



# LEE ACADEMY

Lee, Maine USA

*Official Curriculum*

## Honors Algebra II

Rev 07/08

### Course description

In *Algebra II*, students learn to represent various families of functions—linear, quadratic, exponential, logarithmic, radical, and rational—in various ways: as verbal descriptions, equations, tables, and graphs. *Algebra II* lessons also include concepts and applications of trigonometry, and geometry, data analysis and probability. Assessments are done in a variety of formats: multiple choice, short response, extended response, and major situation-based applications.

Primary text(s) and other major resources:  
*Algebra II* Larson, Boswell, Kanold, Stiff  
(MacDougal Littell, 2007)

~Unit length and MLRs	Objectives	Essential Questions	Assessment
<p><b>Unit 1</b> Linear Equations, Inequalities, Functions and Systems</p> <p><u>Goal set 1:</u></p> <ul style="list-style-type: none"> <li>✓ <b>D11a</b> Use properties to evaluate and simplify expressions.</li> <li>✓ <b>D11a</b> Use problem solving strategies and verbal models.</li> <li>✓ <b>C13d</b> Solve linear and absolute value equations and inequalities.</li> </ul>	<p><u>Objective set 1:</u> 3 classes Student will:</p> <ul style="list-style-type: none"> <li>✓ review-- properties of real numbers</li> <li>✓ review-- simplifying algebraic expressions</li> <li>✓ review—solve linear equations</li> <li>✓ review—rewrite and evaluate formulas and equations</li> <li>✓ review-- use problem solving strategies and models</li> <li>✓ review-- solve linear inequalities</li> <li>✓ review-- solve absolute value equations and inequalities</li> </ul>	<p><u>For set 1:</u> How are linear and absolute value equations/inequalities used in budgets, businesses, and carpentry?</p>	<p><u>For set 1:</u> <u>Olympics Performances Project</u> Students research men's and women's performances in the Olympics to apply linear models to assist them in making future predictions about Olympic performances. <i>(This assessment comes from the textbook supplements and is available from the publisher.)</i></p>
<p><u>Goal set 2:</u></p> <ul style="list-style-type: none"> <li>✓ <b>D12a</b> Represent relations and functions.</li> <li>✓ <b>D13a</b> Graph linear equations and inequalities in two variables.</li> <li>✓ <b>D13a</b> Write linear equations and inequalities</li> </ul>	<p><u>Objective set 2:</u> 5 classes Student will:</p> <ul style="list-style-type: none"> <li>✓ represent relations and graph linear functions</li> <li>✓ find slopes of lines and rates of change</li> <li>✓ graph linear equations in slope-intercept or standard form</li> <li>✓ write equations of lines</li> <li>✓ write and graph direct variation equations</li> <li>✓ draw scatter plots and best-fitting lines</li> <li>✓ graph and write absolute value functions and transformations</li> <li>✓ <u>graph linear equalities in two variables.</u></li> </ul>	<p><u>For set 2:</u> How are linear equations and models helpful in making everyday decisions?</p>	<p><u>For set 2:</u> <u>Researching, Collecting, Graphing... Scatter Plots</u> Project: Students research and develop a survey where they can form a scatter plot and find a best fitting line for a relationship.</p>
<p><u>Goal set 3:</u></p> <ul style="list-style-type: none"> <li>✓ <b>D13a</b> Solve systems of</li> </ul>	<p><u>Objective set 3:</u> 7 classes Student will:</p> <ul style="list-style-type: none"> <li>✓ solve linear systems by graphing</li> </ul>	<p><u>For set 3:</u> How are systems of linear equations used to solve real-world problems (e.g. payment options)</p>	<p><u>For set 3:</u> <u>Buying a Jet Ski Project:</u> Students use linear models to help them purchase the most</p>

<p>equations using a variety of methods.</p> <ul style="list-style-type: none"> <li>✓ <b>D12a</b> Graph systems of equations and inequalities.</li> <li>✓ Use matrices.</li> </ul>	<ul style="list-style-type: none"> <li>✓ solve linear systems algebraically</li> <li>✓ graph systems of linear inequalities</li> <li>✓ solve systems of linear equations in three variables</li> <li>✓ perform basic operations with matrices</li> <li>✓ multiply matrices</li> <li>✓ evaluate determinants of matrices</li> <li>✓ <u>solve linear systems using inverse matrices</u></li> </ul>		<p>cost-efficient Jet Ski</p>
<p><b>Unit 2</b> Quadratic, Polynomial and Radical Functions</p> <p><u>Goal set 4:</u></p> <ul style="list-style-type: none"> <li>✓ <b>D13b</b> Graph and write quadratic functions in several forms.</li> <li>✓ <b>D13</b> Solve quadratic equations using a variety of methods.</li> <li>✓ <b>A1a</b> Perform operations with square roots and complex numbers.</li> </ul>	<p><u>Objective set 4:</u> 13 classes Student will:</p> <ul style="list-style-type: none"> <li>✓ graph quadratic equations using standard form and vertex or intercept form</li> <li>✓ solve quadratic equations</li> <li>✓ use factoring to solve equations of the form <math>ax^2 + bx + c = 0</math></li> <li>✓ solve quadratic equations by finding square roots</li> <li>✓ perform operations with complex numbers</li> <li>✓ solve quadratic equations by completing the square</li> <li>✓ solve quadratic equations using the quadratic formula</li> <li>✓ graph and solve quadratic inequalities</li> <li>✓ write quadratic functions and models</li> </ul>	<p><u>For set 4:</u> How are quadratic functions used to model the heights of projectiles such as a batted baseball, and numerous uses of engineering and business applications?</p>	<p><u>For set 4:</u> <u>Water Flow</u> Students analyze and construct their own water tower in which they apply quadratic function solving techniques. <i>(This assessment comes from the textbook supplements and is available from the publisher.)</i></p>
<p><u>Goal set 5:</u></p> <ul style="list-style-type: none"> <li>✓ <b>D11</b> Graph polynomial functions.</li> <li>✓ <b>D11b</b> Perform operations with polynomials.</li> <li>✓ <b>D11b</b> Solve polynomial equations and</li> </ul>	<p><u>Objective set 5:</u> 8 classes Student will:</p> <ul style="list-style-type: none"> <li>✓ review-- simplify expressions involving powers</li> <li>✓ evaluate and graph polynomial functions</li> <li>✓ review-- add, subtract and multiply other polynomial functions</li> <li>✓ review-- factor and solve other polynomial equations</li> <li>✓ apply the remainder and factor theorems</li> </ul>	<p><u>For set 5:</u> How are polynomial functions used to model real-world situations such as volumes of objects, speed and physics applications, and decorative aesthetics?</p>	<p><u>For set 5:</u> <u>Quadratics: Physics &amp; Gravity Project</u> Students toss balls in the air to help find speed and maximum heights associated with polynomial equations.</p>

find zeros.	<ul style="list-style-type: none"> <li>✓ find rational zeros</li> <li>✓ apply the Fundamental Theorem of Algebra to classify the zeros of polynomial functions</li> <li>✓ use intercepts to graph polynomial functions</li> </ul>		
<p><u>Goal set 6:</u></p> <ul style="list-style-type: none"> <li>✓ <b>D11a</b> Use rational exponents.</li> <li>✓ <b>D12</b> Perform function operations and find inverse functions.</li> <li>✓ <b>D13e</b> Graph radical functions and solve radical equations.</li> </ul>	<p><u>Objective set 6:</u></p> <p>12 classes</p> <p>Student will:</p> <ul style="list-style-type: none"> <li>✓ evaluate nth roots and use rational exponents</li> <li>✓ simplify expressions involving rational expressions</li> <li>✓ perform function operations and composition</li> <li>✓ use inverse functions</li> <li>✓ review—graph square root and cube root functions</li> <li>✓ solve radical equations</li> </ul>	<p><u>For set 6:</u></p> <p>How are radical functions used to predict populations and growth/decay.</p>	
<p><b>Unit 3</b></p> <p>Other Nonlinear Functions and Relations</p> <p>[IMPORTANT NOTE: Goal set 7, <i>study of Exponential and Logarithmic Functions is now in Pre-calculus—not to be learned here, even though it appears in this text</i>]</p> <p><u>Goal set 8:</u></p> <ul style="list-style-type: none"> <li>✓ <b>D13e</b> Graph rational functions</li> <li>✓ <b>A1</b> Perform operations with rational</li> </ul>	<p><u>Objective set 8:</u></p> <p>6 classes</p> <ul style="list-style-type: none"> <li>✓ add, subtract, multiply and divide rational expressions</li> <li>✓ solve rational equations</li> </ul>	<p><u>For set 8:</u></p> <ul style="list-style-type: none"> <li>✓ How are rational functions used in engineering and construction applications?</li> <li>✓ How are operations of rational functions helpful in problem solving?</li> </ul>	<p><u>For set 8:</u></p> <p><u>Depreciation of Cars Project</u></p> <p>Students apply radical functions to help them realize the depreciation of car values.</p>

expressions ✓ <b>A1</b> Solve rational equations			
Goal set 9: ✓ Write equations of conic sections. ✓ Graph equations of conic sections. ✓ Solve quadratic systems.	<u>Objective set 9:</u> 7 classes Student will: ✓ find the length and midpoint of a line segment ✓ graph and write equations of parabolas ✓ graph and write equations of circles ✓ graph and write equations of ellipses ✓ solve quadratic systems	<u>For set 9:</u> ✓ Where are conics used in real life and why is it useful for an engineer to understand conic properties?	<u>For set 9:</u> <u>Polynomial Construct Project</u> - Students research an application of polynomial relationships to apply problem solving techniques.
<b>Unit 4</b> Probability, Data Analysis and Discrete Math  <u>Goal set 10a</u> <i>(content derived from Chapter 13, MacDougall Littell Algebra I text)</i>  Probability and Data Analysis: ✓ <b>B6</b> Find probabilities of simple and compound events ✓ <b>B4</b> Analyze sets of data ✓ <b>B3b, B4</b> Make and interpret data displays	<u>Objective set 10a:</u> 4 classes Student will: ✓ find sample spaces and probabilities ✓ find probabilities using permutations ✓ use combinations to count possibilities ✓ find probabilities of compound events ✓ analyze surveys and samples ✓ use measures of central tendency and dispersion ✓ make and interpret stem-and-leaf plots and histograms ✓ make and interpret box-and-whisker plots	<u>For set 10a:</u> How is the fundamental counting principle used to calculate the number of choices for a given situation?	
<u>Goal set 10b</u> (content derived from Chapter 10, MacDougall Littell)	<u>For set 10b</u> <u>Objective set 10b:</u> 7 classes Student will:	<u>For set 10b:</u> How are permutations and combinations used to answer probability and find the number of choices one has in a given situation.	

<p><b>Algebra II)</b></p> <ul style="list-style-type: none"> <li>✓ Use permutations and combinations.</li> <li>✓ <b>B6</b> Find probabilities.</li> <li>✓ Construct binomial distributions.</li> </ul>	<ul style="list-style-type: none"> <li>✓ apply the fundamental counting principle and permutations</li> <li>✓ use combinations and the Binomial Theorem</li> <li>✓ use probability to find the likelihood that an event will occur</li> </ul>		
<p><u>Goal set 11:</u></p> <ul style="list-style-type: none"> <li>✓ <b>B4, B7a, B7b</b> Use measures of central tendency and dispersion.</li> </ul>	<p><u>Objective set 11:</u></p> <p>2 classes Student will:</p> <ul style="list-style-type: none"> <li>✓ describe and use data using mean, median, mode and standard deviation</li> </ul>	<p><u>For set 11:</u></p> <p>How is central tendency and dispersion used substantially in statistics?</p>	