Syllabus

SAT Mathematics

Course Overview

The SAT Mathematics course was developed by aligning Plato Courseware with the strands and topics that are assessed on the 2016 SAT. Each unit aligns to one or more topics within the 2016 SAT. This course focuses on the study of algebraic problem-solving skills and concepts related to geometry, probability, and statistics. In this course, you'll find a variety of lessons and activities to improve your knowledge and skills in these areas.

Course Goals

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

- Create equations to solve contextual problems.
- Solve problems with linear functions and solve linear inequalities.
- Solve a system of equations and inequalities.
- Solve practical problems with two variables and also use linear math sentences in one variable.
- Graph linear equations in two variables and find the intercepts of a linear equation.
- Determine the slope and intercept of a linear relationship from its graph.
- Study ratios and ratio conversions, convert measurement units, and explore ratios and rates as percentages.
- Recognize proportional relationships and use them to solve ratio and percent problems.
- Construct and apply two-way tables.
- Interpret and describe data in scatter plots, interpret scatter plots with linear associations, and apply linear equations from scatter plots.
- Use the slope and intercept of linear functions to write an equation from a graph, and draw a graph from an equation.
- Understand conditional probability and solve problems that involve exponential growth.
- Use statistics to study a sample of the population, use data to draw conclusions, and evaluate reports based on the data.
- Find the sum, difference, and product of two polynomials.
- Understand monomial and binomial factors of polynomials.

- Solve quadratic equations by factoring and use quadratic equations in one variable to solve practical problems.
- Factor a difference of squares as well as common algebraic expressions.
- Solve linear equations by isolating the variable and find the solution for the quadratic equations of the form $x^2 + bx = 0$.
- Find the solution set for a quadratic equation by using the quadratic formula.
- Solve linear-quadratic equations algebraically and graphically.
- Explore the parabola and its intercepts, vertex, and coefficients.
- Solve problems that involve exponential decay, and identify exponential and logarithmic functions.
- Alter functions by translating and transforming the graph, and learn to find composite functions.
- Solve equations involving radicals and power functions.
- Solve real-world problems by writing and solving equations.
- Rewrite expressions in different forms, and simplify algebraic expressions.
- Use variables to represent numbers when solving real-world and mathematical problems.
- Learn and use the formulas for the volumes of cones, cylinders, and spheres to solve real-world and mathematical problems.
- Examine and apply the Pythagorean Theorem and its converse to find unknown side lengths.
- Solve problems with right triangles and understand trigonometric ratios.
- Define and work with complex numbers.
- Derive the equation, center, and radius of a circle.
- Examine angles and their measures, and identify and describe relationships among inscribed angles, radii, and chords.
- Examine trigonometric functions using the unit circle.
- Describe and use the relationship between the sine and cosine of complementary angles.
- Explain ASA, SAS, and SSS criteria for congruent triangles.
- Write mathematical proofs and apply that knowledge to simple geometric relationships.
- Prove theorems about lines, angles, and triangles using similarity relationships.
- Explore the use of congruence and similarity with triangles.

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.
- Complete basic operations with presentation software, such as Microsoft PowerPoint or Google Docs Presentation.
- Perform online research using various search engines and library databases.
- Communicate through email.

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.

Course Materials

- notebook pencils or pens
- computer with Internet connection and speakers or headphones
- Microsoft Word or equivalent
- Microsoft PowerPoint or equivalent

Course Structure

Unit 1: Heart of Algebra

Summary

In this unit, you will create equations to solve contextual problems, use linear equations to solve practical problems, and describe real-world situations as linear functions. To solve linear inequalities, you will use addition, subtraction, and multiplication and division methods, or solve by isolating the variable. Next, you will solve practical problems with two variables and solve a system of equations by adding or subtracting or by using the substitution method. Further, you will determine whether a point is on the graph of a linear equation and find the slope and intercept of a linear relationship from its graph. Finally, you will find the intercepts of a linear equation and solve a system of inequalities using the graphing method.

Unit 2: Problem Solving and Data Analysis

Summary

Unit 2 begins with the study of ratios and their use in describing the relationships between quantities. You will use ratio reasoning to convert measurement units. You will

then find a percentage of a quantity as a rate per 100, and solve problems that involve finding the whole, given a part and the percentage. To solve ratio and percent problems, you will use proportional relationships and understand whether two quantities are in a proportional relationship. You will then construct and apply two-way tables and interpret and describe data in scatter plots. Further, you will interpret scatter plots with linear associations, and apply linear equations from scatter plots. With the use of a scatter plot, you will represent data of two quantitative variables, describe and fit a function to the data, and solve problems in the context of the data. To relate quantitative data, you will summarize data for two categories in two-way frequency tables and interpret their relative frequencies in the context of the data. You will then use the slope and intercept of linear functions to write an equation from a graph and draw a graph from an equation. In this unit, you will solve problems that involve exponential growth and use statistics to show data center and spread. Using statistics, you will learn about a population through a sample and make predictions based on random samples. Later, you will explore conditional probability, evaluate the validity of a statistical model, and examine reports based on the data.

Unit 3: Passport to Advanced Math

Summary

In unit 3, you will find the sum, difference, and product of two polynomials and learn to factor polynomials that have monomial factors. You will group terms and use the distributive property to write an expression as the product of two sums or differences. You will learn to factor a difference of squares and common algebraic expressions. Next, you will solve difficult linear equations by isolating the variable. You will then find the solution for the quadratic equations of the form $x^2 + bx = 0$. In this unit, you will find the solution set of quadratic equations that factor as the difference of two squares and that is the perfect square of a binomial. You will also find the solution set for quadratic equations by using the factoring method and the quadratic formula. You will use quadratic equations in one variable to solve practical problems. You will then solve linear-quadratic equations algebraically and graphically. You will also learn about the parabola and its intercepts, vertex, and coefficients. In this unit, you will solve problems that involve exponential decay, recognize graphs of types of functions, and alter functions by translating and transforming the graph. You will find composite functions and their values and determine the simpler functions that make up a composite function. Further, you will solve other types of equations, including those that involve radicals and power functions and solve real-world problems by writing and solving equations. Lastly, you will rewrite rational expressions in different forms using multiple methods, simplify algebraic expressions by collecting like terms, and use variables to represent numbers when solving real-world and mathematical problems.

Unit 4: Additional Topics in Math

Summary
Unit 4 begins with studying the formulas to find the volumes of cones, cylinders, and spheres, and then using those formulas to solve real-world and mathematical problems. You will examine and apply the Pythagorean Theorem along with its converse to find unknown side lengths. You will explore trigonometric ratios and use these ratios as well as the Pythagorean Theorem to solve right triangles in applied problems. You will then define and work with complex numbers. In this unit, you will derive the equation, and examine angles and their measures. You will identify and describe relationships among inscribed angles, radii, and chords, and examine trigonometric functions using a unit circle. Further, you will explain and use the relationship between the sine and cosine of complementary angles. You will then explain the ASA, SAS, and SSS criteria for congruent triangles. This unit also includes a lesson that will help you learn and write mathematical proofs and apply that knowledge to simple geometric relationships. The other lessons focus on theorems about lines, angles, triangles, and similarity relationships. This unit ends with a lesson that will help you use the congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.