

## Curriculum Map for: Advanced Algebra

Prepared September 2007 by Mark McCarthy

**Textbook(s):** Pre Calculus - Graphing and Data Analysis, by Michael Sullivan and Michael Sullivan III  
Advanced Mathematics - A Pre Calculus Course, by Brown/Robbins

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**Prerequisites:** This course is intended for students who have completed at least 3 years of high school math. This course is intended for students who have successfully completed Course III-R, Intermediate Algebra, or Trigonometry.

**Scope:** Advanced Algebra is a one-semester high school course that is comparable to entry-level mathematics courses in colleges and universities. This course is designed to prepare students for the various areas of mathematics at the college level. Among the topics investigated are Coordinate Geometry, Matrices, Polynomial Functions, Exponential and Logarithmic Functions, Parametric Equations, and Limits with some work with Derivatives. The use of the graphing calculator will take place on a routine basis.

TIME	CONTENT	TEXTBOOK PAGES / ASSIGNMENTS
<p><b>January</b></p>	<p><b><u>Coordinate Geometry</u></b></p> <p>1-1 Rectangular Coordinates            Formulas</p> <ul style="list-style-type: none"> <li>• Slope</li> <li>• Midpoint</li> <li>• Distance</li> </ul> <p>Parallel and Perpendicular Lines</p> <p>1-2 Graphs of Equations</p> <ul style="list-style-type: none"> <li>• Determine whether a point is on a line</li> <li>• Graphing equations by hand &amp; calculator</li> <li>• Express an equation in three forms               <ol style="list-style-type: none"> <li>1. Standard Form</li> <li>2. Slope-Intercept Form</li> <li>3. Point-Slope Form</li> </ol> </li> </ul> <p>( Do not cover symmetry)</p> <p>1-3 Solving Equations</p> <ul style="list-style-type: none"> <li>• Linear Equations</li> <li>• Quadratic Equations (by hand and graphing)</li> <li>• Quadratic Formula</li> <li>• Radical Equations</li> </ul>	<p>Pages 9 - 11 (Good Application Questions 59 - 72)</p> <p><b>Good Question:</b> Find the area of a triangle given three points.  <i>This is a good question as it incoorporates several mathematical topics they have seen prior to this course.</i></p> <p>There are a number of other problem solving questions used in the Math 12 course</p> <p>Page 35 (Tremendous number of problems to choose from)</p> <p>Lesson 1-2 is a quick lecture in class. Most of the time should be spent on lesson 1-3.</p>

TIME	CONTENT	TEXTBOOK PAGES / ASSIGNMENTS
	<p>1-4 Application Problems</p> <p><b>QUIZ #1</b></p> <p>1-5 Solving Inequalities</p> <p>1-6 can be skipped since many of the topics were discussed within the first three days</p> <p>1-7 Linear Curve Fitting</p> <p>1-8 Circles</p> <ul style="list-style-type: none"> <li>• Standard Form</li> <li>• Center-Radius Form</li> <li>• Graphing a Circle</li> </ul> <p>Chapter Review and Test</p>	<p>Pages 45 - 48</p> <p>Pages 58 - 60 (Incorporate some application questions)</p> <p>Pages 80 - 83</p> <p>Pages 87 - 88</p> <p><b>Good Question:</b> Find the equation of a circle given 3 points on the circle</p> <p>Pages 91 - 94 Incorporate Math 12 type questions into the review</p> <p>Upon completion of this unit you may want to consider incorporating a small unit on matrices. Topics such as - Cramer's Rule, writing equations of lines and circles, and area of geometric figures using a matrix.</p>

TIME	CONTENT	TEXTBOOK PAGES / ASSIGNMENTS
February	<p><b><u>Functions</u></b></p> <p>2.1–Functions</p> <ul style="list-style-type: none"> <li>• Determine whether a set of points is a function</li> <li>• Vertical Line Test</li> <li>• Domain and Range</li> <li>• Function Notation</li> </ul> <p>2.3 Library of Functions</p> <ul style="list-style-type: none"> <li>• Constant Functions</li> <li>• Square and Cubic Functions</li> <li>• Square Root Functions</li> <li>• Absolute Value Functions</li> <li>• Piecewise-Defined Functions</li> </ul> <p>2.5 Operations on Functions</p> <p>2.7 Mathematical Models</p> <p>Chapter Review and Test</p>	<p>Pages 110 - 115</p> <p>Pages 134 - 136</p> <p>Pages 154 - 156 Very good review of algebra skills</p> <p>Pages 162 - 165 Good Pre Calculus type questions - May take longer than two days</p> <p>Pages 167 - 170</p>
February	<b><u>Polynomial and Rational Functions</u></b>	

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	<p>3.3 Polynomial Functions; Curve Fitting</p> <ul style="list-style-type: none"> <li>• Definition of a Polynomial Function</li> <li>• Identify Polynomial Functions</li> <li>• Finding roots of a polynomial function</li> <li>• Finding a polynomial from its zeros</li> <li>• Find x and y-intercepts of a polynomial function</li> <li>• Curve Fitting</li> </ul> <p>3.4 Rational Functions</p> <ul style="list-style-type: none"> <li>• Domain and Range</li> <li>• Asymptotes</li> </ul> <p>3.5 Rational Functions: Analyzing Graphs</p> <ul style="list-style-type: none"> <li>• Sketch the graph of a rational function</li> <li>• Applications</li> </ul> <p>Chapter Review and Test</p>	<p>Pages 205 - 208</p> <p>Pages 218 - 219</p> <p>Pages 228 - 230</p> <p>Pages 232 - 234</p>

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<p><b>March</b></p>	<p><u>The Zeros of a Polynomial Function</u></p> <p>4.1 The Real Zeros of a Polynomial Function</p> <ul style="list-style-type: none"> <li>• Remainder and Factor Theorems</li> <li>• Synthetic Division</li> <li>• Rational Root Theorem</li> <li>• Find Zeros of a Polynomial function</li> </ul> <p>4.2 Complex Numbers; Quadratic Equations with a Negative Discriminant</p> <ul style="list-style-type: none"> <li>• Sum and Difference of Complex Numbers</li> <li>• Product of Complex Numbers</li> <li>• Reciprocal of a Complex Number</li> <li>• Quotient of Complex Numbers</li> <li>• Powers of <math>i</math></li> <li>• Equation Solving</li> </ul> <p>4.3 Complex Zeros; Fundamental Theorem of Algebra</p> <ul style="list-style-type: none"> <li>• Finding a Polynomial Function Whose Zeros are Given</li> <li>• Finding Complex Zeros of a Polynomial</li> </ul> <p>Chapter Review and Test</p>	<p>Pages 251 - 252</p> <p>Pages 260 - 261</p> <p>Pages 266 - 267  There are good polynomial function worksheets from the Math 12 course. When working in this section create functions that the student will need to create the list of rational roots. From the list, students should be able to determine the zeros of the function. Create polynomials that have real and imaginary zeros.</p> <p>Pages 276 - 278</p>

TIME	CONTENT	TEXTBOOK PAGES / ASSIGNMENTS
<b>March</b>	<u>Exponential and Logarithmic Functions</u>  5.1 One-to-One Functions  5.2 Exponential Functions <ul style="list-style-type: none"> <li>• Laws of Exponents</li> <li>• Exponent Graphs</li> <li>• Base <math>e</math></li> <li>• Solving Exponential Equations</li> <li>• Applications</li> </ul> 5.3 Logarithmic Functions <ul style="list-style-type: none"> <li>• Change from Exponential Form to Logarithmic (and Visa Versa)</li> <li>• Domain of Logarithmic Function</li> <li>• Evaluate Logarithmic Functions</li> <li>• Solve Logarithmic Functions</li> </ul> 5.4 Properties of Logarithms  5.5 Logarithmic and Exponential Equations <ul style="list-style-type: none"> <li>• Solving Logarithmic Equations</li> <li>• Solving Exponential Equations</li> </ul> 5.6 Compound Interest <ul style="list-style-type: none"> <li>• One Time Investment Formulas</li> <li>• Present and Future Annuities</li> </ul> <a href="#">Review and Test</a>	Pages 290 - 291 <a href="#">Quick Review of Math B topic</a>  Pages 301 - 304  Pages 312 - 315  Pages 322 - 323  Page 328  Pages 336 - 338 <a href="#">Present and Future Annuity Formulas can be found in the old Math 12 textbook - <u>Advanced Mathematical Concepts.</u></a>

TIME	CONTENT	TEXTBOOK PAGES / ASSIGNMENTS
<p><b>April</b></p> <p><b>(1 - 2 weeks)</b></p>	<p>Parametric Equations</p> <p>Using <math>x = v_0 \cos \theta t</math> and <math>y = v_0 \sin \theta t + \frac{1}{2}gt^2 \pm s_0</math> find</p> <ul style="list-style-type: none"> <li>• Maximum distance traveled - horizontally and vertically</li> <li>• Solve for initial velocity</li> </ul> <p>Review and Test</p> <p><u>A Preview of Calculus</u></p> <p>14.1 Finding Limits Using Tables and Graphs</p> <ul style="list-style-type: none"> <li>• Find a Limit Using a Table</li> <li>• Find a Limit Using a Graph</li> </ul> <p>14.2 Algebra Techniques for Finding Limits</p> <p>14.3 One-Sided Limits; Continuous Functions</p> <ul style="list-style-type: none"> <li>• Find the One-Sided Limit of a Function</li> <li>• Determine Whether a Function is Continuous</li> </ul> <p>14.4 The Tangent Problem; The Derivative</p> <ul style="list-style-type: none"> <li>• Average Rate of Change</li> <li>• "Special Limit Function"</li> <li>• Derivative Rules</li> <li>• Applications of the Derivative</li> </ul> <p>Review and Test</p>	<p>Good problems can be found in <a href="#">Advanced Mathematics Concepts</a>. Also, Math 12 has created several worksheets you can use and/or reference.</p> <p>There are several support materials available in Math 12.</p> <p>Pages 906 - 907</p> <p>Pages 914 - 915</p> <p>Pages 920 - 921</p> <p>Pages 928 - 929</p> <p>This work will take you into May. Once this unit has been completed you may start review for the final exam.</p>

