derived using congruent triangles. |
| **Essential Questions** | ▪ What are the properties of parallelograms?<br>▪ What are the properties of rectangles?<br>▪ What are the properties of rhombi?<br>▪ What are the properties of squares?<br>▪ What are the properties of trapezoids?<br>▪ What are the properties of isosceles trapezoids? |
| **Essential Knowledge** | ▪ Parallelograms, rectangles, rhombi, squares, trapezoids and other quadrilaterals have special properties. |
| **Vocabulary** | ▪ Terms:<br>o 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 |
| **Essential Skills** | ▪ Name the properties of each type of quadrilateral.<br>▪ Determine if a quadrilateral with certain properties is a parallelogram or not.<br>▪ Identify the type of parallelogram based on given properties.<br>▪ Find the lengths of sides and measures of angles of each type of quadrilateral.<br>▪ Solve algebraic equations using properties of parallelograms, rectangles, rhombi, squares, and trapezoids. |
| **Related Maine Learning Results** | Mathematics<br>C. Geometry<br>Geometric Figures<br>C1. Students justify statements about polygons and solve problems.<br>a. Use the properties of triangles to prove theorems about figures and relationships among figures.<br>b. Solve for missing dimensions based on congruence and similarity.<br>c. Use the Pythagorean Theorem in situations where right triangles are created by adding segments to figures.<br>d. Use the distance formula.<br>C2. Students justify statements about circles and solve problems.<br>a. Use the concepts of central and inscribed angles to solve problems and justify statements.<br>b. Use relationships among arc length and circumference, and areas of circles and sectors to solve problems and justify statements. |

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| **Related Maine Learning Results** | C3.Students understand and use basic ideas of trigonometry.<br>a. Identify and find the value of trigonometric ratios for angles in right triangles.<br>b. Use trigonometry to solve for missing lengths in right triangles.<br>c. Use inverse trigonometric functions to find missing angles in right triangles.<br>D. Algebra<br>Symbols and Expressions<br>D1.Students understand and use polynomials and expressions with rational exponents.<br>a. Simplify expressions including those with rational numbers.<br>b. Add, subtract, and multiply polynomials.<br>c. Factor the common term out of polynomial expressions.<br>d. Divide polynomials by (ax+b).<br>Equations and Inequalities<br>D2.Students solve families of equations and inequalities.<br>a. Solve systems of linear equations and inequalities in two unknowns and interpret their graphs.<br>b. Solve quadratic equations graphically, by factoring in cases where factoring is efficient, and by applying the quadratic formula.<br>c. Solve simple rational equations.<br>d. Solve absolute value equations and inequalities and interpret the results.<br>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.<br>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.<br>D3.Students understand and apply ideas of logarithms.<br>a. Use and interpret logarithmic scales.<br>b. Solve equations in the form of $x + b^{y}$ using the equivalent form $y = \log_b x$. |
| **Sample Lessons And Activities** | ▪ 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<br>▪ Use these 3 properties to solve problems involving measurements in parallelograms |

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| **Sample Classroom Assessment Methods** | ▪ Quizzes<br>▪ Take-home worksheets<br>▪ Tests |
| **Sample Resources** | ▪ Publications:<br>o Geometry, Jurgensen, Brown, Jurgensen (McDougal Littell)<br>o Geometry: Concepts and Skills, Larson, Boswell, Stiff (McDougal Littell) |