Mathematics

Math Department Curriculum Overview

The math department at Francis Parker values a student-centered and student-driven classroom. We prioritize problem-based learning and enable students to find solutions through group work and strategic questioning. Our goal is for students to truly understand how the mathematical concepts work instead of simply memorizing a set of procedures for problem solving. Students are encouraged to communicate their ideas both verbally and in writing to themselves, their classmates, and their teachers so that they leave our math classes with the skills necessary to be successful at the next step in their mathematical careers.

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 CPM 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 higher-level courses beyond this curriculum like Linear Algebra or Set Theory and Logic. Texts for these courses are college-level and emphasize correct and consistent use of mathematical vocabulary and notation. A TI-84+, Numworks, or similar graphing 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.

Math Department Course Offerings

Algebra I *(1 credit)*
This course focuses on linear, exponential, and quadratic functions and how to use multiple representations (tables, graphs, equations, and situations) for each of those functions. In addition to studying the behavior of functions, topics will include simplifying expressions and solving linear and quadratic equations, arithmetic and geometric sequences, modeling two-variable data, multiplying polynomials and factoring quadratic expressions.

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 polynomial, rational, exponential, logarithmic, and trigonometric functions and how to use multiple representations (tables, graphs, equations, and situations) for each of those functions. In addition, this course also includes matrix operations, analytic trigonometry, conic sections, parametrically-defined functions, and polar functions.

Functions, Statistics, and Trigonometry (FST) *(1 credit)*
Prerequisites: Algebra II
FST is a course that overlaps some of 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 AB (1 credit)
Prerequisites: Precalculus and permission of the department
AP Calculus AB is the equivalent of one college semester of Calculus (Calculus I). We will study limits, derivatives, integrals, and their applications.

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.

Linear Algebra (1 credit)
Prerequisites: Precalculus and permission of the department
This course will serve as an introduction to higher mathematics by taking a proof-oriented approach to the field of linear algebra. Throughout the course, students will learn to write effective mathematical arguments and develop an understanding of vectors and matrices from both a theoretical and applied perspective. The topics covered will be a significant departure from the standard topics covered at the high school level in mathematics and will offer the opportunity for students to gain a new perspective on a familiar subject.