

MATHEMATICS

ACADEMIC PLACEMENT

Course prerequisites are guidelines set for the purpose of placing students in the academic course, with the appropriate level of academic rigor. Please refer to pages 6 & 7 for school guidelines on academic placement. All incoming ninth grade students must score Proficient or higher on the Keystone Algebra 1 or Shaler Area High School Algebra Proficiency Exam for placement in any course beyond Algebra 1. For appropriate recommendation, it is advised that students and parents consult with their current academic teacher and their assigned school counselor.

ESSENTIALS OF ALGEBRA 1

(#2003)

Periods Per Week: 5

Prerequisites: Completed Math 8

Credit Value: 1.0

Semester: Full Year

Open to Grades: 9

Essentials of Algebra 1 is designed to study the structure of the real number system and the application of the properties of real numbers in problem solving. Included in this study will be a review of the basic operations with directed numbers. Methods are developed for the solution of linear equations and inequalities. These methods are then applied to the solution of various types of statement problems. The course introduces polynomials, functions, and graphing. Techniques for solving linear equations in two variables are also studied. This course will emphasize operations and linear equations & inequalities and linear functions & data organizations while using some technology to aid in their understanding. This course is intended for students entering high school who are not Algebra 1 ready. A scientific calculator is required.

ALGEBRA 1

(#2005)

Periods Per Week: 5

Prerequisites: Math 8 or 60% or higher in
Essentials of Algebra 1

Credit Value: 1.0

Semester: Full Year

Open to Grades: 9, 10

Algebra 1 is designed to study the structure of the real number system and the application of the properties of real numbers in problem solving. Methods are developed for the solution of linear equations and inequalities. There will be an introduction to solving and graphing quadratic equations. These methods are then applied to the solution of various types of statement problems. The course introduces polynomials, functions and graphing. Techniques for solving linear equations in two variables are also studied. This course will emphasize operations and linear equations & inequalities and linear functions & data organizations while using some technology to aid in their understanding. A scientific calculator is required.

GEOMETRY FUNDAMENTALS**Credit Value: 1.0**

(#2070)

Periods Per Week: 5
Prerequisites: 60% or above in Algebra 1**Semester:** Full Year
Open to Grades: 10, 11, 12

Throughout Geometry Fundamentals students will explore geometric concepts while reinforcing algebraic skills. The content areas of this course include the study of polygons, lines, angles, circles, perimeter, area, volume, congruence, and similarity. Continuing themes will incorporate problem solving applications, cooperative learning activities, and appropriate use of technology.

GEOMETRY**Credit Value: 1.0**

(#2065)

Periods Per Week: 5
Prerequisites: 70% or above in Algebra 1**Semester:** Full Year
Open to Grades: 9, 10, 11

Throughout Geometry, students will explore the theory of 2-dimensional and 3-dimensional space. The content areas of this course include the study of polygons, lines, angles, circles, perimeter, area, volume, congruence, and similarity. Continuing themes will incorporate problem solving applications, cooperative learning activities, and appropriate use of technology. A scientific calculator is recommended for success in this course.

HONORS GEOMETRY**Credit Value: 1.0**

(#2060)

Periods Per Week: 5
Prerequisites: 80% or above in Algebra 1 8
or 89% or above in Algebra 1**Semester:** Full Year
Open to Grade: 9, 10

Honors Geometry is a formalized study of mathematical models of the physical world using deductive methods. The course includes a rigorous study of proofs, angles and triangles, congruencies, geometric inequalities, parallel lines, polygonal areas, similarities, circles and spheres, volumes of solids, and trigonometry as related to geometry. The content in Honors Geometry is like that of Geometry but is covered in greater depth and detail to prepare students for the next honors level course. Students will be expected to solve problems with and without the use of technology. A scientific calculator is required.

ALGEBRA 2 FUNDAMENTALS**Credit Value: 1.0**

(#2020)

Periods Per Week: 5
Prerequisites: 60% or above in Geometry
Fundamentals**Semester:** Full Year
Open to Grades: 11, 12

Algebra 2 Fundamentals begins with a review of the basic Algebraic concepts. Emphasis throughout the course is on understanding the algebraic properties of the real number system, and on relating these properties to the solution of equations and inequalities of the first and second degree in one and two variables. Polynomials and exponential functions are also studied. Problem-solving skills and the ability to analyze statement problems are introduced within each topic. The student will be expected to use technology to aid in their understanding of the concepts contained in the course.

ALGEBRA 2

(#2025)

Periods Per Week: 5
Prerequisites: 70% or above in Geometry or
80% or above in Algebra 2
Fundamentals

Credit Value: 1.0

Semester: Full Year
Open to Grades: 9, 10, 11, 12

Emphasis throughout the Algebra 2 course is on understanding the algebraic properties of the real number system, and on relating these properties to the solution of quadratic and higher order polynomial equations. Polynomials, exponential and logarithmic functions are also studied. Problem-solving skills and the ability to analyze statement problems are stressed within each topic. Students will be expected to be able to solve problems with and without the use of technology. A graphing calculator is required. A TI-83, TI-83+, TI-84, or TI-84+ is the recommended calculator and will be used by the instructor.

HONORS ALGEBRA 2

(#2030)

Periods Per Week: 5
Prerequisites: 80% or above in Honors Geometry
or 80% or above in Geometry 8

Credit Value: 1.0

Semester: Full Year
Open to Grade: 9, 10, 11

Honors Algebra 2 continues the function approach to Algebra. Emphasis throughout the course is on differentiating and formulating the algebraic properties of the real and complex number systems, and on relating these properties to the solutions of equations and inequalities of multiple degrees in two or more variables. Polynomials, exponential and logarithmic functions, and an introduction to basic trigonometry concepts and circular functions are also studied. Problem-solving skills and the ability to analyze statement problems are stressed within each topic. The content in Honors Algebra 2 focuses on constructing, evaluating, and defending the topics. A graphing calculator is required, and the following are recommended: A TI-83, TI-83+, TI-84, or TI-84+.

ALGEBRA 3

(#2075)

Periods Per Week: 5
Prerequisites: 70% or above in Algebra 2
and Proficiency on the Keystone
Algebra 1 Exam

Credit Value: 1.0

Semester: Full Year
Open to Grades: 11, 12

Algebra 3 is a course that will provide you with the opportunity to continue in a challenging academic mathematics environment that will help you refine various skills for success in future mathematics courses. Students will reinforce their skills in linear systems of equations, factoring, polynomials, transformations, matrices, quadratic functions, and radicals. They will also advance their studies of Algebra 2 concepts by exploring more depth of logarithmic and exponential functions and models. Algebra 3 will continue the study of advanced mathematics concepts relating to Algebra II and Precalculus such as Non-Linear Systems of Equations, Parametric Equations and Sequences and Series. A graphing calculator is required. A TI-83, TI-83+, TI-84, or TI-84+ is the recommended calculator and will be the calculator used by the instructor.

PRECALCULUS

(#2080)

Periods Per Week: 5
Prerequisites: 80% or above in Algebra 2 or
70% or above in Algebra 3
and Proficiency on the Keystone
Algebra 1 Exam

Credit Value: 1.0

Semester: Full Year
Open to Grades: 10, 11, 12

Precalculus will address topics in Advanced Algebra, Analytical Geometry (a unit consisting of conics; parabolas, hyperbolas, and ellipses) and Trigonometry. Linear, quadratic, polynomial, exponential, and logarithmic equations will be solved analytically and graphically; additionally, properties of each are studied. Trigonometry encompasses the basic functions and their graphs, trig identities, inverse trig functions, and solving trig equations. A unit on complex numbers will also be covered. Problem solving, cooperative learning, and appropriate use of technology are continuing themes in this course. A graphing calculator is required (TI-83, TI-83+, TI-84, or TI-84+), and will be used by the instructor to model and teach and integrate technological concepts within the class.

HONORS PRECALCULUS

(#2085)

Periods Per Week: 5
Prerequisites: 80% or above in Honors Algebra 2
and Proficiency on the Keystone
Algebra 1 Exam

Credit Value: 1.0

Semester: Full Year
Open to Grade: 10, 11, 12

Honors Precalculus is a rigorous course designed for the student, typically a sophomore or junior, who intends to take an advanced calculus course in the next year. This course provides a strong foundation of functions, trigonometry, discrete mathematics, and data analysis. Topics that are exclusive to the honors level of Precalculus are an introduction to calculus, including the study of limits and basic derivatives, and parametric equations. Students will be expected to show understanding of trig functions and graphs with and without the calculator. Problem solving is required and problems are approached algebraically and supported graphically or approached graphically and supported algebraically. A graphing calculator is required. A TI-83, TI-83+, TI-84, or TI-84+ is the recommended calculator as these will be the calculators used by the instructor.

BUSINESS CALCULUS

(College in High School - University of Pittsburgh)
(#2090)

Credit Value: 1.0

Periods Per Week: 5

Semester:

Full Year

Prerequisites: 60% or above in Honors Precalculus
or 70% or above in Precalculus
and Proficiency on the Keystone
Algebra 1 Exam

Open to Grade:

11, 12

Calculus employs the fundamental tools of algebra and geometry to study the topics of limits, continuity, derivatives, and integration through evaluation and application. Problems will be approached both algebraically and graphically while placing an emphasis on application of basic formulas and understanding concepts as opposed to problem solving. Proficiency in algebraic manipulation is essential for success in Calculus, although fundamentals of algebra are reviewed as necessary throughout the course. This course is designed for students intending to continue their education in the areas of business, economics, and the social sciences. A graphing calculator is required. A TI-83, TI-83+, TI-84, or TI-84+ is the recommended calculator as these will be the calculators used by the instructor.

This course follows the University of Pittsburgh Math 120 curriculum. Students can elect to take this course for 4 college credits through the University of Pittsburgh. **Students choosing to take this course for university credit must pass the University of Pittsburgh placement exam.** The initial cost of the exam is \$25 per student. This exam is an online test that may be taken up to 5 times to achieve a passing score that is set by Pitt. Students who do not pass the placement test, may take the course for Shaler Area course credit, but will not be eligible for college credits. Students taking the placement exam and completing necessary remediation work to improve their math skills will be able to use this in lieu of the summer assignment requirement that is provided by the math department.

College/University: University of Pittsburgh (May be accepted at other universities/colleges)
Course Equivalent/Credits: University of Pittsburgh Math 120 / 4 credits
Cost: \$75 per credit/\$300 per course (2023-24)
Registration Deadline: See Teacher
Summer Assignment: No

A.P. CALCULUS AB**(College in High School - University of Pittsburgh)****(#2100)****Periods Per Week: 5****Prerequisites: A.P. Criteria****Credit Value: 1.0****Semester: Full Year****Open to Grade: 11, 12**

Calculus AB is a first course in a single-variable calculus that uses algebra, geometry, and trigonometry skills to study limits, derivatives, continuity, and integration. These topics are applied to algebraic, trigonometric, logarithmic, exponential, and inverse trigonometric functions. Topics from a second course in Calculus are covered including derivatives of parametric equations and methods of integration. A graphing calculator is required. A TI-83, TI-83+, TI-84, or TI-84+ is the recommended calculator and will be used by the instructor.

Students who enroll in this course may take the Advanced Placement Calculus AB examination given in May of each school year. Based on the results of this examination, students may qualify for college credit and/or advanced college standing. A student registered for this course may also enroll in the University of Pittsburgh's Math 0220 course and earn 4 college credits. A student wishing to take A.P. Calculus BC for Math 0230 credit must score a 4 or 5 on the AP Calculus AB exam or successfully complete the University of Pittsburgh's Math 0220 with a C or better as their university grade.

Students choosing to take this course for university credit must pass the University of Pittsburgh placement exam. The initial cost of the exam is \$25 per student. This exam is an online test that may be taken up to 5 times to achieve a passing score that is set by Pitt. Students who do not pass the placement test, may take the course for Shaler Area course credit, but will not be eligible for college credits. Students taking the placement exam and completing necessary remediation work to improve their math skills will be able to use this in lieu of the summer assignment requirement that is provided by the math department.

College/University:	University of Pittsburgh (May be accepted at other universities/colleges)
Course Equivalent/Credits:	University of Pittsburgh Math 0220 / 4 credits
Cost:	\$75 per credit/\$300 per course (2023-24)
Registration Deadline:	See Teacher
Summer Assignment:	Yes

A.P. Test Date:	May 2025
Test Cost:	\$98 (2024)
Registration Deadline:	See Teacher
Summer Assignment:	Yes

A.P. CALCULUS BC**Credit Value: 1.0****(College in High School - University of Pittsburgh)****(#2105)****Periods Per Week: 5****Semester:****Full Year****Prerequisites: A.P. Criteria****Open to Grade:****12**

Calculus BC is a second course in a single-variable calculus that includes a review of the topics of Calculus AB and/or Honors Calculus. Calculus BC provides a deeper understanding of the concepts of limits, continuity, derivatives, and integrals, including the fundamental theorem of calculus. Topics include derivatives and integrals of algebraic, trigonometric, logarithmic, exponential, and inverse trigonometric functions, advanced integration techniques, applications of integration, indeterminate forms, improper integrals, infinite sequences, and series, parametric, polar, vector functions, and differential equations. Graphing calculators are required. A TI-83, TI-83+, TI-84, or TI-84+ is the recommended calculator and will be the calculator used by the instructor.

Students who enroll in this course may take the Advanced Placement Calculus BC examination given in May of each school year. Based on the results of this examination, students may qualify for college credit and/or advanced college standing. Students may also elect to take this course for Math 0230 credit through the University of Pittsburgh's College in High School program. The course would give them 4 credits in a Calculus 2 level college course.

College/University: University of Pittsburgh (May be accepted at other universities/colleges)**Course Equivalent/Credits:** University of Pittsburgh Math 0230 / 4 credits**Prerequisite:** C or higher in Math 0220 or 4/5 score on AP Calculus AB Exam**Cost:** \$75 per credit/\$300 per course (2023-24)**Registration Deadline:** See Teacher**Summer Assignment:** Yes**A.P. Test Date:** May 2025**Test Cost:** \$98 (2024)**Registration Deadline:** See Teacher**Summer Assignment:** Yes

HONORS PROBABILITY & STATISTICS

Credit Value: 1.0

(College in High School - University of Pittsburgh)
(#2145)

Periods Per Week: 5

Semester: Full Year

Prerequisites: *89% or above in Algebra 2 or 3 or
*80% or above in Honors Algebra 2 or
*60% or above in Precalculus or
Honors Precalculus
*and Proficiency on the Keystone
Algebra 1 Exam

Open to Grades: 10, 11, 12

This course teaches methods of descriptive and inferential statistics. Topics include data collection and description, probability, hypothesis testing, correlation and regression, the analysis of variance, and contingency tables (chi square). This will provide the necessary foundation so statistical methods can be applied to sample data to determine if the difference is due to chance or some other factor. Students who complete this course will be able to conduct their own analysis of standard one-sample or two-sample data sets, follow statistical reasoning and read statistical reports with understanding. Students will learn how to read statistical software outputs and use statistical computer programs.

A graphing calculator is required. A TI-84 or TI-84+ is the recommended calculator and will be used by the instructor. Students will have the opportunity to take this as a four-credit course in the University of Pittsburgh's College in High School Program.

College/University:	University of Pittsburgh (May be accepted at other universities/colleges)
Course Equivalent/Credits:	University of Pittsburgh STAT 0200 / 4 credits
Cost:	\$75 per credit/\$300 per course (2023-24)
Registration Deadline:	See Teacher
Summer Assignment:	Yes

MATH ELECTIVES

COMPUTER SCIENCE – Python

(#2110)

Periods Per Week: 5

Prerequisites: *80% or above in Algebra 1 or
 Geometry
 *70% or above in Honors Geometry
 *or currently enrolled in Honors
 Algebra 2, Algebra 3, Precalculus,
 Honors Precalculus, Honors Probability
 and Statistics or any Calculus course

Credit Value: 0.5

Semester: Either
Open to Grades: 9, 10, 11, 12

Computer Science-Python is the study of elementary computer programming techniques with the Python language and mathematical models. To achieve this goal, the following topics will be studied: algorithms and flowcharts, numeric and string variables, output formatting, I/O, decision making, repetition with loops, and functions. The student will demonstrate his understanding of these topics by interpreting and writing programs in the Python language. Other methods of evaluation will be used as directed by the instructor.

HONORS COMPUTER SCIENCE- Python

(College in High School - University of Pittsburgh)

(#2115)

Periods Per Week: 5

Prerequisites: 80% or above in Computer Science
 Python

Credit Value: 0.5

Semester: Either
Open to Grades: 9, 10, 11, 12

Honors Computer Science-Python is an elective designed to introduce students to more advanced topics of programming in the Python language. This course will cover file processing, error and exception handling, lists, sets, dictionaries, and object-oriented programming. This course will offer students a good exposure to the world of computer programming and is recommended for students interested in business, mathematics, or science fields of study. Students will be given the opportunity to take this course as a four-credit course in the University of Pittsburgh's College in High School Program.

College/University: University of Pittsburgh (May be accepted at other universities/colleges)
Course Equivalent/Credits: University of Pittsburgh CS 0012 / 4 credits
Cost: \$75 per credit/\$300 per course (2023-24)
Registration Deadline: See Teacher
Summer Assignment: No

COMPUTER SCIENCE – Java**Credit Value: 0.5****(#2120)****Periods Per Week: 5****Semester: Either****Prerequisites: *80 % or above in Algebra 1
Geometry
*70% or above in Honors Geometry
*Or currently enrolled in Honors
Algebra 2, Algebra 3, Precalculus,
Honors Precalculus, Honors Probability
and Statistics, or any Calculus course****Open to Grades: 9, 10, 11, 12**

Computer Science 1- Java is the study of elementary computer programming techniques with the Java programming language, and mathematical models. In order to achieve this goal, the following topics will be studied: algorithms and flowcharts, system commands and program statements, numeric and string variables, output format. The student will demonstrate his understanding of these topics by interpreting and writing programs in the Java language. Other methods of evaluation will be used as directed by the instructor.

HONORS COMPUTER SCIENCE – Java**Credit Value: 0.5****(College in High School - University of Pittsburgh)****(#2125)****Periods Per Week: 5****Semester: Either****Prerequisites: 80% or above in
Computer Science – Java****Open to grades: 9, 10, 11, 12**

Honors Computer Science JAVA is an elective designed to introduce students to the fundamentals of programming in the JAVA language. This course will cover variables and constants, math operations, screen and string I/O, decision-making, loops, error and exception handling, classes, arrays, and object-oriented programming. This course will offer students a good exposure to the world of computer programming and is recommended for students interested in business, mathematics, or science fields of study. Students will be given the opportunity to take this course as a three-credit course in the University of Pittsburgh's College in High School Program.

College/University: University of Pittsburgh (May be accepted at other universities/colleges)**Course Equivalent/Credits:** University of Pittsburgh CS 0007 / 3 credits**Cost:** \$75 per credit/\$225 per course (2023-24)**Registration Deadline:** See Teacher**Summer Assignment:** No

A.P. COMPUTER SCIENCE A
(#2130)

Credit Value: 1.0

Periods Per Week: 5

Semester:

Full year

Prerequisites: A.P. Criteria

Open to Grade:

10, 11, 12

The third Java course will include programming methodology, features of programming languages, data structures (linear lists, stacks, and queues), algorithms (searching and sorting), recursion, inheritance, and object-oriented programming including classes, templates, and modularity. Students will advance their techniques learned in their first Java course and complete advanced programming projects.

A.P. Test Date: May 2025

Test Cost: \$98 (2024)

Registration Deadline: See Teacher

Summer Assignment: No