AoPS Algebra 2

Textbook: "Intermediate Algebra", by Richard Rusczyk and Mathew Crawford, the Art of Problem Solving series, ISBN-13: 978-1-934124-04-8

Course Introduction:

Algebra 2 covers quadratic equations, conics, polynomials, functions, logarithms, cleaver factorizations and substitutions, systems of equations, sequences and series, symmetric sums, advanced factoring methods, classical inequalities, functional equations, and more. This course goes beyond what you would find in a typical honors Algebra II curriculum, as it covers topics found in honors Algebra II and Precalculus classes, as well as many topics no found in most other curricula. This is a one-year course and is divided into two parts to be taught in two semesters, Algebra 2A and Algebra 2B.

Algebra 2A covers conics, polynomial division, polynomial roots, factoring multivariable polynomials, sequences and series. Algebra 2B covers identities, induction, inequalities, exponents and logarithms, radicals, special classes of functions, and piecewise defined functions.

This course is intended for high-performing students and will focus on problem solving skills. Students will learn via practicing solving problems in the classroom. Each class will have 3 hours where after being introduced with the new material, students spend the rest of the classroom time practicing the new skills.

Who Should Take Algebra 2A:

Students should have a mastery of basic algebra up through and including quadratic equations before taking this course. Typically this class follows our "Algebra 1B" class. Students who have completed typical Algebra 1 may be ready for this class.

An entrance exam should be taken to evaluate student's readiness.

Who Should Take Algebra 2B:

Students should have a mastery of basic algebra up through and including polynomials, sequences and series, advanced factoring before taking this course. Typically this class follows our "Algebra 2A" class.

An entrance exam should be taken to evaluate student's readiness.

Requirements for Students Registering for Algebra 2A or Algebra 2B

In general, students in grade 8 – 10 are eligible to register for either one of Algebra 2 courses. All students interested in take any of these courses should pass the corresponding evaluation test.

The test must be taken and submitted before the specified deadline posted by the school web site. The tests are posted on the school web site as well. Please check the class schedule at the school web site.

Teaching Plan

Algebra 2A	
Lesson 1	Ch 5. Conics 5.1 Parabolas 5.2 Problem Solving With Parabolas 5.3 Maxima and Minima of Quadratics
Lesson 2	5.4 Circles 5.5 Ellipses 5.6 Hyperbolas 5.7 Summary
Lesson 3	Ch 6. Polynomial Division 6.1 Polynomial Review 6.2 Introduction to Polynomial Division
Lesson 4	6.3 Synthetic Division 6.4 The Remainder Theorem 6.5 Summary
Lesson 5	Ch 7. Polynomial Roots, Part 1 7.1 The Factor Theorem 7.2 Integer Roots
Lesson 6	7.3 Rational Roots 7.4 Bound
Lesson 7	7.5 Graphing and Fundamental Theorem of Algebra 7.6 Algebraic Applications of the Fundamental Theorem 7.7 Summary
Lesson 8	Ch 8. Polynomial Roots, Part 2 8.1 Irrational Roots 8.2 Nonreal Roots
Lesson 9	8.3 Vieta's Formulae 8.4 Using Roots to Make Equations 8.5 Summary
Lesson 10	Ch 9. Factoring Multivariable Polynomial 9.1 Grouping 9.2 Sums and Differences of Powers
Lesson 11	9,3 The Factor Theorem of Multivariable Polynomial 9.4 Summary
Lesson 12	Ch 10. Sequences and Series 10.1 Arithmetic Sequences 10.2 Arithmetic Series
Lesson 13	10.3 Geometric Sequences 10.4 Geometric Series
Lesson 14	10.5 Sequence, Summation, and Product Notation

	10.6 Nested Sums and Products
	10.7 Summary
Lesson 15	Ch 11. Identities, Manipulations, and Induction
	11.1 Brute Force
	11.2 Ratios
Lesson 16	11.3 Induction
	11.4 Binomial Theorem
	11.5 Summary

Algebra 2B	
Lesson 1	Ch 11. Identities, Manipulations, and Induction
	11.1 Brute Force
	11.2 Ratios
Lesson 2	11.3 Induction
	11.4 Binomial Theorem
	11.5 Summary
Lesson 3	Ch 12. Inequalities
	12.1 Manipulating Inequalities
	12.2 The Trivial Inequality
Lesson 4	12.3 AM-GM Inequality with Two Variables
	12.4 AM-GM Inequality with More Variables
Lesson 5	12.5 The Cauchy-Schwarz Inequality
	12.6 Maxima and Minima
	12.7 Summary
Lesson 6	Ch 13. Exponents and Logarithms
	13.1 Exponential Function Basics
	13.2 Introduction to Logarithms
Lesson 7	13.3 Logarithmic Identity
	13.4 Using Logarithm Identity
Lesson 8	13.5 Switching Between Loga and Exponents
	13.6 Natural Logarithm and Exponential Decay
	13.7 Summary
Lesson 9	Ch 14. Radicals
	14.1 Raising Radicals to Powers
	14.2 Evaluating Expressions with Radicals
Lesson 10	14.3 Radical Conjugates
	14.4 Summary
Lesson 11	Ch 15. Special Classes of Functions
	15.1 Rational Functions and Their Graphs
	15.2 Rational Function Equations and Inequalities
Lesson 12	15.3 Even and Odd Functions
	15.4 Monotonic Functions
	15.5 Summary
Lesson 13	Ch 16. Piecewise Defined Functions
	16.1 Introduction to Piecewise Defined Functions