

**Mathematics**  
**Algebra II: CP**  
**Unit 4: Polynomial Functions**

<b>Essential Understandings</b>	<ul style="list-style-type: none"> <li>▪ Polynomial functions can be used to model real-life situations.</li> </ul>
<b>Essential Questions</b>	<ul style="list-style-type: none"> <li>▪ What are the properties of Algebra and how are these used to solve polynomial equations?</li> <li>▪ How do you manipulate polynomial expressions?</li> <li>▪ How do you solve polynomial equations?</li> <li>▪ How do you draw reasonable graphs of polynomial functions?</li> </ul>
<b>Essential Knowledge</b>	<ul style="list-style-type: none"> <li>▪ Factoring, the rational root theorem, and synthetic division are used to solve polynomial equations.</li> <li>▪ Complex numbers are used to solve polynomial equations with non-real roots.</li> <li>▪ The degree of the polynomial determines the number of solutions.</li> </ul>
<b>Vocabulary</b>	<ul style="list-style-type: none"> <li>▪ <u>Terms:</u> <ul style="list-style-type: none"> <li>○ polynomial function, degree of an equation, zeros or roots of an equation, synthetic division, end behavior, zero product rule, complex numbers</li> </ul> </li> </ul>
<b>Essential Skills</b>	<ul style="list-style-type: none"> <li>▪ Apply order of operation.</li> <li>▪ Manipulate polynomial expressions.</li> <li>▪ Solve polynomial functions by various means.</li> <li>▪ Sketch reasonable graphs of polynomial functions.</li> </ul>
<b>Related Maine Learning Results</b>	<p><u>Mathematics</u></p> <p>A. Number</p> <p>Real Number</p> <p>A1.Students will know how to represent and use real numbers.</p> <ol style="list-style-type: none"> <li>a. Use the concept of nth root.</li> <li>b. Estimate the value(s) of roots and use technology to approximate them.</li> <li>c. Compute using laws of exponents.</li> <li>d. Multiply and divide numbers expressed in scientific notation.</li> <li>e. Understand that some quadratic equations do not have real solutions and that there exist other number systems to allow for solutions to these equations.</li> </ol>

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**Related  
Maine Learning  
Results**

- B. Data  
Measurement and Approximation  
B1.Students understand the relationship between precision and accuracy.
- Express answers to a reasonable degree of precision in the context of a given problem.
  - Represent an approximate measurement using appropriate numbers of significant figures.
  - Know that most measurements are approximations and explain why it is useful to take the mean of repeated measurements.
- C. Geometry  
Geometric Figures  
C1.Students justify statements about polygons and solve problems.
- Use the properties of triangles to prove theorems about figures and relationships among figures.
  - Solve for missing dimensions based on congruence and similarity.
  - Use the Pythagorean Theorem in situations where right triangles are created by adding segments to figures.
  - Use the distance formula.
- C2.Students justify statements about circles and solve problems.
- Use the concepts of central and inscribed angles to solve problems and justify statements.
  - 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.
- Identify and find the value of trigonometric ratios for angles in right triangles.
  - Use trigonometry to solve for missing lengths in right triangles.
  - 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.
- Simplify expressions including those with rational numbers.
  - Add, subtract, and multiply polynomials.
  - Factor the common term out of polynomial expressions.
  - Divide polynomials by  $(ax+b)$ .

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<p><b>Related Maine Learning Results</b></p>	<p>Equations and Inequalities</p> <p>D2.Students solve families of equations and inequalities.</p> <ol style="list-style-type: none"> <li>a. Solve systems of linear equations and inequalities in two unknowns and interpret their graphs.</li> <li>b. Solve quadratic equations graphically, by factoring in cases where factoring is efficient, and by applying the quadratic formula.</li> <li>c. Solve simple rational equations.</li> <li>d. Solve absolute value equations and inequalities and interpret the results.</li> <li>e. 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>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.</li> </ol> <p>D3.Students understand and apply ideas of logarithms.</p> <ol style="list-style-type: none"> <li>a. Use and interpret logarithmic scales.</li> <li>b. Solve equations in the form of <math>x + b^y</math> using the equivalent form <math>y = \log_b x</math>.</li> </ol> <p>Functions and Relations</p> <p>D4.Students understand and interpret the characteristics of functions using graphs, tables, and algebraic techniques.</p> <ol style="list-style-type: none"> <li>a. Recognize the graphs and sketch graphs of the basic functions.</li> <li>b. Apply functions from these families to problem situations.</li> <li>c. Use concepts such as domain, range, zeros, intercepts, and maximum and minimum values.</li> <li>d. Use the concepts of average rate of change (table of values) and increasing and decreasing over intervals, and use these characteristics to compare functions.</li> </ol> <p>D5.Students express relationships recursively and use iterative methods to solve problems.</p> <ol style="list-style-type: none"> <li>a. Express the <math>(n+1)</math>st term in terms of the <math>n</math>th term and describe relationships in terms of starting point and rule followed to transform one terms to the next.</li> <li>b. Use technology to perform repeated calculations to develop solutions to real life problems involving linear, exponential, and other patterns of change.</li> </ol>
<p><b>Sample Lessons And Activities</b></p>	<ul style="list-style-type: none"> <li>▪ Solve polynomial equations using a variety of techniques. These include graphing, factoring and synthetic division.</li> <li>▪ Use long division and synthetic division to divide polynomials.</li> </ul>

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<b>Sample Classroom Assessment Methods</b>	<ul style="list-style-type: none"><li>▪ Evaluate homework.</li><li>▪ Quizzes.</li><li>▪ Chapter test.</li></ul>
<b>Sample Resources</b>	<ul style="list-style-type: none"><li>▪ <u>Publications:</u><ul style="list-style-type: none"><li>○ McDougal Littell Algebra 2</li></ul></li><li>▪ <u>Other Resources:</u><ul style="list-style-type: none"><li>○ Graphing calculators.</li><li>○ The A+ learning system for remediation.</li></ul></li></ul>