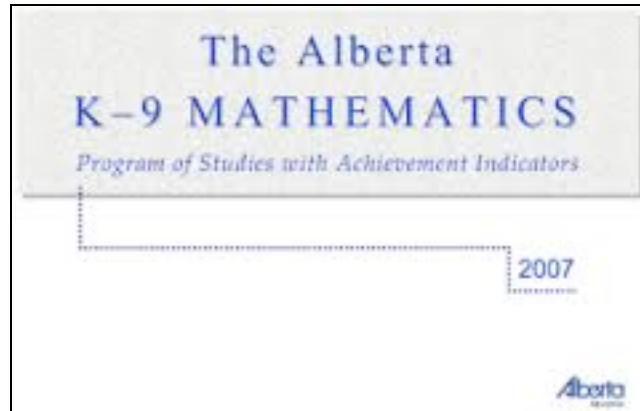


Beliefs about Mathematics and Inuit Qaujimajatuqangit

In Nunavut, elementary and middle school mathematics is guided by the Alberta or NWT K-9 Mathematics Program of Studies with Achievement Indicators. Nunavut has approved this document for use in its schools. **The version we are currently following was developed in 2007 and can be downloaded by in PDF format from the link below:**



http://education.alberta.ca/media/645598/kto9math_ind.pdf

Beliefs about Mathematics and Learning

Students are curious, active learners with individual interests, abilities and needs. They come to classrooms with varying knowledge, life experiences and backgrounds. A key component in successfully developing numeracy is making connections to these backgrounds and experiences. Students learn by attaching meaning to what they do and need to construct their own meaning of mathematics. This meaning is best developed when learners encounter mathematical experiences that proceed from the simple to the complex and from the concrete to the abstract. The use of manipulatives and a variety of pedagogical approaches can address the diversity of learning styles and developmental stages of students, and enhance the formation of sound, transferable, mathematical concepts. At all levels, students benefit from working with a variety of materials, tools and contexts when constructing meaning about new mathematical ideas. Meaningful student discussions can provide essential links among concrete, pictorial and symbolic representations of mathematics. The learning environment should value and respect all students' experiences and ways of thinking, so that learners are comfortable taking intellectual risks, asking questions and posing conjectures. Students need to explore problem-solving situations in order to develop personal strategies and become mathematically literate. Learners must realize that it is acceptable to solve problems in different ways and that solutions may vary.

Curriculum Organisation

Strands

Strands are content headings that are derived from the nature of mathematics and help to organize programs and learning outcomes. Our curriculum is divided into four main strands. Some are further divided into substrands.

Number

- Develop number sense.

Patterns and Relations

Patterns

- Use patterns to describe the world and solve problems.

Variables and Equations

- Represent algebraic expressions in multiple ways.

Shape and Space

Measurement

- Use direct and indirect measure to solve problems.

3-D Objects and 2-D Shapes

- Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.

Transformations

- Describe and analyze position and motion of objects and shapes.

Statistics and Probability

Data Analysis

- Collect, display and analyze data to solve problems.

Chance and Uncertainty

- Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.

The Nelson Math Focus program has developed its resources based on the Alberta (WNCP) content stands as well as the Mathematical Process.

Mathematical Processes

Communication, Connections, Mental Mathematics and Estimation, Problem Solving, Reasoning, Technology, and Visualization are the critical components that students must encounter in a mathematics program in order to achieve the goals of mathematics education and encourage lifelong learning in mathematics.

Students are expected to:

- communicate in order to learn and express their understanding
- connect mathematical ideas to other concepts in mathematics, to everyday experiences and to other disciplines
- demonstrate fluency with mental mathematics and estimation
- develop and apply new mathematical knowledge through problem solving
- develop mathematical reasoning
- select and use technologies as tools for learning and solving problems
- develop visualization skills to assist in processing information

Outcomes and Achievement Indicators

The Alberta K-9 Mathematics Program of Studies (2007) is stated in terms of general outcomes, specific outcomes and achievement indicators.

General outcomes are overarching statements about what students are expected to learn in each strand/substrand. The general outcome for each strand/substrand is the same throughout the grades.

Specific outcomes are statements that identify the specific skills, understanding and knowledge students are required to attain by the end of a given grade.

Achievement indicators are one example of a representative list of the depth, breadth and expectations for the outcome. Achievement indicators are pedagogy and context free.

Consider the following when planning for instruction.

- Integration of the mathematical processes within each strand is expected.
- Problem solving, reasoning and connections are vital to increasing mathematical fluency, and must be integrated throughout the program.
- There is to be a balance among mental mathematics and estimation, paper and pencil exercises, and the use of technology, including calculators and computers.

Concepts should be introduced using manipulatives and gradually developed from the concrete to the pictorial to the symbolic.

Concrete → Pictorial → Symbolic
manipulatives diagrams equations

Inuit Qaujimajatuqangit and Balanced Mathematics Education

Inuit Qaujimajatuqangit or IQ refers to the collective wisdom, knowledge and attitudes rooted in Inuit culture. The Department of Culture, Language, Elders, and Youth has identified eight Common Essential Learnings or Core Values that make up Inuit Qaujimajatuqangit. These values are summarized below:

- Inuuqatigiitsiarniq- the concept of respecting others, relationships, and caring for people.
- Tunnganarniq- the practice of fostering good spirit by being open, welcoming, and inclusive
- Piliriqatigiingniq- the concept of developing a collaborative relationships and working together for a common purpose
- Avatimik kamattiarniq- the concept of environmental stewardship stresses the key relationship Inuit have with their environment and with the world in which they live.
- Pilimmaksarniq- the concept of skills and knowledge acquisition and capacity building is central to the success of Inuit in a challenging environment
- Qanuqtuurniq - the concept of being resourceful to seek solution
- Aajiqatigiingniq- the concept of consensus decision-making relies on strong communication skills and a strong belief in shared goals
- Pijitsirarniq- the concept of serving others or the collective

It is the Department of Education's goal that all current and future curriculum and program development projects make connections to and highlight these core values. A balanced math program shares many of these core values with Inuit Qaujimajatuqangit. The following table correlates components of a Balanced Mathematics program to IQ principles.

Inuit Qaujimagatuqangit Principle	Correlation to Math Curriculum/Program
Pilimmaksarniq (skills and knowledge acquisition)	Each of the strands relies upon Pilimmaksarniq. Students should be introduced to concepts through concrete, hands-on demonstrations and activities before making the transition through pictorial representations to arrive at symbolic, abstract understanding. Lessons and classroom centers that provide opportunities for students to practice and master mathematical skills and concepts reinforce the principle of Pilimmaksarniq.
Qanuqtuurniq (resourcefulness)	Problem solving, reasoning, mental mathematics and estimating are mathematical processes that value Qanuqtuurniq. Puzzles, problems, and projects that encourage students to explore possibilities enroute to a solution are great activities that encourage Qanuqtuurniq. Word problems, although challenging, can also provide opportunities for students to be resourceful.
Inuuqatigiitsiarniq (respect and caring)	Inuuqatigiitsiarniq should permeate your entire classroom and school. Clearly defined routines and classroom expectations can help students practice and demonstrate respect and caring for fellow students. Group work and centers provide small scale activities to display this same principle.
Tunnganarniq (fostering good spirit)	Inclusion is a foundation of Nunavut education and fostering good spirit is a desired outcome. Differentiated instruction helps to ensure that all students receive appropriate learning activities. The Nelson Math Focus program provides many suggestions for differentiated instruction, including an adaptive workbook for upper grades. Good spirit also evolves from enjoying activities and having fun. Math games, puzzles, and challenges can be a valuable part of a balanced math program and help develop positive classroom attitudes towards math.

Piliriqatigiingniq (collaboration)	Collaboration requires communication and communication is a mathematical process that is strengthened through group work. Math games and centers are activities that naturally initiate group work as you move your class towards, project and problem solving teams.
Aajiqatigiingniq (consensus decision-making)	Aajiqatigiingniq is a principle that you can develop in your class after students are familiar with the daily routines. Developing class rules and/or decisions are great ways it introduce consensus. Group work also provides an opportunity to practice Aajiqatigiingniq on a smaller scale.
Pijitsirarniq (service)	Group work helps students to see beyond themselves and to develop empathy and responsibility which lay foundations for the principle of Pijitsirarniq. Class or school projects that support causes like food banks, the <i>Terry Fox Run</i> , or <i>Jump Rope for Heart</i> can involve the reinforcement of math skills and certainly place an activity squarely in the realm of service and social responsibility.
Avatititnnik Kamatsiarniq (environmental stewardship)	Environmental stewardship can be part of every classroom. Recycling paper for rough calculations and using egg cartons and coffee cans for math games and manipulatives are just a few examples of creative ways to reduce our carbon footprint.