

Virginia Algebra 2A

Course Overview

Algebra is a branch of mathematics that uses symbols in place of numbers to describe and generalize relationships. You have worked with rational numbers in prior courses. In Virginia Algebra 2A, you will perform operations and identify restrictions on rational expressions (expressions that contain rational numbers as coefficients). You will also analyze and graph polynomial functions. Virginia Algebra 2A will introduce you to a new concept, complex numbers. Complex numbers rely on an imaginary unit, i , where $i^2 = -1$. You will plot complex numbers in the complex number plane and solve quadratic equations in the complex number system.

Course Goals

By the end of this course, you will be able to do the following:

- Evaluate and simplify expressions, including polynomial and rational expressions.
- Find the least common denominator of rational expressions.
- Rewrite rational expressions.
- Divide polynomials using synthetic division.
- Plot complex numbers in the complex number plane.
- Perform addition, subtraction, multiplication, and division with complex numbers.
- Solve quadratic equations in the complex number system.
- Solve equations involving radicals and power functions.
- Examine polynomial functions and their graphs.
- Derive and use a formula to predict the outcome of a geometric series.

General Skills

To participate in this course, you should be able to do the following:

- Complete basic operations with word processing software, such as Microsoft Word or Google Docs.
- Understand the basics of spreadsheet software, such as Microsoft Excel or Google Spreadsheets, but having prior computing experience is not necessary.
- Perform online research using various search engines and library databases.
- Communicate through email and participate in discussion boards.

For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Plato Student Orientation document, found at the beginning of this course.

Credit Value

Virginia Algebra 2A is a 0.5-credit course.

Course Materials

- notebook
- computer with Internet connection and speakers or headphones
- Microsoft Word or equivalent
- Microsoft Excel or equivalent

Course Pacing Guide

This course description and pacing guide is intended to help you stay on schedule with your work. Note that your course instructor may modify the schedule to meet the specific needs of your class.

Unit 1: Polynomial, Rational, and Radical Relationships

Summary

In this unit, you will evaluate and simplify rational and polynomial expressions. You will study polynomial identities and the Binomial Theorem, and you will find the sum, difference, and product of two rational expressions.

Day	Activity/Objective	Type
1 day: 1	Syllabus and Plato Student Orientation <i>Review the Plato Student Orientation and Course Syllabus at the beginning of this course.</i>	Course Orientation
3 days: 2–4	Evaluating Rational Expressions <i>Evaluate a rational expression for a given set of values.</i>	Lesson
3 days: 5–7	Restrictions on Rational Expressions <i>Identify nonpermissible values for the variables in the rational expression.</i>	Lesson
3 days: 8–10	Equivalent Forms of Rational Expressions <i>Identify rational expressions that are equivalent.</i>	Lesson
3 days: 11–13	Simplifying Rational Expressions <i>Simplify rational expressions.</i>	Lesson

Day	Activity/Objective	Type
3 days: 14–16	Simplifying Polynomial Expressions <i>Simplify polynomial expressions.</i>	Lesson
3 days: 17–19	Polynomial Identities and the Binomial Theorem <i>Prove and use polynomial identities and the Binomial Theorem.</i>	Lesson
3 days: 20–22	Sum of Rational Expressions, Part 1 <i>Find the sum of rational expressions with like denominators.</i>	Lesson
3 days: 23–25	Difference of Rational Expressions, Part 1 <i>Subtract rational expressions with like denominators.</i>	Lesson
3 days: 26–28	Product of Rational Expressions <i>Find the product of two rational expressions.</i>	Lesson
3 days: 29–31	Unit Activity/Threaded Discussion—Unit 1	Unit Activity
1 day: 32	Posttest—Unit 1	Assessment

Unit 2: Advanced Polynomial, Rational, and Radical Relationships

Summary

In this unit, you will study advanced concepts relating to rational and polynomial expressions. You will explore complex examples of operations with rational expressions. You will find the least common denominator of two rational expressions and simplify algebraic expressions by grouping like terms. At the end of the unit, you will factor algebraic expressions and divide polynomials using synthetic division.

Day	Activity/Objective	Type
2 days: 33–34	Quotient of Rational Expressions <i>Find the quotient of two rational expressions.</i>	Lesson
3 days: 35–37	Common Denominators of Rational Expressions <i>Find the least common denominator of two rational expressions.</i>	Lesson
2 days: 38–39	Sum of Rational Expressions, Part 2 <i>Find the sum of two rational expressions with unlike denominators.</i>	Lesson
2 days: 40–41	Difference of Rational Expressions, Part 2 <i>Find the difference of rational expressions with unlike denominators.</i>	Lesson
3 days: 42–44	Simplifying Algebraic Expressions <i>Simplify algebraic expressions by collecting like terms and following grouping symbols.</i>	Lesson

Day	Activity/Objective	Type
2 days: 45–46	Review: Rational Expressions <i>Review solving of rational expressions.</i>	Lesson
3 days: 47–49	Rewriting Rational Expressions <i>Rewrite rational expressions in different forms using multiple methods.</i>	Lesson
3 days: 50–52	Factoring Algebraic Expressions <i>Factor common algebraic expressions.</i>	Lesson
3 days: 53–55	Dividing Polynomials Using Synthetic Division <i>Divide polynomials using synthetic division.</i>	Lesson
3 days: 56–58	Unit Activity/Threaded Discussion—Unit 2	Unit Activity
1 day: 59	Posttest—Unit 2	Assessment

Unit 3: Complex Numbers

Summary

In this unit, you will plot complex numbers, perform operations on complex numbers, and solve quadratic equations in the complex number system. You will rationalize the denominator in rational expressions using the rules for exponents. You will solve radical and power functions, examine graphs of polynomial functions, and calculate the rate of change of a function. You will also learn about geometric sums and their use in solving word problems.

Day	Activity/Objective	Type
2 days: 60–61	Plotting Complex Numbers in the Plane <i>Plot complex numbers in the complex number plane.</i>	Lesson
2 days: 62–63	Adding and Subtracting Complex Numbers <i>Add and subtract complex numbers.</i>	Lesson
2 days: 64–65	Multiplying and Dividing Complex Numbers <i>Multiply and divide complex numbers.</i>	Lesson
3 days: 66–68	Solving Quadratic Equations in the Complex Number System <i>Solve quadratic equations with complex solutions.</i>	Lesson
3 days: 69–71	Rationalizing the Denominator in Rational Expressions <i>Study how to rationalize the denominator in rational expressions using the rules for exponents.</i>	Lesson
2 days: 72–73	Other Types of Equations <i>Solve other types of equations, including those involving radicals and power functions.</i>	Lesson

Day	Activity/Objective	Type
3 days: 74–76	Polynomial Functions <i>Examine polynomial functions.</i>	Lesson
3 days: 77–79	Graphing Polynomial Functions <i>Examine graphs of polynomial functions.</i>	Lesson
2 days: 80–81	Average Rate of Change <i>Calculate and interpret the rate of change of functions presented in different formats.</i>	Lesson
3 days: 82–84	Finite Geometric Sums <i>Derive and use the formula for the sum of a finite geometric series.</i>	Lesson
3 days: 85–87	Unit Activity/Threaded Discussion—Unit 3	Unit Activity
1 day: 88	Posttest—Unit 3	Assessment
1 day: 89	Semester Review	
1 day: 90	End-of-Semester Test	Assessment

Virginia Algebra 2B

Course Overview

Algebra is a branch of mathematics that uses symbols in place of numbers to describe and generalize relationships. In Virginia Algebra 2B, you will begin with trigonometry, which is the study of how the sides and angles of a triangle are related. You will examine trigonometric functions and graphs in the context of the unit circle. You will extend your understanding of lines by classifying systems of linear equations. In prior courses, you solved inequalities by graphing. Here, you will solve systems of inequalities, including quadratic and absolute value inequalities that contain restrictions on the variable. You will finish Virginia Algebra 2B by applying statistics and probability to make complex decisions. You'll reach decisions based on representative sampling from a population and by creating and evaluating statistical models.

Course Goals

By the end of this course, you will be able to do the following:

- Examine trigonometric functions and their graphs.
- Examine and apply basic trigonometric identities.
- Rewrite and solve single-variable equations.
- Classify linear systems.
- Solve linear systems by graphing or substitution.
- Graph the solution to inequalities, including absolute value inequalities.
- Perform operations on functions.
- Graph exponential and logarithmic functions and solve problems involving such functions.
- Investigate transformations of functions.
- Find the inverse of a function.
- Fit a data set to a normal distribution curve.
- Make predictions and inferences from a data set.
- Estimate a population mean and develop a margin of error.
- Solve complex probabilities to make fair decisions.
- Use data to compare two treatments or experiments.

General Skills

To participate in this course, you should be able to do the following:

- Complete basic operations with word-processing software, such as Microsoft Word and Google Docs.
- Understand the basics of spreadsheet software, such as Microsoft Excel or Google Spreadsheets, but having prior computing experience is not necessary.
- Perform online research using various search engines and library databases.
- Communicate through email and participate in discussion boards.

For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Plato Student Orientation document, found at the beginning of this course.

Credit Value

Virginia Algebra 2B is a 0.5-credit course.

Course Materials

- notebook
- computer with Internet connection and speakers or headphones
- Microsoft Word or equivalent
- Microsoft Excel or equivalent

Course Pacing Guide

This course description and pacing guide is intended to help you stay on schedule with your work. Note that your course instructor may modify the schedule to meet the specific needs of your class.

Unit 1: Trigonometric Functions

Summary

In this unit, you will explore trigonometric functions. You will learn about radians and use the unit circle to understand trigonometric functions. You will also examine trigonometric graphs and use different trigonometric identities.

Day	Activity/Objective	Type
1 day: 1	Syllabus and Plato Student Orientation <i>Review the Plato Student Orientation and Course Syllabus at the beginning of this course.</i>	Course Orientation
2 days: 2–3	Angles and Their Measures <i>Examine angles and their measures.</i>	Lesson

Day	Activity/Objective	Type
2 days: 4–5	Trigonometric Functions and the Unit Circle <i>Examine trigonometric functions using a unit circle.</i>	Lesson
2 days: 6–7	Trigonometric Functions <i>Examine trigonometric functions.</i>	Lesson
3 days: 8–10	Trigonometric Graphs <i>Examine trigonometric graphs.</i>	Lesson
3 days: 11–13	Basic Trigonometric Identities <i>Examine and apply the basic trigonometric identities.</i>	Lesson
4 days: 14–17	Unit Activity/Threaded Discussion—Unit 1	Unit Activity
1 day: 18	Posttest—Unit 1	Assessment

Unit 2: Modeling with Functions

Summary

In this unit, you will solve equations, inequalities, and systems of equations. You will write and solve equations that represent a situation or a word problem. You will also study how to classify and solve linear systems of equations.

Day	Activity/Objective	Type
2 days: 19–20	Creating and Solving Equations <i>Create equations to represent situations and solve them to work out problems in context.</i>	Lesson
2 days: 21–22	Rewriting Formulas <i>Rewrite equations to solve for a single variable.</i>	Lesson
3 days: 23–25	Direct, Inverse, and Joint Variations <i>Investigate direct, inverse, and joint variations for variables that describe a situation.</i>	Course Activity
2 days: 26–27	Solving Linear Systems of Equations: Graphs <i>Use the graphing method to solve systems of two linear equations.</i>	Lesson
2 days: 28–29	Classifying Linear Systems <i>Classify a system of linear equations as parallel, intersecting, or coincident.</i>	Lesson
2 days: 30–31	Solving Linear Systems of Inequalities: Graphs <i>Solve a system of inequalities by graphing.</i>	Lesson

Day	Activity/Objective	Type
2 days: 32–33	Solving Linear Systems of Equations: Substitution <i>Solve a system of equations by substitution.</i>	Lesson
2 days: 34–35	Estimating Solutions for a System of Equations <i>Study how the graphs of equations relate to the solution of a system of equations and explore multiple methods of approximation for a system of equations.</i>	Lesson
3 days: 36–38	Unit Activity/Threaded Discussion—Unit 2	Unit Activity
1 day: 39	Posttest—Unit 2	Assessment

Unit 3: Graphing with Functions

Summary

In this unit, you will graph the solution set for single inequalities, including absolute value inequalities and associated inequalities. You will add, subtract, multiply, and divide pairs of functions. You will solve word problems using exponential and logarithmic functions and graph and identify the key features of these function types. Finally, you will examine different transformations of functions and how to find the inverse of a function.

Day	Activity/Objective	Type
2 days: 40–41	Graphing Linear Inequalities in 1 Variable <i>Graph the solution sets to inequalities in one variable.</i>	Lesson
2 days: 42–43	Graphing with Restrictions on the Variable <i>Graph the solution sets to absolute value inequalities in one variable.</i>	Lesson
2 days: 44–45	Graphing Solution Sets of Associated Inequalities <i>Graph the solution sets of quadratic inequalities in one variable and other unions of solution sets.</i>	Lesson
2 days: 46–47	Operations on Functions <i>Add, subtract, multiply, and divide pairs of functions.</i>	Lesson
2 days: 48–49	Solving Problems: Exponential and Logarithmic <i>Solve problems that involve exponential or logarithmic functions.</i>	Lesson
2 days: 50–51	Graphing Exponential and Logarithmic Functions <i>Graph exponential and logarithmic functions and identify key features of those functions.</i>	Lesson
2 days: 52–53	Transformation of Functions <i>Investigate transformations of functions.</i>	Lesson

Day	Activity/Objective	Type
2 days: 54–55	Inverse Functions <i>Study and apply the method for finding the inverse of a function.</i>	Lesson
3 days: 56–58	Unit Activity/Threaded Discussion—Unit 3	Unit Activity
1 day: 59	Posttest—Unit 3	Assessment

Unit 4: Inferences and Conclusions from Data

Summary

In this unit, you will analyze statistical data and models. You will analyze data sets and fit them to normal distribution curves using their mean and standard deviation. You will make inferences from statistical data and evaluate the validity of statistical models. You will examine the purposes of and differences among various data collection methods. Finally, you will use probability concepts for making decisions in complex situations.

Day	Activity/Objective	Type
3 days: 60–62	Normal Distributions <i>Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages.</i>	Lesson
3 days: 63–65	Using Counting Techniques to Determine Probabilities <i>Use permutations and combinations to compute probabilities of compound events and to solve problems.</i>	Lesson
2 days: 66–67	Making Inferences Based on Statistics <i>Understand statistics as a process for making inferences about population parameters based on a random sample from that population.</i>	Lesson
2 days: 68–69	Evaluating the Validity of a Statistical Model <i>Decide if a specified model (such as a simulation) is consistent with results from a given data-generating process.</i>	Lesson
3 days: 70–72	Using Statistics in Surveys, Experiments, and Studies <i>Recognize the purposes of and differences among sample surveys, experiments, and observational studies.</i>	Lesson
2 days: 73–74	Analyzing a Survey <i>Use data from a sample survey to estimate a population mean or proportion and develop a margin of error through the use of simulation models for random sampling.</i>	Lesson

Day	Activity/Objective	Type
3 days: 75–77	Fair Decisions with Random Variables <i>Solve for probabilities in complex situations that go beyond counting rules and use these probabilities to make fair decisions.</i>	Lesson
2 days: 78–79	Evaluating Reports Based on Data <i>Evaluate reports based on data.</i>	Lesson
2 days: 80–81	Statistically Comparing Two Treatments <i>Use data from a randomized experiment to compare two treatments and use simulations to decide if differences between parameters are significant.</i>	Lesson
3 days: 82–84	Complex Decisions Using Probability <i>Analyze decisions and strategies in complex situations, using probability concepts that go beyond counting rules.</i>	Lesson
3 days: 85–87	Unit Activity/Threaded Discussion—Unit 4	Unit Activity
1 day: 88	Posttest—Unit 4	Assessment
1 day: 89	Semester Review	
1 day: 90	End-of-Semester Test	Assessment