

## Program of Studies – Mathematics – High School

The high school mathematics program includes strong literacy connections, active and hands-on work with concrete materials and appropriate technologies. High school problem solving, mathematical communication, connections, mathematical reasoning and multiple representations should be a part of the mathematics curriculum. The use of these techniques enhances and extends students' mathematics skills. Accuracy is an integral part of the mathematics program. The minimum high school graduation requirements, which take effect with the graduating Class of 2012, will require that students take a mathematics course each year they are in high school.

Students should have opportunities to work individually and in groups of varying size and composition in order to conduct investigations, process information and discuss important mathematical concepts. Students must have regular opportunities to share their ideas with others and to solve problems generated as a result of their learning experiences.

The mathematics content standards at the high school level are directly aligned with Kentucky's Academic Expectations. Mathematics standards are organized around five “Big Ideas” that are important to the discipline of mathematics. The five big ideas in mathematics are: Number Properties and Operations, Measurement, Geometry, Data Analysis and Probability and Algebraic Thinking. The Big Ideas are conceptual organizers for mathematics and are similar at each grade level to ensure students have multiple opportunities throughout the students' school careers to develop skills and concepts linked to the Big Ideas.

Under each Big Idea are statements of Enduring Knowledge/Understandings that represent overarching generalizations linked to the Big Ideas of mathematics. The understandings represent the desired results – what learning will focus upon and what knowledge students will be able to explain or apply. Understandings can be used to frame development of units of study and lesson plans.

Skills and concepts describe ways that students demonstrate their learning and are specific to each grade level. The skills and concepts for mathematics are fundamental to mathematical literacy, mathematical power and build on prior learning.

Effectively implementing the Program of Studies requires a common understanding of the process standards below.

**Problem solving** includes modeling and formulating problems based in real-world situations, within and outside mathematics, and aids in investigating and understanding mathematical content.

**Mathematical communication** includes both words and symbols, enabling students to clarify their thinking, create definitions, share mathematical ideas, ask questions and develop facility in using mathematical notation (letters and marks used in mathematics to name numbers, operations, sets, relations and so on).

**Mathematical connections** include the use of equivalent representations of a concept or a procedure and extend to both topics within mathematics and to other disciplines.

**Mathematical reasoning** includes the use of logical skills in the context of testing conjectures, creating counter examples (an example that shows a general statement to be false), and composing and understanding valid arguments.

**Multiple representations** include the more symbolic and abstract aspects of mathematics (e.g., translating between the different modes of representing functions; making the connections between visual and analytical geometry).

**Academic Expectation 1.5-1.9** (Students use mathematical ideas and procedures to communicate, reason, and solve problems.) is infused throughout the mathematics instruction P-12 and is integral to the content and instruction across all grade levels.

**Academic Expectation 1.16** (Students will use computers and other kinds of technology to collect, organize, and communicate information and ideas.) is an essential and integral part of instruction across the content and the mathematics Program of Studies.