Requirements for Mathematics Courses Beyond Geometry/Mathematics 2

Ohio Law requires all students to have earned one of their four high school mathematics credits in Algebra 2/Mathematics 3 or equivalent. Algebra 2/Mathematics 3 or equivalent courses are high-quality mathematics courses aimed at preparing students for both college and career.

Typically, the first two courses in the high school mathematics sequence are Algebra 1/Mathematics 1 and Geometry/Mathematics 2. To meet the requirements of a course beyond Geometry/Mathematics 2, the course should address mathematical reasoning through the Mathematical Practices, using fluencies in knowledge and skills in the application and extension of content from algebra and/or geometry.

MATHEMATICAL PRACTICES

The Standards for Mathematical Practice are essential in the extension of mathematical thinking. Students develop these habits of mind through orchestrated, intentional experiences of reading, writing, talking, listening and reasoning that connect mathematics to daily life and career situations.

While all of the Standards for Mathematical Practice are important in all courses, the following are predominant in a course beyond Geometry/Mathematics 2:

- Construct viable arguments and critique the reasoning of others (MP.3);
- Modeling with mathematics (MP.4);
- Attend to precision (MP.6);and
- Look for and make use of structure (MP.7).

FLUENCY

The following fluencies are developed within initial high school mathematics courses. They should be the foundation for extension and application to career and real-world situations.

Algebra/Functions	Students should look at algebraic manipulation as a meaningful enterprise in which they seek to understand the structure of an expression or equation and use properties to transform it into forms that provide useful information (e.g., features of a function or solutions to an equation). This perspective will help students continue to usefully apply their mathematical knowledge in a range of situations, whether their continued study leads them toward college or career readiness.
Geometry	The understanding of the criteria for triangle congruence and similarity is foundational in finding solutions to real-world problems involving triangles, quadrilaterals, circles, parallelism and trigonometric ratios. With the ability to use physical and computational construction tools, geometric models can be created. Geometric visualization becomes not only a tool for understanding algebra but also a tool in analyzing and solving problems. Students should experience the power found in using geometric understanding as a problem-solving tool.
Modeling	Seeing mathematics as a tool to model real-world situations should be an underlying perspective in everything students do, including writing algebraic expressions, creating functions, creating geometric models and understanding statistical relationships. This perspective will help students appreciate the importance of mathematics in daily life.
Statistics	Students should be able to create a visual representation of a data set that is useful in understanding or solving a problem.

Number and Quantity	In particular, students should recognize that much of mathematics is concerned with understanding quantities and their relationships. They should pick appropriate units for quantities being modeled, using them as a guide to understand a situation, and be attentive to the level of accuracy that is reported in a solution.

CONTENT

All mathematics courses should focus on a small number of topics taught in depth, with a balance among skills, understanding, reasoning and problem solving. The purpose of Algebra 2/Mathematics 3 or equivalent courses is to develop the ability to tie together Number and Quantity, Algebra, Functions, Geometry and Statistics. Curriculum should engage students in using mathematical models to solve real-world problems, through effective and accurate use of mathematical notation, vocabulary and reasoning. Instruction should focus on the following content which is a cross-section of Algebra 2 and Mathematics 3 courses.

Building Functions	Builds functions that model mathematical and real-world (career) applications including those requiring trigonometric functions, sequences and combinations of these and other functions. Uses the models to solve, interpret, and generalize about problems (applications).
Equivalent Expressions	Uses the structure of polynomial, exponential and rational expressions to create equivalent expressions, especially to aid in solving mathematical problems.
Data: Univariate and Bivariate	Uses the means and standard deviations of data sets to fit them to normal distributions. Fits exponential functions to data to solve real-world applications. Uses fitted trigonometric functions to solve a multi-step real-world application.
Data: Inference	Identifies when sample data can be used to make inferences. Uses sample data to make inferences and justify conclusions about the corresponding population. Critiques inferences. Determines if specified models are inconsistent with results from given data-generating process.
Functions	Understands families of functions (linear, polynomial, quadratic, and exponential) and their real-world applications.
Interpreting Functions	Analyze functions within the context of real-world (career) applications: Interprets key features of graphs and tables of polynomial, rational, and trigonometric functions. Identifies characteristics of the relationships between quantities. Sketches graphs of easily factorable quadratics and cubics. Identifies the impact of changing parameters on the key features of the graph of functions
Rate of Change	Calculates and interprets the average rate of change of polynomial functions (presented symbolically or as a table over a specified interval). Estimates the rate of change from a graph.
Solving Equations	Solves mathematical equations within career real-world applications directly and indirectly using structure, technology, graphs, formulas and tables of values. Gives and identifies extraneous solution(s).

These requirements are merely foundational for Algebra 2/Mathematics 3 or equivalent courses. Course material should be extended for students pursuing careers in STEM or Mathematics related fields and for students on college readiness pathways. Refer to Mathematics Graduation Requirements – Curriculum Requirements for further information on how to meet the four mathematics courses required for graduation.