Mathematics

Philosophy and Rationale

What Is Mathematics?
Mathematics includes the study of number, space, pattern and change. Historically, the language of mathematics has roots in many cultures, each contributing to the development of common syntax and vocabulary. Because mathematics can be represented in multiple forms, such as physical, visual, verbal or symbolic, it is accessible to all people. Mathematics is used to engage with natural events that occur in the world, and it will continue to evolve in support of innovation.

Why Is Mathematics Important?
Both in and out of school, students can experience the beauty of mathematics in intellectual, creative, social, emotional and physical encounters. The study of mathematics helps students build quantitative and spatial understanding. It also supports students in developing resiliency through productive struggle, becoming critical thinkers and problem solvers, and fostering curiosity and creative thinking. Mathematics is about far more than finding an answer; reasoning and explaining are fundamental aspects of mathematics. All students use mathematical skills when exploring, processing and communicating their ideas. They use mathematical reasoning to identify patterns and develop generalizations to make sense of the world around them. The collaborative processes involved in learning mathematics motivate students to value diverse ways of knowing and to learn from each other in their schools, communities and future workplaces.

Beyond school, mathematical learning and understanding enhances the confidence and capability of educated Albertans to develop numeracy skills needed to interact in society in an ethical way. Procedural and conceptual knowledge of mathematics allows for critical analysis of information to solve novel and complex problems. In various contexts, mathematics provides opportunities to abstract from physical reality, to investigate problems, make and analyze decisions, and expand perspectives. The universal nature of mathematics allows it to be used in diverse situations such as sharing a snack equally with friends, estimating the tax on a purchase or applying computational thinking to follow a recipe. The application of mathematics during the common pursuits of daily life and the specialized activities of countless careers will continue to be necessary in our globally connected and ever-changing world.
**Inclusive Education**

A curriculum that is inclusive involves recognizing and valuing the diversity of students and is built on the assertion that all students can learn. The mathematics curriculum is designed to support safe and caring learning environments where all students can explore and engage with mathematics in a meaningful and personal way. A mathematics curriculum that is accessible to and inclusive of students with diverse learning needs means that teachers have the flexibility to ensure that all students are engaged. Mathematics education takes into account student diversity and enables relevant and flexible learning opportunities that acknowledge and builds upon students’ prior experiences, points of view and ways of knowing. Teachers create multiple entry points to the curriculum for students by using strategies and supports to ensure that all students have the confidence to approach mathematical learning with the goal of success in school, careers and everyday life.

**First Nations, Métis and Inuit Experiences and Perspectives**

First Nations, Métis and Inuit understandings of mathematics education, including relationships, balance, connections, representations and visualizations, have evolved from and are evident in diverse social, cultural and spiritual perspectives. A holistic approach to mathematics respects First Nations, Métis and Inuit ways of knowing that embraces concept-based learning by listening, observing, taking action and speaking, and that creates space and respect for the inclusion of First Nations, Métis and Inuit contexts. Students can engage in the study of mathematics and numeracy using a variety of approaches, including culturally responsive mathematics that honours multiple ways of engaging in authentic learning, inquiring, problem solving, and discussing ideas and implications. Through collaboration and collective endeavours, diverse First Nations, Métis and Inuit ways of knowing and understandings of mathematical concepts and contexts will strengthen student learning and advance reconciliation.

**Francophone Cultures and Perspectives**

In mathematics, incorporating Francophone perspectives helps students to recognize and appreciate the nuances that exist regarding notation, symbols, reasoning and procedures. Including Francophone perspectives also helps to develop understanding, appreciation and respect for cultural differences.

Francophone music, literature, games and art can provide a mathematical context for all students to develop understanding and appreciation of Francophone cultures and perspectives. By recognizing the integral role of local, national and global Francophone communities, students’ awareness of self and others broadens.
Literacy

Mathematics supports the development of literacy$^1$ and literacy enhances students’ understanding of the subject. When literacy concepts specific to mathematics are made explicit, students see how they can use their literacy skills in purposeful ways. Students use literacy to understand quantitative and spatial information as they learn and apply mathematical vocabulary, symbols, notations and conventions. Literacy supports the creation and interpretation of mathematical texts that range from calendars, maps and diagrams to complex representations of data. Students use literacy to comprehend explanations and instructions that contain the particular language features of mathematics. Literacy supports students’ ability to pose and answer questions, engage in mathematical problem solving, and discuss, produce and justify solutions. Literate students communicate their understanding of mathematical concepts by coherently presenting ideas, adjusting their presentations based on audience and purpose, and choosing appropriate modes and media to share information. Literacy awareness, knowledge and understanding enhance students’ mathematical expertise and strengthen their ability to communicate effectively.

Numeracy

Mathematics is central to the development of numeracy$^2$ and numeracy enhances students’ understanding of mathematics. Within the context of this subject, students learn the foundational mathematical skills that support numeracy. This foundational learning is also essential to numeracy development in all other subjects and disciplines. In mathematics, students become numerate as they engage with quantitative and spatial information and apply their understanding in a wide range of familiar and unfamiliar situations that help them interpret and make sense of the world. They recognize that mathematics is constantly used outside the classroom and that numeracy skills are employed during activities such as comparing costs, locating a destination, judging distances, fitting objects into a limited space, interpreting a schedule or adapting a recipe. Numeracy awareness, knowledge and understanding in mathematics enable students to see the purpose and value of the mathematical concepts that they are learning and contribute to their active participation in society.

Competencies

Competencies are combinations of attitudes, skills and knowledge that students apply for successful learning, living and working. They emphasize aspects of learning that apply within and across all subjects. Alberta’s Kindergarten to Grade 12 learning outcomes in mathematics provide contexts for students to apply and develop the following competencies:

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$^1$ Literacy is the ability, confidence and willingness to engage with language to acquire, construct and communicate meaning.

$^2$ Numeracy is the ability, confidence and willingness to engage with quantitative and spatial information to make informed decisions.
• Critical Thinking
• Problem Solving
• Managing Information
• Creativity and Innovation
• Communication
• Collaboration
• Cultural and Global Citizenship
• Personal Growth and Well-being

For more information, go to Competencies in Mathematics.