

Algebra II

Algebra II – is a full-year, high school math course intended for the student who has successfully completed the prerequisite course Algebra I. This course focuses on algebraic techniques and methods in order to develop student understanding of advanced number theory, concepts involving linear, quadratic and polynomial functions, and pre-calculus theories. This course also integrates geometric concepts and skills throughout the units, as well as introducing students to basic trigonometric identities and problem solving.

Objectives

- Understand set notation and the structure of mathematical systems.
- Calculate and perform operations with real and imaginary numbers.
- Know how to use functional notation and operations on functions.
- Simplify and solve algebraic fractions.
- Perform operations on polynomials, including factoring, long division, and synthetic division.
- Solve algebraic word problems involving mixtures, money, integers, and work.
- Evaluate and solve radical expressions and equations.
- Solve systems of equations with graphing, substitution, and matrices.
- Graph and solve quadratic equations, including conic sections.
- Graph and solve exponential and logarithmic equations.
- Explore trigonometric identities and functions using the Unit Circle, graphs and modeling.
- Calculate permutations, combinations, and complex probabilities.
- Interpret sample surveys, normal distributions and observational studies.

Unit 1: Set, Structure, and Function	
Assignments	
1. Course Overview	15. Algebraic Expressions: Exponents Part 1
2. Properties of Sets	16. Algebraic Expressions: Exponents Part 2
3. Operations of Sets	17. Algebraic Expressions: Multiplication and Division Part 1
4. Quiz 1: Set Theory	18. Algebraic Expressions: Multiplication and Division Part 2
5. Structure: Axioms	19. Exponents of Exponential Expressions
6. Structure: Applications	20. Algebraic Expressions: Combining Terms
7. Relations and Functions: Definitions	21. Quiz 3: Algebraic Expressions
8. Relations and Functions: Graphs	22. Special Project*
9. Relations and Functions: Domain and Range	23. Test
10. Relations and Functions: Function Transformations	24. Alternate Test*
11. Relations and Functions: Function Notation	25. Glossary and Credits
12. Relations and Functions: Operations	
13. Relations and Functions: Inverses	
14. Quiz 2: Relations and Functions	

Unit 2: Numbers, Sentences, and Problems		
Assignments		
Algebra II	1. Number Order and Absolute Value	12. Quiz 2: Equalities and Inequalities
	2. Sums and Products	13. Number Problems
	3. Quiz 1: Numbers, Sentences, and Problems	14. Motion Problems
	4. Solving Equations	15. Miscellaneous Problems
	5. Multiplication Property	16. Quiz 3: Problems
	6. Multi-step Equations	17. Performance Task
	7. Equations with Parentheses	18. Alternate Performance Task*
	8. Literal Expressions	19. Special Project*
	9. Solving Inequalities	20. Test
	10. Graphing Solution Sets for Inequalities	21. Alternate Test*
	11. Compound Sentences	22. Glossary and Credits

Unit 3: Linear Equations and Inequalities		
Assignments		
Algebra II	1. Line Graphs	13. Solutions by Substitution
	2. Line Graphs by Two Points	14. Application of Systems of Equations
	3. Slope of Lines Part 1	15. Quiz 2: Solutions for Systems
	4. Slope of Lines Part 2	16. Solving Inequalities
	5. Equations: Point Slope Part 1	17. Solving Two-order Inequalities
	6. Equations: Point Slope Part 2	18. Quiz 3: Solving Inequalities
	7. Equations: Point Slope Part 3	19. Performance Task
	8. Equations: Slope-Intercept	20. Alternate Performance Task*
	9. General Equation of a Line	21. Special Project*
	10. Quiz 1: Lines	22. Test
	11. Solutions for Systems of Equations	23. Alternate Test*
12. Solutions by Addition	24. Glossary and Credits	

Unit 4: Polynomials		
Assignments		
Algebra II	1. Products and Factoring	14. Quiz 2: Polynomials
	2. Multiplying Polynomials by Polynomials	15. Numerical Relationships from Identities
	3. Using Special Products Part 1	16. Direct Variation
	4. Using Special Products Part 2	17. Inverse Variation
	5. Factoring Trinomials	18. Joint and Combined Variation
	6. Factoring Special Products Part 1	19. Quiz 3: Working with Variations
	7. Factoring Special Products Part 2	20. Project: Creating an Algorithm
	8. Quiz 1: Special Products	21. Performance Task
	9. Addition and Subtraction Operations	22. Alternate Performance Task*
	10. Division with Polynomials	23. Special Project*
	11. Synthetic Division	24. Test
12. The Remainder Theorem	25. Alternate Test*	
13. Graphing Polynomials	26. Glossary and Credits	

Unit 5: Algebraic Fractions		
Assignments		
Algebra II	1. Multiplying and Dividing with Fractions	14. Graphs of Rational Functions
	2. Reducing Rational Expressions	15. Graphs of Rational Functions (2)
	3. Multiplying Algebraic Fractions	16. Applications of Fractions
	4. Dividing Algebraic Fractions	17. Mixture Problems
	5. Quiz 1: Algebraic Fractions	18. Work Problems
	6. Adding and Subtracting Rational Expressions	19. Quiz 4: Problems with Fractions
	7. Addition and Subtraction	20. Performance Task
	8. Mixed Expressions and Complex Fractions	21. Alternate Performance Task*
	9. Quiz 2: Addition and Subtraction of Fractions	22. Special Project*
	10. Equations with Fractions	23. Test
	11. Fractional Equations	24. Alternate Test*
	12. Proportions	25. Glossary and Credits
	13. Quiz 3: Fractional Equations	

Unit 6: Semester Review and Exam		
Assignments		
Algebra II	1. Review	3. Alternate Exam - Form A*
	2. Exam	4. Alternate Exam - Form B*

Unit 7: Real Numbers		
Assignments		
Algebra II	1. Real Numbers	14. Sum and Product of Roots
	2. Law of Radicals	15. The Discriminant
	3. Conjugates	16. The Fundamental Theorem of Algebra
	4. Radical Equations	17. Imaginary Numbers
	5. Quiz 1: Real Numbers	18. Complex Solutions
	6. Standard Form of a Quadratic Function	19. Quiz 3: Quadratic Formula
	7. Quadratic Equations	20. Performance Task
	8. Factoring Quadratic Equations	21. Alternate Performance Task*
	9. Completing the Square	22. Special Project*
	10. Quiz 2: Quadratic Solutions	23. Test
	11. Quadratic Formula	24. Alternate Test*
	12. Graphs of Quadratic Functions	25. Glossary and Credits
	13. Word Problems Involving Quadratic Equations	

Unit 8: Quadratic Relations and Systems		
Assignments		
Algebra II	1. Distance Formula	14. Solutions of Inequalities
	2. Circle	15. Applications of Conic Sections-Part 1
	3. Ellipse	16. Applications of Conic Sections-Part 2
	4. Ellipse Continued	17. Applications of Conic Sections-Part 3
	5. Quiz 1: Conics and the Coordinate Plane	18. Constant of Proportionality
	6. Conic Sections: Parabola	19. Quiz 3: Applications of Conics
	7. Conic Sections: Parabola Continued	20. Performance Task
	8. Conic Sections: Hyperbola	21. Alternate Performance Task *
	9. Conic Sections: Hyperbola Continued	22. Special Project*
	10. Identifying Conic Sections	23. Test
	11. Quiz 2: Conics	24. Alternate Test*
	12. Systems of Equations	25. Glossary and Credits

Unit 9: Functions		
Assignments		
Algebra II	1. Absolute Value Functions	17. Graphs of Logarithmic Functions
	2. Exponential Functions	18. Solving Logarithmic Equations
	3. Fractional Exponents	19. Graphs of Natural Logarithms
	4. Radical Functions	20. Logarithmic Applications
	5. Graphs of Piece-Wise Defined Functions	21. Quiz 2: Logarithmic Functions
	6. Exponential Equations	22. Comparing Functions
	7. Graphing Exponential Functions	23. Inverse Functions
	8. Exponential Applications	24. Matrices
	9. Solving Equations by Graphing Functions	25. System Solutions with Matrices
	10. Quiz 1: Exponential Functions	26. Addition and Multiplication of Matrices
	11. Logarithmic Functions	27. Quiz 3: Matrices
	12. Evaluation of Logarithms	28. Performance Task
	13. Evaluating Exponential Functions, Common and Natural Logarithms	29. Alternate Performance Task*
	14. General Properties of Logarithms	30. Special Project*
	15. Scientific Notation	31. Test
	16. Calculation of Common Logarithms	32. Alternate Test*
	33. Glossary and Credits	

Unit 10: Counting Principles		
Assignments		
Algebra II	1. Progressions: Sequences	13. Probability: Concepts
	2. Arithmetic and Geometric Sequences	14. Probability: Equally Likely Outcomes
	3. Progressions: Series	15. Probability: Multiplication Principle
	4. Quiz 1: Sequences and Series	16. Conditional Probability
	5. Permutations: Factorials	17. Quiz 4: Probability
	6. Permutation Formula	18. Performance Task
	7. Permutations: Applications	19. Alternate Performance Task*
	8. Quiz 2: Permutations	20. Special Project*
	9. Combination Formula	21. Test
	10. Combinations: Applications	22. Alternate Test*
	11. Combinations: Binomial Coefficients	23. Glossary and Credits
	12. Quiz 3: Combinations	

Unit 11: Trigonometry		
Assignments		
Algebra II	1. Trigonometry Basics	11. Quiz 3: Graphs
	2. The Unit Circle	12. Project: Regression Curve
	3. Reciprocal Functions	13. Performance Task
	4. Radian Measure	14. Alternate Performance Task*
	5. Quiz 1: Unit Circle	15. Special Project*
	6. Trigonometric Functions on the Unit Circle	16. Review
	7. Pythagorean Identity	17. Test
	8. Quiz 2: Trigonometric Functions	18. Alternate Test*
	9. Graphs and Amplitude	19. Glossary and Credits
	10. Graphs and Modeling	

Unit 12: Statistics	
Algebra II	Assignments
	1. Sample Surveys
	2. Normal Distributions
	3. Simulations
	4. Experiments
	5. Quiz 1: Statistics
	6. Observational Studies
	7. Probability and Decisions
	8. Quiz 2: Statistical Probability
	9. Performance Task
10. Alternate Performance Task*	
11. Appropriate Models	
12. Modeling Functions	
13. Regression Models	
14. Quiz 3: Math Models	
15. Special Project*	
16. Review	
17. Test	
18. Alternate Test*	
19. Glossary and Credits	

Unit 13: Review	
Algebra II	Assignments
	1. Integers
	2. Integers Continued
	3. Open Sentences
	4. Open Sentences Continued
	5. Graphs
	6. Graphs Continued
	7. Quiz 1: Review
	8. Polynomials
	9. Polynomials Continued
10. Algebraic Fractions Part 1	
11. Algebraic Fractions Part 2	
12. Algebraic Fractions Part 3	
13. Real Numbers	
14. Real Numbers Continued	
15. Quiz 2: Review	
16. Quadratic Relations and Systems	
17. Quadratics Continued	
18. Exponential Functions	
19. Exponential Functions Continued	
20. Counting Principles	
21. Counting Principles Continued	
22. Quiz 3: Review	
23. Special Project*	
24. Test	
25. Alternate Test*	
26. Glossary and Credits	

Unit 14: Semester Review and Exam	
Algebra II	Assignments
	1. Review
	2. Exam
	3. Alternate Exam – Form A*
	4. Alternate Exam – Form B*

Unit 15: Final Exam	
Algebra II	Assignments
	1. Exam
	2. Alternate Exam – Form A*
	3. Alternate Exam – Form B*
	4. Performance Task 1*
	5. Performance Task 2*

Unit 16: End of Course Exam	
Algebra II	Assignments
	1. Exam
	2. Alternate Exam – Form A*
	3. Alternate Exam – Form B*