

Mathematics

Math Department Curriculum Overview

The math department at Francis Parker strives to provide students with not only the mathematical skills they will need to take their place in a technologically advanced society, but also with the fundamental skills, procedures, mathematical thinking, problem solving, and good judgment to continue their mathematics education at the most competitive universities and throughout their careers. We emphasize the necessity of communicating answers in mathematically correct notation and in complete sentences. Students are encouraged to be part of the process, driving discussions, working through problems, seeing teachers for help, and being advocates for their own education.

We offer a full range of coursework in high school mathematics, beginning with Algebra I, Geometry, and Algebra II with Trigonometry, and with a range of options after Algebra II. In math courses from Algebra I through Precalculus, we use the College Preparatory Mathematics texts, which emphasize the importance of students confidently discovering the fundamentals of math through thoughtful problem solving and application of their basic skills. This process builds confidence in all students regardless of their past math experiences. After Algebra II with Trigonometry, students can opt for FST (Functions, Statistics, and Trigonometry), Precalculus, AP Calculus AB and/or BC, AP Statistics, AP Computer Science Principles, and sometimes even higher-level courses beyond this curriculum like Set Theory and Logic or Differential Equations. Texts for these courses are college-level and emphasize correct and consistent use of mathematical vocabulary and notation. A TI-84+ calculator is required for Francis Parker math courses, beginning with Algebra I.

Beyond the ordinary curricula, we offer students the chance to participate in the Greater Louisville Math League, a challenging competition held four times per year, with both individual and team scores reported. Selected students are also invited to participate in the American Math Competition, the first level of a talent-search process.

Math Department Course Offerings

Algebra I (1 credit)

This is an introductory course in algebra covering the basics of using variables and grouping symbols, exponents, and real numbers, including irrational numbers. Topics will include functions, linear relationships, simplifying expressions and solving equations, systems of equations, arithmetic and geometric sequences, modeling two-variable data, exponential functions, quadratic functions, and solving quadratic equations and inequalities. There will be considerable emphasis on word problems and on the correct and consistent use of appropriate mathematical notation and vocabulary..

Geometry (1 credit)*Prerequisite: Algebra I*

As well as being the study of the mathematics of points, lines, planes, and other geometric objects, geometry is concerned with the process of careful, organized, abstract thinking. Students will learn the importance of careful definitions and learn to make conjectures and justify arguments through different types of formal and informal proofs. Additional topics will include congruence and similarity, solid geometry, coordinate geometry, transformations, and graph theory.

Algebra II with Trigonometry (1 credit)*Prerequisites: Algebra I and Geometry, or concurrent enrollment in Geometry*

This is the sequel to Algebra I, and although it is usually taken after Geometry, concurrent enrollment in Geometry will provide the necessary background. Topics covered will include linear and quadratic functions, systems of linear and nonlinear equations, polynomial and rational functions, exponential and logarithmic functions, and trigonometric functions.

Precalculus (1 credit)*Prerequisites: Algebra II with a minimum grade of B- and permission of the instructor*

This is a course for students who plan to take calculus or have the necessary level of interest. Topics will include a detailed study of functions, including polynomial, exponential, logarithmic, logistic, rational, and trigonometric functions. Other topics include conic sections, polar- and parametrically-defined functions, vectors, complex numbers, matrix algebra, sequences and series, basic combinatorics, and probability. The correct use of and the limitations of scientific calculators will be emphasized.

Functions, Statistics, and Trigonometry (FST) (1 credit)*Prerequisites: Algebra II*

FST is a course that overlaps both Algebra II and Precalculus. The material covered in this class will review some of the more difficult and important concepts from Algebra II, preview a number of topics that are explored in more depth in Precalculus, and teach students a number of more advanced probability and statistics concepts. This course is appropriate for those who want to stay fresh on their algebra skills before going to college or those desiring a more manageable pace through the material than that in Precalculus.

AP Statistics (1 credit)*Prerequisites: Algebra II and permission of the department*

This AP course in Statistics will introduce students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. Students are exposed to four broad conceptual themes: (1) Exploring data: describing patterns and departures from patterns; (2) Sampling and Experimentation: planning and conducting a study; (3) Anticipating Patterns: exploring random phenomena using probability and simulation; (4) Statistical Inference: estimating population parameters and testing hypotheses.

AP Computer Science Principles (1 credit)*Prerequisites: Algebra II and permission of the department*

AP Computer Science Principles offers a multidisciplinary approach to teaching the underlying principles of computation. The course will introduce students to the creative aspects of programming, abstractions, algorithms, large data sets, the Internet, cybersecurity concerns,

and computing impacts. This course also gives students the opportunity to use current technologies to create computational artifacts for both self-expression and problem-solving. Together, these aspects make up a rigorous and rich curriculum that aims to broaden participation in computer science.

AP Calculus BC (1 credit)

Prerequisites: Precalculus and permission of the department

AP Calculus BC is the equivalent to two college semesters of Calculus (or Calculus I and II) and covers both the AB and BC curriculum. We will study limits, derivatives, integrals, and their applications the first semester and focus on advanced integration techniques, infinite series, and the calculus of parametric and polar functions in the second semester.

Proofs, Logic and Set Theory (1 credit)

Prerequisites: Precalculus and permission of the department

This course is an introduction to concepts central to modern theoretical mathematics, and will be modeled after college courses typically aimed at students considering majoring in mathematics. This course will explore the use of logic in effective written argumentation, especially as it applies to mathematical reasoning. Further, students will be introduced to the fundamental objects of mathematics, sets, and will explore their utility in the underpinning of topics already well known to them. The course will a digression from the more computational topics typically taught at the high school level, and as such has potential to provide a unique perspective on a familiar subject