



Alignment Document
State of Indiana and Aventa Learning Algebra II

Algebra II
2005-2007 Benchmark Blueprint

| Standards | Benchmarks | Unit Name | Course Topic Description |
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| A2.1 Students graph relations and functions and find zeros. They use function notation and combine functions by composition. They interpret functions in given situations. | A2.1.1 Recognize and graph various types of functions, including polynomial, rational, and algebraic functions. | Composition of Functions | Horizontal Line Test |
| | | Composition of Functions | Domain Restrictions |
| | | Composition of Functions | Function Notation |
| | A2.1.2 Use function notation. Add, subtract, multiply, and divide pairs of functions. | Composition of Functions | Combining functions |
| | | Composition of Functions | Checking that two functions really are inverse functions of each other |
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| | A2.1.3 Understand composition of functions and combine functions by composition. | | |
| | A2.1.4 Graph relations and functions with and without graphing technology. | Composition of Functions | Definition of Functions |
| | | Composition of Functions | Domain Restrictions |
| | | Composition of Functions | Review of Functions |
| Composition of Functions | | Horizontal Line Test | |
| Composition of Functions | | Function Notation | |
| A2.1.5 Find the zeros of a function. | | | |
| A2.1.6 Solve an inequality by examining the graph. | Absolute Value | Absolute Value and Inequalities Shortcuts Summary | |
| | Absolute Value | Absolute Value and Inequalities | |



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| | A2.1.7 Graph functions defined piece-wise. | Composition of Functions | Domain Restrictions |
| | | Composition of Functions | Horizontal Line Test |
| | A2.1.8 Interpret given situations as functions in graphs, formulas, and words. | Composition of Functions | Function Notation |
| | | Composition of Functions | Definition of Functions |
| | | Composition of Functions | Domain Restrictions |
| | | Composition of Functions | Review of Functions |
| | | Composition of Functions | Horizontal Line Test |
| A2.2 Students solve systems of linear equations and inequalities and use them to solve word problems. They model data with linear equations. | A2.2.1 Graph absolute value equations and inequalities. | Absolute Value | Absolute Value and Inequalities Shortcuts Summary |
| | | Absolute Value | More Complicated Absolute Value Equations |
| | | Absolute Value | Absolute Value and Inequalities |
| | | Absolute Value | Shortcuts |
| | | Absolute Value | Absolute Value and Inequalities Shortcuts |
| | | Absolute Value | Absolute Value equations in other places |
| | | Absolute Value | Absolute Value Equations |
| | A2.2.2 Use substitution, elimination, and matrices to solve systems of two or three linear equations in two or three variables. | | |
| | A2.2.3 Use systems of linear equations and inequalities to solve word problems. | Systems of Linear Equations | Systems having three linear equations |
| | | Systems of Linear Equations | Underdetermined Systems of Equations |
| Systems of Linear Equations | | Introduction | |
| Systems of Linear Equations | | Gauss - Jordan Elimination for systems with | |



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| | | Systems of Linear Equations | three equations and three variables |
| | | Systems of Linear Equations | Substitution Method to solve a system |
| | | Systems of Linear Equations | Using your calculator to solve systems of linear equations |
| | | Systems of Linear Equations | Inconsistent Systems of Equations |
| | | Systems of Linear Equations | Gauss - Jordan Elimination Method |
| | | Systems of Linear Equations | Addition Method of Solving Systems of Equations |
| | | Systems of Linear Equations | Systems of two linear equations with two variables |
| | A2.2.4 Find a linear equation that models a data set using the median fit method and use the model to make predictions. | Linear Equations | Linear Functions |
| A2.3 Students solve quadratic equations, including the use of complex numbers. They interpret maximum and minimum values of quadratic functions. They solve equations that contain square roots. | A2.3.1 Define complex numbers and perform basic operations with them. | Complex Numbers | The complex number i |
| | | Complex Numbers | Working with complex numbers |
| | | Complex Numbers | Absolute Value of a Complex Number |
| | | Complex Numbers | Introduction |
| | | Complex Numbers | Addition and Subtraction in a Complex Plane |
| | A2.3.2 Understand how real and complex numbers are related, including plotting complex numbers as points in the plane. | Complex Numbers | Absolute Value of a Complex Number |
| | | Complex Numbers | The complex number i |
| | | Complex Numbers | Graphing Complex Numbers |
| | | Complex Numbers | Introduction |
| | | Complex Numbers | Addition and Subtraction in a Complex Plane |

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| | | Complex Numbers | Working with complex numbers |
| | A2.3.3 Solve quadratic equations in the complex number system. | Complex Numbers | Introduction |
| | | Complex Numbers | Absolute Value of a Complex Number |
| | | Complex Numbers | Working with complex numbers |
| | | Complex Numbers | The complex number i |
| | A2.3.4 Graph quadratic functions. Apply transformations to quadratic functions. Find and interpret the zeros and maximum or minimum value of quadratic functions. | Quadratics | Factored form of quadratics |
| | | Quadratics | Quadratic functions and their graphs |
| | | Quadratics | Zeros of the quadratic function |
| | | Quadratics | Quadratic functions in the real world |
| | | Quadratics | From the zeros to the equation of quadratic functions |
| | A2.3.5 Solve word problems using quadratic equations. | Quadratics | Introduction |
| A2.3.6 Solve equations that contain radical expressions. | | | |
| A2.3.7 Solve pairs of equations, one quadratic and one linear, or both quadratic. | | | |
| A2.4 Students write equations of conic sections and draw their graphs. | A2.4.1 Write the equations of conic sections (circle, ellipse, parabola, and hyperbola). | Conic Sections | What kind of conic is it? |
| | | Conic Sections | General equation for conic sections. |
| | A2.4.2 Graph conic sections. | Conic Sections | Hyperbolas |
| | | Conic Sections | Ellipses in Standard Form |
| | | Conic Sections | Parabolas in Standard Form |



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| | | Conic Sections | Asymptotes for hyperbolas |
| | | Conic Sections | How to get the equation of an ellipse |
| | | Conic Sections | Ellipses |
| | | Conic Sections | Circles |
| | | Conic Sections | Circles in Standard Form |
| | | Conic Sections | Eccentricity |
| | | Conic Sections | Parabolas |
| | | Conic Sections | Finding the Center and Radius of a Circle |
| | | Conic Sections | Foci of Ellipses |
| | | Conic Sections | "Vertical" ellipses |
| | | Conic Sections | Hyperbola in Standard Form |
| | | Quadratics | Graphing Parabolas |
| | | Quadratics | Quadratic functions and their graphs |
| A2.5 Students use the binomial theorem, divide and factor polynomials, and solve polynomial equations. | A2.5.1 Understand the binomial theorem and use it to expand binomial expressions raised to positive integer powers. | Counting | The Binomial Theorem |
| | | Counting | More about the Binomial Theorem |
| | | Counting | The values in Pascal's triangle as factorials |
| | | Counting | Some computations with factorials |
| | A2.5.2 Divide polynomials by others of lower degree. | Polynomials | Dividing polynomials |
| | A2.5.3 Factor polynomials completely and solve polynomial equations by factoring. | Polynomials | The Factor Theorem |
| | | Polynomials | Working with Cubes |

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| | | Polynomials | Factoring Polynomials |
| | A2.5.4 Use graphing technology to find approximate solutions for polynomial equations. | Exponential and Logarithm functions | Values of logarithm functions: a look at your calculator |
| | | Exponential and Logarithm functions | The Natural Logarithm function |
| | A2.5.5 Use polynomial equations to solve word problems. | | |
| | A2.5.6 Write a polynomial equation given its solutions. | | |
| | A2.5.7 Understand and describe the relationships among the solutions of an equation, the zeros of a function, the x-intercepts of a graph, and the factors of a polynomial expression. | Polynomials | Factoring Polynomials |
| | | Polynomials | The Factor Theorem |
| | | Polynomials | Working with Cubes |
| A2.6 Students use negative and fractional exponents. They simplify algebraic fractions and solve equations involving algebraic fractions. They solve problems of direct, inverse, and joint variation. | A2.6.1 Understand and use negative and fractional exponents. | | |
| | A2.6.2 Add, subtract, multiply, divide, and simplify algebraic fractions. | | |
| | A2.6.3 Simplify complex fractions. | | |
| | A2.6.4 Solve equations involving algebraic fractions. | | |
| | A2.6.5 Solve word problems involving fractional equations. | | |
| | A2.6.6 Solve problems of direct, inverse, and joint variation. | | |
| A2.7 Students graph exponential functions and relate them to logarithms. They solve logarithmic and exponential equations and inequalities. They solve word problems using exponential functions. | A2.7.1 Graph exponential functions. | Exponential and Logarithm functions | Exponential functions: an example |
| | | Exponential and Logarithm functions | Graphs of exponential functions |
| | | Exponential and Logarithm functions | Introduction |

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| | Exponential and Logarithm functions | Computations with exponential functions |
| | Exponential and Logarithm functions | Exponential functions: the formal definition |
| | Exponential and Logarithm functions | Exponential functions: an intuitive approach |
| | Composition of Functions | Horizontal Line Test |
| | Composition of Functions | Domain Restrictions |
| A2.7.2 Prove simple laws of logarithms. | Exponential and Logarithm functions | More Real Life Logarithmic Examples |
| A2.7.3 Understand and use the inverse relationship between exponents and logarithms. | Exponential and Logarithm functions | Values of logarithm functions: a look at your calculator |
| | Exponential and Logarithm functions | Values of logarithm functions |
| | Exponential and Logarithm functions | More Real Life Logarithmic Examples |
| | Exponential and Logarithm functions | Logarithm functions |
| | Exponential and Logarithm functions | Real Life Logarithmic Examples |
| | Exponential and Logarithm functions | Logarithm functions and exponential functions together |
| A2.7.4 Solve logarithmic and exponential equations and inequalities. | Absolute Value | Absolute Value and Inequalities Shortcuts Summary |
| | Absolute Value | Absolute Value and Inequalities |
| | Exponential and Logarithm | Graphs of logarithm functions |

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| | | functions | |
| | | Exponential and Logarithm functions | The horizontal line property, and one-to-one functions |
| | A2.7.5 Use the definition of logarithms to convert logarithms from one base to another. | Exponential and Logarithm functions | More Real Life Logarithmic Examples |
| | A2.7.6 Use the properties of logarithms to simplify logarithmic expressions and to find their approximate values. | Exponential and Logarithm functions | Comparing sizes |
| | | Exponential and Logarithm functions | Properties of Logarithms |
| | | Exponential and Logarithm functions | Logarithm functions and exponential functions together |
| | | Exponential and Logarithm functions | Computations with logarithm functions |
| | A2.7.7 Use calculators to find decimal approximations of natural and common logarithmic numeric expressions. | Exponential and Logarithm functions | Comparing sizes |
| | | Exponential and Logarithm functions | Values of logarithm functions: a look at your calculator |
| | | Exponential and Logarithm functions | Computations with logarithm functions |
| | | Exponential and Logarithm functions | More Real Life Logarithmic Examples |
| | | Exponential and Logarithm functions | Properties of Logarithms |
| | | Exponential and Logarithm functions | The Natural Logarithm function |
| | A2.7.8 Solve word problems involving applications of exponential functions to | Exponential and Logarithm functions | Computations with exponential functions |



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| | growth and decay. | Exponential and Logarithm functions Exponential and Logarithm functions | Exponential functions with fractional bases Graphs of exponential functions |
| A2.8 Students define and use arithmetic and geometric sequences and series. | A2.8.1 Define arithmetic and geometric sequences and series. | Sequences and Series | Geometric Series |
| | | Sequences and Series | Series |
| | | Sequences and Series | Geometric sequences |
| | | Sequences and Series | One very special Arithmetic Series |
| | | Sequences and Series | Arithmetic sequences |
| | | Sequences and Series | Sigma notation and series |
| | | Sequences and Series | Series: An important example |
| | | Sequences and Series | Arithmetic Series |
| | | Sequences and Series | Summation notation (also called Sigma notation) |
| | A2.8.2 Find specified terms of arithmetic and geometric sequences. | Sequences and Series | Geometric Series |
| | | Sequences and Series | Arithmetic Series |
| | A2.8.3 Find partial sums of arithmetic and geometric series. | Sequences and Series | Geometric Series |
| | | Sequences and Series | Arithmetic Series |
| A2.8.4 Solve word problems involving applications of sequences and series. | Sequences and Series | Introduction | |
| | Sequences and Series | Sigma notation and series | |
| | Sequences and Series | Geometric sequences | |

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| | | Sequences and Series | Explicitly defined sequences |
| | | Sequences and Series | Arithmetic sequences |
| | | Sequences and Series | Sequences |
| | | Sequences and Series | Series |
| | | Sequences and Series | The formula $1+2+3+\dots+n =$ |
| | | Sequences and Series | Series: An important example |
| | | Sequences and Series | Implicitly (or Recursively) defined sequences |
| | | Sequences and Series | One very special Arithmetic Series |
| | | Sequences and Series | Summation notation (also called Sigma notation) |
| A2.9 Students use fundamental counting principles to compute combinations, permutations, and probabilities. | A2.9.1 Understand and apply counting principles to compute combinations and permutations. | Counting | Counting Subsets Formula |
| | | Counting | Counting: An introduction to choosing subsets |
| | | Counting | Combinations |
| | | Counting | Permutations |
| | A2.9.2 Use the basic counting principle, combinations, and permutations to compute probabilities. | Counting | Permutations |
| | | Counting | Frequency Expectation Interpretation of probability |
| | | Counting | Combinations |
| | | Counting | Counting Subsets Formula |
| | | Counting | Counting: An introduction to choosing subsets |

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| A2.10 Mathematical Reasoning and Problem Solving | A2.10.1 Use a variety of problem-solving strategies, such as drawing a diagram, guess-and-check, solving a simpler problem, writing an equation, and working backwards. | Covered throughout the course | |
| | A2.10.2 Decide whether a solution is reasonable in the context of the original situation. | Covered throughout the course | |
| | A2.10.3 Decide if a given algebraic statement is true always, sometimes, or never (statements involving rational or radical expressions, logarithmic or exponential functions). | Exponential and Logarithm functions | Introduction |
| | A2.10.4 Use the properties of number systems and the order of operations to justify the steps of simplifying functions and solving equations. | | |
| | A2.10.5 Understand that the logic of equation solving begins with the assumption that the variable is a number that satisfies the equation, and that the steps taken when solving equations create new equations that have, in most cases, the same solution set as the original. Understand that similar logic applies to solving systems of equations simultaneously. . | | |
| | A2.10.6 Use counterexamples to show that statements are false. | | |