Mathematics at Delta

I. Introduction – Nature of the Discipline

The mathematics curriculum at Delta High School is driven by the perspective that mathematical literacy is necessary to develop successful intellectual capability in all students.

Mathematics is both a language and a science. Historically, mathematics has been rooted in the search for patterns. It is one of the fundamental ways that we attach meaning to the human experience. "Mathematics today is a diverse discipline that also deals with data, measurements, and observations from science; with inference, deduction and proof; and with mathematical models of natural phenomenon, of human behavior, and of social systems."[1]

The study of mathematics at Delta High School is designed to produce mathematically literate students, with the ability to analyze, reason, and communicate ideas effectively as they pose, formulate, solve, and interpret solutions to mathematical problems in a variety of situations[2]. It is the desire of the writing team that teaching and learning of mathematics in the Delta High School embody the spirit of inquiry of one of history's most renowned mathematicians, Galileo Galilei, ***"Nature's great book is written in mathematics."***

II. Overarching Goals and Purposes

The study of mathematics at Delta High School will help students understand that mathematics is an integral part of all disciplines. The following overarching goals will ensure that students engage in purposeful cross-curricular experiences while attaining a high level of mathematics fluency.

- Exploring patterns and relationships to form a conceptual understanding of mathematics.
- Using mathematics to model phenomena in the world.
- Organizing mathematical thinking so that fundamental ideas form an integrated whole.
- Demonstrating the ability to engage in independent mathematical inquiry.
- Transferring mathematical concepts, skills and processes to address problems in a variety of disciplines.

III. Course Sequence

The nature of mathematics and its application in the real world does not recognize rigid distinctions between mathematical sub-disciplines. These sub-disciplines are unified by fundamental themes, by common ideas, and by mathematical habits of mind. The organization of the Delta mathematics program reflects this unification by blending the sub-disciplines over a four-year sequence rather than treating them as isolated courses.

Delta High School will engage students in the exploration of mathematics for its own beauty. In addition, students will apply concepts and processes from all sub-disciplines of mathematics to solve authentic problems in science, technology, engineering and the humanities.

III. Course Sequence

In years one and two of the Delta High School mathematics program, students will develop conceptual foundations and skills through the interwoven study of algebra, geometry and statistics and their application to meaningful problems.

In year three, students will study advanced mathematics including, but not limited to, pre-calculus, calculus, and advanced statistics, constantly weaving the sub-disciplines of mathematics and their applications.

Before or during year four, students will have attained the fundamentals of algebra I and II, geometry, pre-calculus, statistics, and calculus. Year four students will continue their study of advanced topics and pursue their emerging interests through mathematics capstone projects. Advanced topics will include multivariable calculus, number theory, differential equations, linear algebra and others.

IV. Big Ideas

At Delta High School, Big Ideas will unify the sub-disciplines of mathematics and provide avenues for interaction with other disciplines. For this reason the mathematics curriculum is based upon:

- Patterns and relationships
- Mathematical modeling
- Communication
- Reasoning, analysis and problem solving

V. Cross-Curricular Applications

The study of mathematics extends beyond the mechanical mastery of basic skills to understanding how these skills are necessary to solve complex problems. Cross-curricular applications at Delta High School will facilitate the transfer of mathematical processes to multi-discipline projects. These projects are designed

around the mathematical Big Ideas: patterns and relationships, mathematical modeling, communication, reasoning, analysis and problem solving.

In one cross-curricular application, students will work with their math, science, technology/engineering and humanities teachers along with a member(s) of the community in an integrated unit of study around the Big Idea of reasoning, analysis and problem solving. Through multiple learning experiences, students will explore the factors that influence the supply and demand of potatoes. Other integrated units of study may include bicycle efficiency, bridge building, power generation, "green" energy and physics of music. Each of these applications has particular relevance to the Tri-Cities area.

VI. Cornerstone to Capstone Experiences

The Delta High School experience in mathematics has an application and interaction component, where students will interact with Delta professionals. Students will use their mathematical skills in an authentic context. For their capstone experience, students will develop a core question that impacts the local, regional, national or global community. An example of a core question might be "How can Energy Northwest improve their energy efficiency by capturing waste heat?"

Students will have the opportunity to work independently or with a team to explore the core question, engaging community partners as part of the process. Students will submit a proposal, research, their findings/recommendations, and an oral presentation as part of their capstone experience.

[1]*Everybody Counts: A Report to the Nation on the Future of Mathematics Education,* 1989 by the National Academy of Sciences. National Academy Press, Washington, D.C.

[2]Organisation for Economic Co-operation and Development, *Mathematical Literacy: The PISA 2003 Assessment Framework*, (France: Organisation for Economic Co-operation and Development, 2003).