BIG IDEAS

Number represents, describes, and compares the quantities of ratios, rates, and percents.	Computational **fluency** and flexibility extend to operations with fractions.	**Discrete linear relationships** can be represented in many connected ways and used to identify and make generalizations.	The relationship between surface area and volume of **3D objects** can be used to describe, measure, and compare spatial relationships.	Analyzing **data** by determining averages is one way to make sense of large data sets and enables us to compare and interpret.

Learning Standards

Curricular Competencies

Students are expected to do the following:

Reasoning and analyzing

- Use **logic and patterns** to solve puzzles and play games
- Use **reasoning and logic** to explore, analyze, and apply mathematical ideas
- **Estimate reasonably**
- Demonstrate and **apply** mental math strategies
- Use tools or technology to explore and create patterns and relationships, and test conjectures
- **Model** mathematics in contextualized experiences

Understanding and solving

- Apply **multiple strategies** to solve problems in both abstract and contextualized situations
- Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving
- Visualize to explore mathematical concepts
- 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

Communicating and representing

- Use mathematical vocabulary and language to contribute to mathematical discussions
- **Explain and justify** mathematical ideas and decisions

Content

Students are expected to know the following:

- **perfect squares and cubes**
- **square and cube roots**
- **percents** less than 1 and greater than 100 (decimal and fractional percents)
- numerical **proportional reasoning (**rates, ratio, proportions, and percent)
- operations with **fractions** (addition, subtraction, multiplication, division, and order of operations)
- **discrete linear relations** (extended to larger numbers, limited to integers)
- **expressions**- writing and evaluating using substitution
- **two-step equations** with integer coefficients, constants, and solutions
- **surface area and volume** of regular solids, including triangular and other right prisms and cylinders
- **Pythagorean theorem**
- construction, views, and nets of **3D objects**
- **central tendency**
- **theoretical probability** with two independent events
- **financial literacy —** best buys

Learning Standards (continued)

Curricular Competencies	Content
• **Communicate** mathematical thinking in many ways • Represent mathematical ideas in concrete, pictorial, and symbolic forms **Connecting and reflecting** • **Reflect** on mathematical thinking • Connect mathematical concepts to each other and to **other areas and personal interests** • Use mathematical arguments to support **personal choices** • **Incorporate** First Peoples worldviews and perspectives to **make connections** to mathematical concepts	

Big Ideas – Elaborations	MATHEMATICS Grade 8

numbers:

- Number: Number represents and describes quantity.

Sample questions to support inquiry with students:

- How can two quantities be compared, represented, and communicated?
- How are decimals, fractions, ratios, and percents interrelated?
- How does ratio use in mechanics differ from ratio use in architecture?

fluency:

- Computational Fluency: Computational fluency develops from a strong sense of number.

Sample questions to support inquiry with students:

- When we are working with fractions, what is the relationship between addition and subtraction?
- When we are working with fractions, what is the relationship between multiplication and division?
- When we are working with fractions, what is the relationship between addition and multiplication?
- When we are working with fractions, what is the relationship between subtraction and division?

Big Ideas – Elaborations

MATHEMATICS
Grade 8

Discrete linear relationships:

- Patterning: We use patterns to represent identified regularities and to make generalizations.

Sample questions to support inquiry with students:

- What is a discrete linear relationship?
- How can discrete linear relationships be represented?
- What factors can change a discrete linear relationship?

3D objects:

- Geometry and Measurement: We can describe, measure, and compare spatial relationships.

Sample questions to support inquiry with students:

- What is the relationship between the surface area and volume of regular solids?
- How can surface area and volume of regular solids be determined?
- How are the surface area and volume of regular solids related?
- How does surface area compare with volume in patterning and cubes?

data:

- Data and Probability: Analyzing data and chance enables us to compare and interpret.

Sample questions to support inquiry with students:

- How does determining averages help us understand large data sets?
- What do central tendencies represent?
- How are central tendencies best used to describe a quality of a large data set?

Curricular Competencies – Elaborations

MATHEMATICS
Grade 8

logic and patterns:

- including coding

reasoning and logic:

- making connections, using inductive and deductive reasoning, predicting, generalizing, drawing conclusions through experiences

Estimate reasonably:

- estimating using referents, approximation, and rounding strategies (e.g., the distance to the stop sign is approximately 1 km, the width of my finger is about 1 cm)

Curricular Competencies – Elaborations

apply:

- extending whole-number strategies to decimals
- working toward developing fluent and flexible thinking about number

Model:

- acting it out, using concrete materials (e.g., manipulatives), drawing pictures or diagrams, building, programming

multiple strategies:

- includes familiar, personal, and from other cultures

connected:

- in daily activities, local and traditional practices, the environment, popular media and news events, cross-curricular integration
- Patterns are important in First Peoples technology, architecture, and art.
- Have students pose and solve problems or ask questions connected to place, stories, and cultural practices.

Explain and justify:

- using mathematical arguments

Communicate:

- concretely, pictorially, symbolically, and by using spoken or written language to express, describe, explain, justify, and apply mathematical ideas; may use technology such as screencasting apps, digital photos

Reflect:

- sharing the mathematical thinking of self and others, including evaluating strategies and solutions, extending, and 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., cross-discipline, daily activities, local and traditional practices, the environment, popular media and news events, and social justice)

personal choices:

- including anticipating consequences

Incorporate First Peoples:

- Invite local First Peoples Elders and knowledge keepers to share their knowledge

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,* FNESC http://www.fnesc.ca/k-7/

perfect squares and cubes:

- using colour tiles, pictures, or multi-link cubes
- building the number or using prime factorization

square and cube roots:

- finding the cube root of 125
- finding the square root of 16/169
- estimating the square root of 30

percents:

- A worker's salary increased 122% in three years. If her salary is now $93,940, what was it originally?
- What is ½% of 1 billion?
- The population of Vancouver increased by 3.25%. What is the population if it was approximately 603,500 people last year?
- beading

proportional reasoning:

- two-term and three-term ratios, real-life examples and problems
- A string is cut into three pieces whose lengths form a ratio of 3:5:7. If the string was 105 cm long, how long are the pieces?
- creating a cedar drum box of proportions that use ratios to create differences in pitch and tone
- paddle making

fractions:

- includes the use of brackets, but excludes exponents
- using pattern blocks or Cuisenaire Rods
- simplifying ½ ÷ 9/6 x (7 – 4/5)
- drumming and song: 1/2, 1/4, 1/8, whole notes, dot bars, rests = one beat
- changing tempos of traditional songs dependent on context of use
- proportional sharing of harvests based on family size

discrete linear relations:

- two-variable discrete linear relations
- expressions, table of values, and graphs
- scale values (e.g., tick marks on axis represent 5 units instead of 1)
- four quadrants, integral coordinates

expressions:

- using an expression to describe a relationship
- evaluating 0.5n – 3n + 25, if n = 14

Content – Elaborations

two-step equations:

- solving and verifying $3x - 4 = -12$
- modelling the preservation of equality (e.g., using a balance, manipulatives, algebra tiles, diagrams)
- spirit canoe journey calculations

surface area and volume:

- exploring strategies to determine the surface area and volume of a regular solid using objects, a net, 3D design software
- volume = area of the base x height
- surface area = sum of the areas of each side

Pythagorean theorem:

- modelling the Pythagorean theorem
- finding a missing side of a right triangle
- deriving the Pythagorean theorem
- constructing canoe paths and landings given current on a river
- First Peoples constellations

3D objects:

- top, front, and side views of 3D objects
- matching a given net to the 3D object it represents
- drawing and interpreting top, front, and side views of 3D objects
- constructing 3D objects with nets
- using design software to create 3D objects from nets
- bentwood boxes, lidded baskets, packs

central tendency:

- mean, median, and mode

theoretical probability:

- with two independent events: sample space (e.g., using tree diagram, table, graphic organizer)
- rolling a 5 on a fair die and flipping a head on a fair coin is 1/6 x ½ = 1/12
- deciding whether a spinner in a game is fair

financial literacy:

- coupons, proportions, unit price, products and services
- proportional reasoning strategies (e.g., unit rate, equivalent fractions given prices and quantities)

