

BIG IDEAS

Many functions are related through inverse operations.

Analyzing the characteristics of functions allows us to solve equations, and model and understand relationships.

Transformations of shapes extend to functions in all of their representations.

Geometrical thinking and visualization can be used to explore conics and functions.

Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p>Reasoning and analyzing</p> <ul style="list-style-type: none"> • Use reasoning and logic to analyze and apply mathematical ideas • Estimate reasonably • Demonstrate fluent and flexible thinking of number • Use tools or technology to analyze relationships and test conjectures • Model mathematics in contextualized experiences <p>Understanding and solving</p> <ul style="list-style-type: none"> • Develop, demonstrate, and apply conceptual understanding of mathematical ideas • Visualize to explore and illustrate mathematical concepts and relationships • Apply flexible strategies to solve problems in both abstract and contextualized situations • Engage in problem-solving experiences that are connected to place, story, cultural practices, and perspectives relevant to local First Peoples communities, the local community, and other cultures <p>Communicating and representing</p> <ul style="list-style-type: none"> • Communicate mathematical thinking in many ways • Use mathematical vocabulary and language to contribute to mathematical discussions • Represent mathematical ideas in a variety of ways • Explain and justify mathematical ideas 	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> • logarithmic functions and equations • exponential equations • sequences and series • operations on logarithms • polynomial functions and equations • transformations of functions, including $y = \sqrt{x}$, $y = x$, $y = \frac{1}{x}$ • conics • rational functions • trigonometric functions and equations with real numbers • trigonometric identities

Learning Standards (continued)

Curricular Competencies	Content
<p>Connecting and reflecting</p> <ul style="list-style-type: none"> • Reflect on mathematical thinking • Use mathematics to support personal choices • Connect mathematical concepts to each other and to other areas and personal interests • Incorporate First Peoples worldviews and perspectives to make connections to mathematical concepts 	

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Curricular Competencies – Elaborations

reasoning and logic:

- inductive and deductive reasoning
- predicting, generalizing, drawing conclusions through experiences including puzzles, games, and coding

Estimate:

- being able to defend the reasonableness of an estimate across mathematical contexts

fluent and flexible thinking:

- includes using known facts and benchmarks; partitioning; applying whole number strategies to rational numbers and algebraic expressions

Model:

- using concrete materials and dynamic interactive technology
- representing a situation graphically and/or symbolically

conceptual understanding:

- developed through playing with ideas, inquiry, and problem solving

Visualize:

- includes dynamic visualizations such as graphical relationships, simulations

flexible strategies:

- from a repertoire of strategies, choosing an appropriate strategy to solve problems (e.g., guess and check, model, solve a simpler problem, use a chart, use diagrams, role-play)

experiences:

- includes context, strategies and approaches, language across cultures

many ways:

- including oral, written, visual, use of technology

discussions:

- developing a mathematical community in the classroom through discourse — partner talks, small-group discussions, teacher-student conferences

Represent:

- concretely, pictorially, symbolically, including using models, tables, graphs, words, numbers, symbols

Reflect:

- sharing the mathematical thinking of self and others, including evaluating strategies and solutions, extending, posing new problems and questions

other areas and personal interests:

- to develop a sense of how mathematics helps us understand ourselves and the world around us (e.g., daily activities, local and traditional practices, the environment, popular media and news events, social justice, cross-curricular integration)

Curricular Competencies – Elaborations

Incorporate:

- Collaborate with local First Peoples Elders and knowledge keepers.

make connections:

- Bishop’s cultural practices: counting, measuring, locating, designing, playing, explaining (http://www.csus.edu/indiv/o/oreyd/ACP.htm_files/abishop.htm)
- www.aboriginaleducation.ca
- *Teaching Mathematics in a First Nations Context*, FNEC (<http://www.fnesc.ca/resources/math-first-peoples/>)

Content – Elaborations

exponential:

- graphing, including transformations, solving, base e

series:

- such as geometric, sigma notation, infinite

logarithms:

- laws of logarithms, evaluating with different bases

polynomial:

- solving, factoring, graphing, characteristics of graphs, function notation

transformations:

- singular vertical and horizontal expansions, compressions, reflections and translations, inverses, recognizing composed functions (e.g., $y = \sqrt{\sin x}$)

conics:

- transformations and/or locus derivations

rational:

- characteristics of graphs, including asymptotes, intercepts, point discontinuities

functions:

- radian measure; graphing primary trigonometric ratios, including transformations, characteristics, solving

identities:

- using Pythagorean, double angle, reciprocal, sum and difference identities to reduce complexity in expressions