CURRICULUM OVERVIEW

Algebra II

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Algebra II Course Overview

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.

- **Set, Structure, and Function**: Student will review the properties of sets and functions, determine the domains, ranges and inverses of functions, and simplifying expressions by combining like terms, exponent rules for multiplication and division and exponents.

- **Numbers, Sentences, and Problems**: Student will solve linear equations and inequalities using multiplication, addition, and distributive properties, graph absolute value, and compound equations and inequalities, and problems involving rate, distance, and time.

- **Linear Equations and Inequalities**: Student will determine the slope of a line and use that information to write an equation, compare lines, and solve a system of equations using the addition property of equality, the substitution property of equality, and graphical methods.

- **Polynomials**: Student will factor trinomials using the difference of two squares, the product of the sum of two perfect cubes, perfect square trinomials, and the difference of two cubes, and solve problems involving direct variation, inverse variation and joint or combination variation.

- **Algebraic Fractions**: Student will reduce fractions, add and subtract fractions, and change mixed numbers and complex fractions to simple algebraic fractions, and solve equations that contain algebraic fractions, variables in the denominator of a fraction, and mixture problems.

- **Real Numbers**: Student will evaluate and simplify radical expressions and fractional exponent expressions, and solve quadratic equations by the factoring method, and by completing the square.

- **Quadratic Relations and Systems**: Student will determine the major components of different conic sections, write their equations, solve and graph them.

- **Exponential Functions**: Student will evaluate and simplify equations in logarithmic form, exponential form, graph them, and use matrices to solve a system of equations.

- **Counting Principles**: Student will differentiate between a finite and an infinite series, and between an arithmetic and a geometric series, calculate the number of permutations or combinations of r elements from a set of n elements, and use the counting principle, conditional probability, and multiplication principle to calculate the probability of complex events.

- **Trigonometry**: Student will understand the relationships of trig functions and use Pythagorean identities to determine specific values.

- **Statistics**: Student will understand how sampling is used to gather information, distinguish between non-random, and random samples and what kinds of bias they employ, and solve problems with linear, quadratic, and exponential models.

Unit 1: Set, Structure, and Function

Assignments

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

Unit 2: Numbers, Sentences, and Problems

Assignments

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

Unit 3: Linear Equations and Inequalities

Assignments

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

Unit 4: Polynomials

Assignments

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

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Unit 5: Algebraic Fractions

Assignments

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		

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Unit 6: Semester Review and Exam

Assignments

1.	Review	3.	Alternate Exam – Form A*
2.	Exam	4.	Alternate Exam – Form B*

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Unit 7: Real Numbers

Assignments

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

Unit 8: Quadratic Relations and Systems

Assignments

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

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*
		30.	Special Project*
14.	General Properties of Logarithms	31.	Test
15.	Scientific Notation	32.	Alternate Test*
16.	Calculation of Common Logarithms	33.	Glossary and Credits

Unit 10: Counting Principles

Assignments

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

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

Assignments

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

Unit 13: Review

Assignments

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

Unit 14: Semester Review and Exam

Assignments

1.	Review	3.	Alternate Exam – Form A*
2.	Exam	4.	Alternate Exam – Form B*

Unit 15: Final Exam

Assignments

1.	Exam	4.	Performance Task 1*
2.	Alternate Exam – Form A*	5.	Performance Task 2*
3.	Alternate Exam – Form B*		

Unit 16: End of Course Exam

Assignments

1.	Exam	3.	Alternate Exam – Form B*
2.	Alternate Exam – Form A*		

(*) Indicates alternative assignment