

TASC Preparation - Mathematics Part 2

Course Overview

The Test Assessing Secondary Completion (TASC) Preparation Courses were developed by aligning Plato Courseware with the strands and topics that are assessed on the 2014 TASC Test. Each unit aligns to one or more objectives within the 2014 TASC Test and the modules within each unit target the essential concepts of the Common Core State Standards as assessed on the TASC test. The 2014 TASC Test for Math is the study of algebraic problem-solving skills, and concepts related to geometric, probability and statistics. In this course, you will 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:

- Understand what are functions, some different types of functions, and the associated concepts such as function notation, domain, and range.
- Explore graphs of functions including absolute value functions, exponential and logarithmic functions.
- Understand multiplication and division involving polynomials.
- Explore composite functions and inverse of functions, and demonstrate the ability to describe real-world situations as linear and quadratic functions.
- Explore problems that involve exponential growth and decay.
- Understand the concepts of sequences and series and calculations involving sum of a series.
- Understand how to alter a function by translating and transforming the graph.
- Explore trigonometric functions using a unit circle and trigonometric graphs.
- Explore and use the basic trigonometric identities.
- Understand the basic concepts of geometry and transformations represented in a plane.
- Explore rotations, reflections, and translations, and understand the concepts and application of rigid motions, congruence and similarity.
- Understand theorems about lines, angles, triangles, and parallelograms.
- Explore how to create formal geometric constructions using a variety of tools and methods including inscribed and circumscribed circles of a triangle.
- Understand and explore the use of trigonometric ratios and the Pythagorean Theorem.
- Explore the relationship between the sine and cosine of complementary angles, and the Laws of Sines and Cosines.
- Explore the concepts of inscribed angles, radii, chord, inscribed and circumscribed circles.

- Explore the use of coordinates to prove simple geometric theorems algebraically and to compute area- and perimeter- based problems.
- Understand how the arc length and area relate to the radius.
- Demonstrate the ability to derive the equation of a circle or use the equation to obtain the center and radius of a circle.
- Explore the formulas for circumference and area of a circle, and volumes of three-dimensional geometric figures.
- Explore three-dimensional objects and their two dimensional cross sections.
- Understand how to plot data on a real number line using dot plots, histograms, and box plots.
- Explore the concepts of shape, center and spread in the context of data sets.
- Understand the use of mean and standard deviation of a data set.
- Explore categorical and quantitative data.
- Explore the slope and intercept of a linear model in context of the data, and the correlation coefficient of a linear fit.
- Explore the process involved in the use of statistics to draw inferences and evaluate results based on data.
- Understand the Addition and Multiplication rules, and permutations and combinations involved in Probability.
- Explore conditional probability, rules of probability to make fair decisions and strategies involved in analyzing decisions.
- Explore random variables and probability distribution.

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

Course Structure

Unit 1 - 3: Functions

Summary

Unit 1 introduces students to functions, function notation, domain and range. This unit includes lessons that explore graphs of functions and absolute value functions. At the conclusion of the unit, students work through multiplying and dividing polynomials.

Unit 2 begins by exploring composite functions and inverse of functions. Students will learn how to use linear and quadratic functions to represent real-world situations. This unit also covers solving problems involving exponential growth and decay. The unit then introduces how to use and write sequences and series and find the sum of a series. The unit ends with translations and transformations of graphs to alter a function.

Unit 3 begins by exploring graphs of exponential and logarithmic functions. The unit then focuses on trigonometric functions. Students will explore trigonometric functions using a unit circle and trigonometric graphs. The unit also covers the understanding and application of the basic trigonometric identities.

Unit 4 - 7: Geometry

Summary

Unit 4 begins with the study of basic geometric definitions. Students will also learn how to define rotations, reflections, and translations in terms of geometric concepts of angles, circles, perpendicular lines, parallel lines, and line segments. This unit also covers how to represent transformations in a plane and comparison between transformations that preserve distance and angle to those that do not.

Unit 5 focuses on congruence, proofs, and geometric constructions. The unit begins by exploring rigid motions to transform figures and understanding congruence in terms of rigid motions to identify congruent figures. Students will also understand theorems about lines, angles, triangles, and parallelograms. Towards the end of the unit students will work through formal geometric constructions.

In Unit 6, students will learn about using the definition of similarity in terms of similarity transformations to identify similar figures. The unit also explores the definition and use of trigonometric ratios. In this unit students will study how to use trigonometric ratios and Pythagorean Theorem to solve right triangles in applied problems. The unit also includes lessons which cover sine and cosine of complementary angles, and the use of Laws of Sines and Cosines to solve problems.

Unit 7 explores the relationship between inscribed angles, radii and chords and connection between arc length, area and radius. Students will learn how to construct the inscribed and circumscribed circles of a triangle and prove properties of angles for a quadrilateral inscribed in a circle. Through the lessons in this unit students also work

through the equation of a circle and formulas for circumference and area of a circle. The unit includes lessons on use of coordinates to prove simple geometric theorems and on solving problems for perimeter and area. At the end of the unit, students are introduced to three-dimensional objects, their volume formulas and their two-dimensional cross sections.

Unit 8 - 12: Statistics and Probability

Summary

Unit 8 begins by exploring the use of dot plots, histograms, and box plots to represent data with plots on the real number line. The unit then moves on to show students how to compare center and spread of two or more different data sets. Students will learn how to interpret differences in shape, center, and spread in the context of the data sets. Unit 8 also shows students how to use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages.

Unit 9 shows how to work with categorical data using frequency tables and quantitative data using a scatter plot. Students also will explore the slope and the intercept of a linear model in the context of the data. The unit also covers the use of technology to compute and interpret the correlation coefficient of a linear fit.

Unit 10 shows students the process involved in the application of statistics drawing conclusions from a data set and evaluating these results. Students will learn how to make inferences about population parameters, explore the data-generating process, purposes of and differences among sample surveys, experiments, and observational studies. The latter part of the unit introduces students to the Addition and Multiplication rules for Probability, and examples of problems involving permutations and combinations to compute probabilities of compound events.

Unit 11 explores the application of counting rules to determine probability, make fair decisions and also to analyze outcomes. This unit also covers how to solve for conditional probability of an event and interpret the answer in terms of the model.

In Unit 12, students will learn about random variables and probability distribution. Students will learn how to assign a numerical value to each event in a sample space and graph the corresponding probability distribution. The unit also shows how to find the expected value of a random variable. At the end of the unit students learn how to evaluate decisions in complex situations using probability concepts that go beyond counting rules.