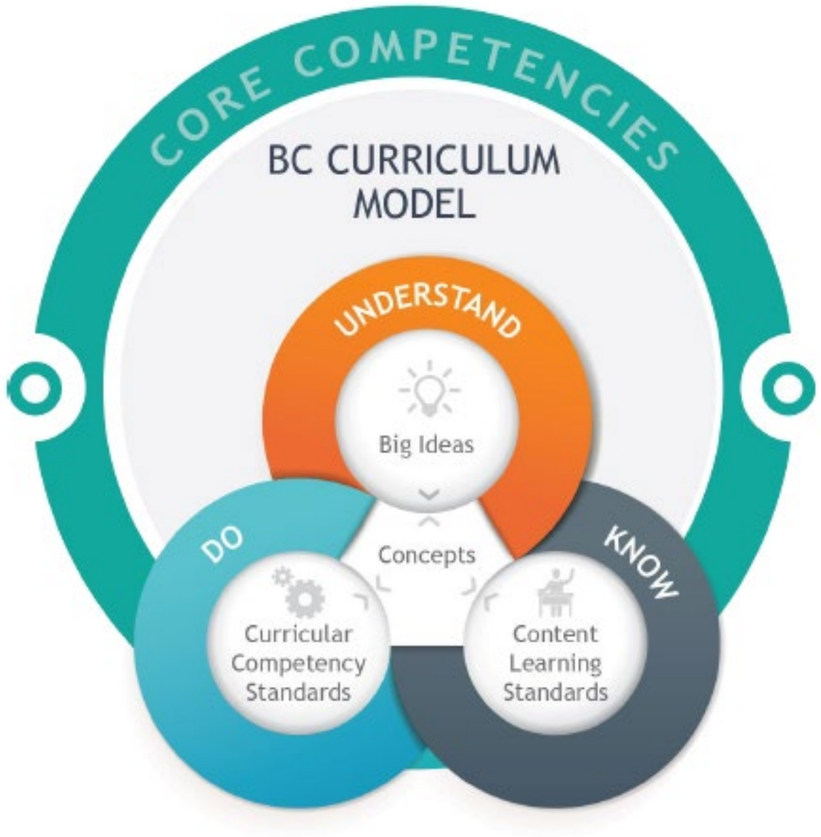
Math and Numeracy in the BC Curriculum

May 16, 2023

curriculum.gov.bc.ca/curriculum/mathematics/12/calculus

BC's curriculum is a leading, competency-based curriculum



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Calculus 12

Background Information ▾ Change Grade ▾ Download ▾

Core Competencies

Communication ▾ | Thinking ▾ | Personal and Social ▾

Big Ideas

The concept of a limit is foundational to calculus.	Differential calculus develops the concept of instantaneous rate of change.	Integral calculus develops the concept of determining a product involving a continuously changing quantity over an interval.	Derivatives and integrals are inversely related.

Curricular Competency

Learning Standards

Elaborations +

Students are expected to be able to do the following:

Reasoning and modelling

- Develop thinking strategies to solve puzzles and play games
- Explore, analyze, and apply mathematical ideas using reason, technology, and other tools
- Estimate reasonably and demonstrate fluent, flexible, and strategic thinking about number
- Model with mathematics in situational contexts
- Think creatively and with curiosity and wonder when exploring problems

Understanding and solving

Content

Learning Standards

Elaborations +

Students are expected to know the following:

- functions and graphs
- limits:
  - left and right limits
  - limits to infinity
  - continuity
- differentiation:
  - rate of change
  - differentiation rules
  - higher order, implicit
  - applications (differentiation)
- integration:
  - approximations

Curricular Competency

Learning Standards

Elaborations +

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Reasoning and modelling

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Understanding and solving

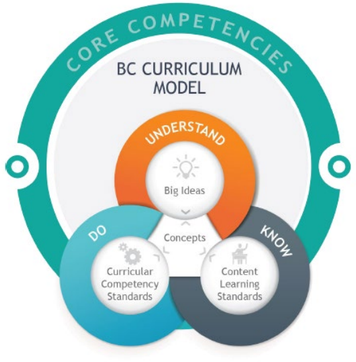
- Develop, demonstrate, and apply conceptual understanding of mathematical ideas through play, story, inquiry, and problem solving
- Visualize to explore and illustrate mathematical concepts and relationships
- Apply flexible and strategic approaches to solve problems
- Solve problems with persistence and a positive disposition
- Engage in problem-solving experiences connected with place, story, cultural practices, and perspectives relevant to local First Peoples communities, the local community, and other cultures

Communicating and representing

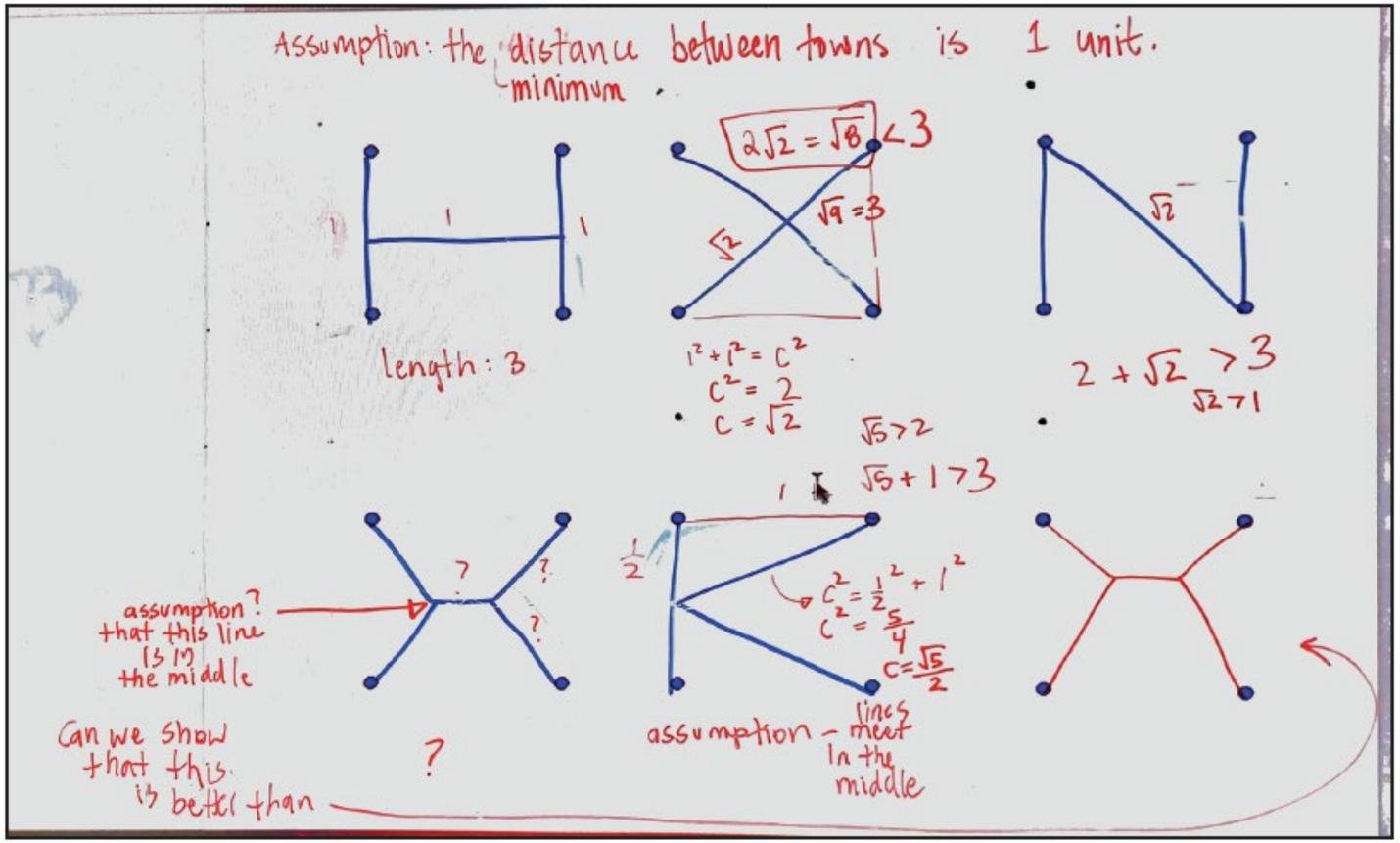
- Explain and justify mathematical ideas and decisions in many ways
- Represent mathematical ideas in concrete, pictorial, and symbolic forms
- Use mathematical vocabulary and language to contribute to discussions in the classroom
- Take risks when offering ideas in classroom discourse

Connecting and reflecting

- Reflect on mathematical thinking
- Connect mathematical concepts with each other, other areas, and personal interests
- Use mistakes as opportunities to advance learning
- Incorporate First Peoples worldviews, perspectives, knowledge, and practices to make connections with mathematical concepts



Math 12: Competency-based instruction sample



Summary of Learning Opportunity:

What is the shortest distance connecting 4 towns?

Mathematics 12 Curricular Competencies to be Developed and Assessed:

- Model with mathematics in situational contexts
- Visualize to explore and illustrate mathematical concepts and relationships
- Explain and justify mathematical ideas and decisions in many ways

Pedagogical research in assessment and communication of student learning

Focus on Proficiency

Assessment that is focused on student proficiency in relation to the established learning standards leads to improved reliability of assessment results and increased student engagement.

Triangulation of Evidence

Inclusive and culturally responsive assessment practices support gathering ample evidence of learning through multiple modalities: portfolios, oral assessments, self/peer assessment, collaborative group work, experiential learning

Descriptive Feedback

Descriptive feedback regarding process and product facilitates further learning by providing the student with information about how to reach their goal, rather than evaluative feedback which can be reductionist and performative.

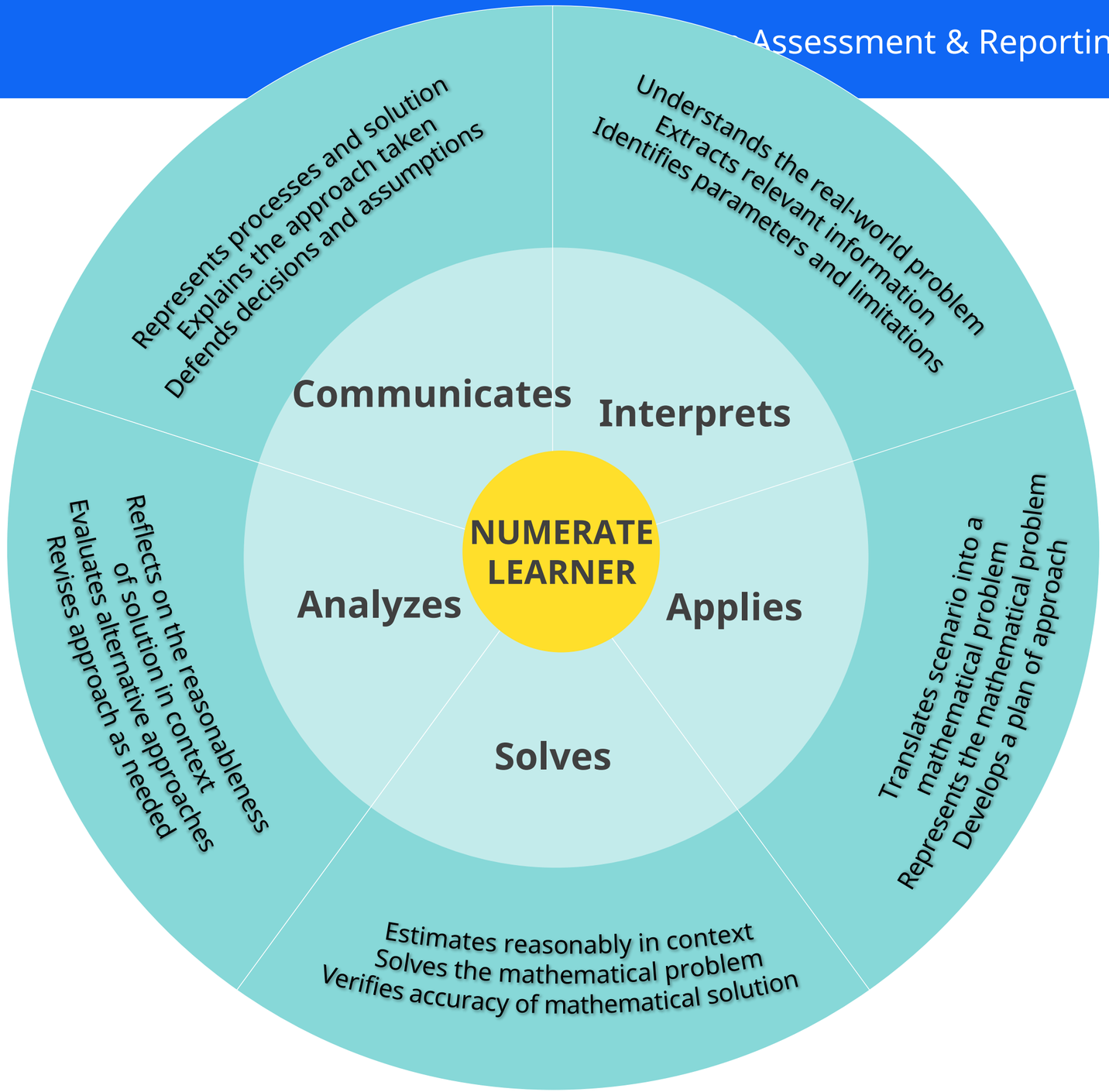
Student-Led Assessment

Student-led assessment, both self and peer, leads to an increase in student confidence in their abilities, improved performance, greater responsibility for their own learning, greater student satisfaction and independence, and positive and productive learning environments.

The Provincial Proficiency Scale aligns with best practices in education

The Provincial Proficiency Scale	EMERGING	DEVELOPING	PROFICIENT	EXTENDING
	The student demonstrates an initial understanding of the concepts and competencies relevant to the expected learning.	The student demonstrates a partial understanding of the concepts and competencies relevant to the expected learning.	The student demonstrates a complete understanding of the concepts and competencies relevant to the expected learning.	The student demonstrates a sophisticated understanding of the concepts and competencies relevant to the expected learning

The proposed Numeracy framework describes transferrable skills which can be developed in all learning areas



Competencies drive Provincial Assessment

Interpret

Model: Snowshoe Hare and Lynx

YUKON NEWS

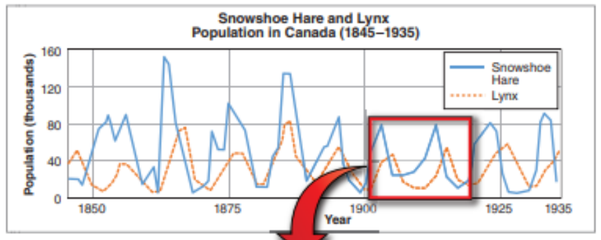
Lynx sightings increasing

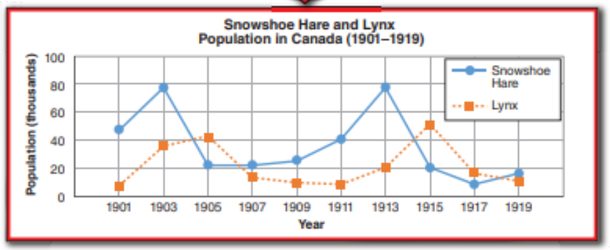
Lynx rely almost entirely on snowshoe hare as their main food source. Each lynx eats approximately 2 snowshoe hare every 3 days. Over the years, both populations have risen and fallen. The relationship between the snowshoe hare population and the lynx population has been documented for over 200 years.

Snowshoe Hare

Year	Snowshoe Hare Population (x 1000)	Lynx Population (x 1000)
1901	47	6
1903	77	35
1905	21	42
1907	21	13
1909	25	9
1911	40	8
1913	77	20
1915	20	51
1917	8	16
1919	16	10

Lynx





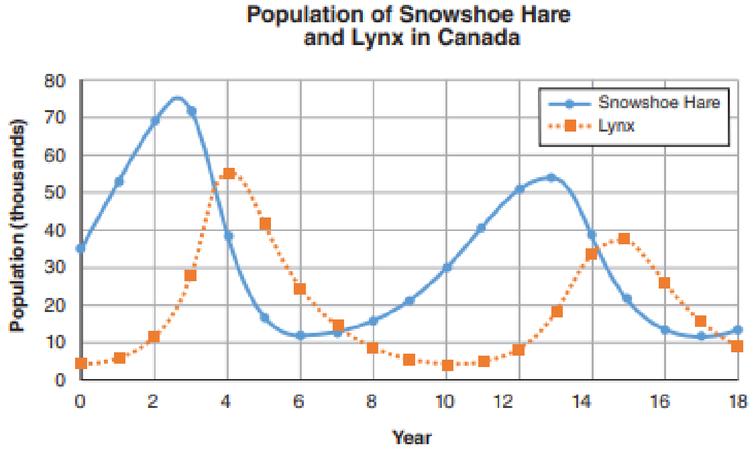
Analyze

Model: Snowshoe Hare and Lynx

26. **Answer this question on the yellow sheet.**

The relationship between the numbers of snowshoe hare and lynx is tightly linked, as the snowshoe hare make up over 95% of the diet of the lynx. The graph shows the cyclical nature of this relationship.

Biologists have noted a recent decline in the numbers of snowshoe hare and lynx at the peak of their cycles. They are estimating a similar percentage decrease in the next cycle as well.



Apply/Solve

Using the information in the graph above, predict the peak populations of each species in their next cycle. Create a graph starting at year 16 showing population numbers and the time (year) when these peaks will occur.

Explain and justify your solution. Be sure to include any calculations, estimations, and assumptions you made.

Communicate

Thank you

Merci