A Correlation of

Algebra and Trigonometry for College Readiness (Lial, Hornsby) ©2011

to the

Alabama Course of Study Mathematics Algebra II with Trigonometry

PEARSON

Algebra and Trigonometry for College Readiness (Lial, Hornsby) correlated to the
Alabama Course of Study: Mathematics – Algebra II with Trigonometry

INTRODUCTION

This document demonstrates how *Algebra and Trigonometry for College Readiness* **©2011** meets the objectives of the Alabama Course of Study: Mathematics – Algebra II with Trigonometry. Correlation page references are to the Student and Annotated Instructor's Edition.

Algebra and Trigonometry for College Readiness is the perfect program for students who have finished Algebra 2, but need an extra year of math to prepare for credit-bearing college-level courses. College-bound students will be well prepared with this curriculum, having the necessary math skills to succeed.

MathXL is available; a powerful, online tutorial, homework, and assessment program that provides personalized practice and instruction for all levels of students. Time-saving tools allow teachers to quickly create, edit and assign homework, tests, and quizzes.

Algebra and Trigonometry for College Readiness

- Content created for students who need another year of math, but are not ready for precalculus.

- Traditional approach of skill-building and problem-solving practice, with many excellent applications included.

- Provides a hand-holding approach with a lot of practice for students who need extra support.

- Problems are clearly stepped out to enhance student understanding.

- An abundance of exercises to provide students with plenty of practice

This document demonstrates the success students will achieve using *Algebra and Trigonometry for College Readiness*.

Alabama Course of Study: Mathematics Algebra II with Trigonometry	Algebra and Trigonometry for College Readiness (Lial, Hornsby)
ALGEBRA II WITH TRIGONOMETRY	
Algebra II With Trigonometry is a course designed to extend students' knowledge of Algebra I with additional algebraic and trigonometric content. Mastery of the content standards for this course is necessary for student success in higher-level mathematics. The use of appropriate technology is encouraged for numerical and graphical investigations that enhance analytical comprehension.	
NUMBER AND QUANTITY	
The Complex Number System	
Perform arithmetic operations with complex numbers.	
1. Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real. [N-CN1]	**SE/TE**: 420-426
2. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers. [N-CN2]	**SE/TE**: 420-426
Use complex numbers in polynomial identities and equations. *(Polynomials with real coefficients.)*	
3. Solve quadratic equations with real coefficients that have complex solutions. [N-CN7]	**SE/TE**: 442-444
4. (+) Extend polynomial identities to the complex numbers. Example: Rewrite $x^2 + 4$ as $(x + 2i)(x - 2i)$. [N-CN8]	This standard can be addressed when solving quadratic equations with complex solutions: **SE/TE**: 442-444
5. (+) Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials. [N-CN9]	**SE/TE**: 596-600
ALGEBRA	
Seeing Structure in Expressions	
Interpret the structure of expressions. (*Polynomial and rational.***)**	
6. Interpret expressions that represent a quantity in terms of its context.* [A-SSE1]	**SE/TE**: 60-72, 135-142, 256, 262-264, 310-313, 351-361, 362-370, 451-454, 458-459, 462-469, 504-506, 508-510, 609, 612, 622, 625
a. Interpret parts of an expression such as terms, factors, and coefficients. [A-SSE1a]	**SE/TE**: 249-254
b. Interpret complicated expressions by viewing one or more of their parts as a single entity. [A-SSE1b]	**SE/TE**: 249-254
7. Use the structure of an expression to identify ways to rewrite it. [A-SSE2]	**SE/TE**: 44, 50-52, 286-290, 291-298, 299-302, 303-306
Write expressions in equivalent forms to solve problems.	
8. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems.* [A-SSE4]	This standard could be addressed when analyzing rational functions, because the sum of a finite geometric series is rational expression: **SE/TE**: 319-370
Arithmetic With Polynomials and Rational Expressions	
Perform arithmetic operations on polynomials. (*Beyond quadratic.***)**	
9. Understand that polynomials form a system analogous to the integers; namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. [A-APR1]	**SE/TE**: 249-254, 264-271, 272-278

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Understand the relationship between zeros and factors of polynomials.	
10. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$. [A-APR2]	**SE/TE**: 591, 593
11. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. [A-APR3]	**SE/TE**: 591-593, 594-600, 604-608, 610-613
Use polynomial identities to solve problems.	
12. Prove polynomial identities and use them to describe numerical relationships. [A-APR4]	**SE/TE**: 298-302, 303-306
13. (+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined, for example, by Pascal's Triangle. (The Binomial Theorem can be proved by mathematical induction or by a combinatorial argument.) [A-APR5]	This standard can be addressed when examining polynomial identities: **SE/TE**: 298-302, 303-306
Rewrite rational expressions. *(Linear and quadratic denominators.)*	
14. Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or for the more complicated examples, a computer algebra system. [A-APR6]	**SE/TE**: 272-278, 588-593
15. (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions. [A-APR7]	**SE/TE**: 320-329, 330-338
Creating Equations*	
Create equations that describe numbers or relationships. *(Equations using all available types of expressions, including simple root functions.)*	
16. Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.* [A-CED1]	**SE/TE**: 60-72, 78-83, 135-142, 256, 262-264, 310-313, 351-361, 362-370, 451-454, 458-459, 462-469, 504-506, 508-510, 544-547, 572-578, 609, 612, 622, 625
17. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. [A-CED2]	**SE/TE**: 60-72, 110, 112-117, 135-142, 156-160, 256, 260-264, 310-313, 351-361, 362-370, 381-382, 384-385, 451-454, 458-459, 462-469, 490-500, 504-510, 511-516, 544-547, 550-554, 572-578, 601-613, 614-625
18. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. [A-CED3]	**SE/TE**: 60-72, 78-83, 135-142, 256, 262-264, 310-313, 351-361, 362-370, 451-454, 458-459, 462-469, 504-506, 508-510, 544-547, 572-578, 609, 612, 622, 625
19. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. [A-CED4]	**SE/TE**: 52-54, 56-60, 351-352, 357-358, 461-462, 465-466

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* Indicates a standard that relates to modeling.

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Reasoning With Equations and Inequalities	
Understand solving equations as a process of reasoning, and explain the reasoning. *(Simple rational and radical.)*	
20. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. [A-REI2]	**SE/TE:** 346-350, 351-361, 413-419
Represent and solve equations and inequalities graphically. *(Combine polynomial, rational, radical, absolute value, and exponential functions.)*	
21. Explain why the *x*-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.* [A-REI11]	**SE/TE:** 146-147, 171-172, 179-181, 417-419, 575-578, 648-653
FUNCTIONS	
Interpreting Functions	
Interpret functions that arise in applications in terms of the context. *(Emphasize selection of appropriate models.)*	
22. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* [F-IF4]	**SE/TE:** 110-117, 118-129, 130-131, 136-142, 150, 156-160, 261-264, 347-350, 381-382, 384, 490-499, 500-509, 510-516, 517-523, 540-541, 545-547, 550-554, 601-613, 614-625
23. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.* [F-IF5]	**SE/TE:** 150, 156-160, 261-264, 347-350, 381-382, 384, 490-500, 503, 506-509, 514-516, 519-523, 540-541, 545-547, 550-554, 601-613, 614-625
24. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.* [F-IF6]	**SE/TE:** 123-129
Analyze functions using different representations. *(Focus on using key features to guide selection of appropriate type of model function.)*	
25. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.* [F-IF7]	**SE/TE:** 110-117, 118-129, 130-131, 136-142, 150, 156-160, 261-264, 347-350, 381-382, 384, 490-499, 500-509, 510-516, 517-523, 540-541, 545-547, 550-554, 601-613, 614-625
a. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. [F-IF7b]	**SE/TE:** 381-382, 384, 517-523
b. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. [F-IF7c]	**SE/TE:** 261-264, 601-613, 614-625
c. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. [F-IF7e]	**SE/TE:** 540-541, 545-547, 550-554

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26. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. [F-IF8]	**SE/TE**: 120, 123, 127, 134, 139, 144, 447-450, 496, 500-501
27. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). [F-IF9]	The opportunity to address this standard is available. See the following: **SE/TE**: 147-156
Building Functions	
Build a function that models a relationship between two quantities. (Include all types of functions studied.)	
28. Write a function that describes a relationship between two quantities.* [F-BF1]	**SE/TE**: 60-72, 78-83, 135-142, 256, 262-264, 310-313, 351-361, 362-370, 451-454, 458-459, 462-469, 504-506, 508-510, 544-547, 572-578, 609, 612, 622, 625
a. Combine standard function types using arithmetic operations. [F-BF1b]	**SE/TE**: 484-490
Build new functions from existing functions. (Include simple radical, rational, and exponential functions; emphasize common effect of each transformation across function types.)	
29. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. [F-BF3]	**SE/TE**: 110-117, 118-129, 130-131, 136-142, 150, 156-160, 261-264, 347-350, 381-382, 384, 490-499, 500-509, 510-516, 517-523, 540-541, 545-547, 550-554, 601-613, 614-625
30. Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse, and write an expression for the inverse. [F-BF4a]	**SE/TE**: 535-539
Linear, Quadratic, and Exponential Models*	
Construct and compare linear, quadratic, and exponential models and solve problems. (Logarithms as solutions for exponentials.)	
31. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers, and the base b is 2, 10, or e; evaluate the logarithm using technology. [F-LE4]	**SE/TE**: 569-570, 572-578
Trigonometric Functions	
Extend the domain of trigonometric functions using the unit circle.	
32. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. [F-TF1]	**SE/TE**: 736-741
33. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle. [F-TF2]	**SE/TE**: 749-757
34. Define the six trigonometric functions using ratios of the sides of a right triangle, coordinates on the unit circle, and the reciprocal of other functions.	**SE/TE**: 702-708, 749-757
Model periodic phenomena with trigonometric functions.	
35. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.* [F-TF5]	**SE/TE**: 770-780, 781-788, 789-795, 796-802

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Prove and apply trigonometric identities.	
36. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$, and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle. [F-TF8]	**SE/TE:** 687-691
STATISTICS AND PROBABILITY	
Interpreting Categorical and Quantitative Data	
Summarize, represent, and interpret data on a single count or measurement variable.	
37. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. [S-ID4]	This objective falls outside the scope of *Algebra and Trigonometry for College Readiness*.
Making Inferences and Justifying Conclusions	
Understand and evaluate random processes underlying statistical experiments.	
38. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. [S-IC1]	This objective falls outside the scope of *Algebra and Trigonometry for College Readiness*.
39. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. [S-IC2]	This objective falls outside the scope of *Algebra and Trigonometry for College Readiness*.
Make inferences and justify conclusions from sample surveys, experiments, and observational studies.	
40. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each. [S-IC3]	This objective falls outside the scope of *Algebra and Trigonometry for College Readiness*.
41. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. [S-IC4]	This objective falls outside the scope of *Algebra and Trigonometry for College Readiness*.
42. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. [S-IC5]	This objective falls outside the scope of *Algebra and Trigonometry for College Readiness*.
43. Evaluate reports based on data. [S-IC6]	This objective falls outside the scope of *Algebra and Trigonometry for College Readiness*.
Using Probability to Make Decisions	
Use probability to evaluate outcomes of decisions. (*Include more complex situations.*)	
44. (+) Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator). [S-MD6]	This standard can be addressed when discussing probability: **SE/TE:** 927-933
45. (+) Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game). [S-MD7]	This standard can be addressed when discussing probability: **SE/TE:** 927-933

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