Praxis Core Academic Skills for Educators: Mathematics Part 2

Course Overview

The development of the Praxis Core Academic Skills for Educators (Praxis CASE) Courses aligns Plato Courseware with the strands and topics assessed in the 2014 Praxis CASE Test. Each unit aligns with one or more objectives within the 2014 Praxis CASE Test and the modules within each unit target the essential concepts of the Common Core State Standards as assessed in the Praxis CASE test. The 2014 Praxis Test for Mathematics is the study of both numerical and algebraic problem-solving skills. 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:

- Define basic geometric concepts such as angle, circle, perpendicular line, parallel line, and line segment.
- Study and compare transformations in a plane.
- Explore rigid transformations and learn how to predict the result of a rigid transformation.
- Explore triangles to understand methods that determine the measurements of given angles in a triangle.
- Study Pythagorean Theorem, its corollary, and its uses to solve problems.
- Explore right triangles and the relationships between the hypotenuse, the legs, and the altitude of right triangles to solve problems.
- Explore circles and understand the relationships between circles, chords, and radii, and apply these concepts to solve problems.
- Learn to derive the equation of a circle with a known center and radius and complete the square to find the center and radius of a circle given by an equation.
- Explore how to find the area of squares, rectangles, parallelograms, trapezoids and circles and volume of a rectangular prism and other geometrical shape and use these formulas to solve problems.
- Explore how to represent data on the real number line using dot plots, histograms, and box plots.
- Explore how to use statistics appropriate to the shape of the data distribution to compare the center and spread of two or more different data sets.
- Understand how to interpret differences in shape, center, and spread in the context of the data set.

- Understand how to use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages.
- Use the rules of probability to compute probabilities of compound events in a uniform probability model.
- Use probability to evaluate outcomes of decisions.
- Understand and evaluate random processes underlying statistical experiments.
- Make inferences and justify conclusions from sample surveys, experiments, and observational studies.
- Calculate expected values and use them to solve problems.

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—4: Geometry

Summary

Unit 1 introduces to the students the precise definitions for basic geometric concepts. Students will learn to transformation geometric shapes in a plane and compare transformations that preserve the distance and angle to those that do not. They will describe rigid transformations like the rotations and reflections that carry a standard geometric shape on to itself and define them and translations in terms of basic geometric concepts. They will also predict the result of a

rigid transformation and specify a sequence of transformations to carry a given figure on to another. This unit concludes with a lesson based on the use of rigid transformations on a figure to decide if two figures are congruent.

Unit 2 begins with an introduction on triangles. It then moves on to explain to the use of the property on the sum of angles in a triangle to find the measure of an unknown angle. Students will learn the Pythagorean Theorem and use it to solve various real-world problems involving right triangles.

Unit 3 begins with an introduction to circles and then moves on to some circle related theorems, such as the line chord theorem and chord bisector theorem. Students will study how the segment measures relate for the segments created by various intersections, like the two chords intersecting inside a circle, two secants intersecting outside a circle, and a secant intersecting a tangent outside a circle.

In Unit 4, students will solve measurement problems based on real-world scenarios. They will find the area of figures such as squares, rectangles, parallelograms, triangles, trapezoids, and circles. Students will understand the idea behind the volume formulas of various three-dimensional shapes and use them to solve problems that involve computation of volumes of cylinders, cones, pyramids, and spheres. This unit concludes with lessons that give practice to the students in solving practical problems involving geometry and measurement.

Unit 5—10: Statistics and Probability

Summary

Unit 5 starts with introducing statistics. It shows you how to represent data using dot plots, histograms, and box plots. You will learn to use two key statistical concepts, central tendency, and spread, and to analyze and interpret data. The unit concludes with lessons that describe how to interpret the shape of data distributions, use mean and standard deviation of a data set to fit it to a normal distribution, and estimation of population percentages.

In Unit 6, you will learn to describe events as subsets of set of outcomes. You will apply the rules of probability to find the combined probability of independent and dependent events. You will also learn how to identify events by looking at the mathematical relationship between two events. You will use permutation and combination to find out the outcomes of a particular event and then use rules of probability to determine the results. In the latter part of the unit, you will learn what conditional probability is and interpret the independence of two events.

In unit 7, you will learn to summarize data for two categories in two-way frequency tables and then interpret their relative frequencies. You will learn to represent bivariate data using a scatter plot, fit a function using the points in a scatter plot, and solve problems. You will also learn to use technology to compute and interpret the correlation coefficient in a linear fit. The unit concludes with a lesson based on how to distinguish between correlation and causation.

Unit 8 starts with describing the use of two-way tables to calculate conditional probabilities between two variables to decide whether they are independent. You will then learn to apply counting rules to determine probabilities and use them to make fair decisions and analyze decisions and strategies. You will also learn to apply the concepts of conditional probability to make decisions in everyday situations. In the concluding lesson of this unit, you will learn how to use Bayer's Theorem to find the conditional probability in highly complex scenarios where there are some unknown individual values.

In Unit 9, students will learn to make inferences about a population by analyzing a random sample taken from the population. You will learn the difference between theoretical probability and experimental probability. In this unit, you will also learn about the different methods of data collection- sample surveys, experiments and observational studies. You will then learn to use data from a sample survey to estimate a population mean or proportion and develop a margin of error with simulation models for random sampling. You will learn to use data from a randomized experiment to compare two treatments and use simulations to decide whether differences between parameters are significant. The unit concludes with a lesson that teaches you to evaluate reports using statistics.

The beginning of unit 10 focuses on random variables and their definition. You will also learn to calculate the expected value of a random variable and interpret it as the mean of the probability distribution. You will learn quick method for calculating theoretical probabilities in binomial situations and apply it to find expected values. You will learn to develop probability distribution for a random variable, defined for a sample space that empirically assigns probabilities, and find the expected value. In the concluding lesson of this unit, you will learn to solve probabilities in complex situations and use them to make fair decisions, analyze decisions and concepts.