Math Proficiency Profile

OVERVIEW

Proficiency Profiles show how the **cross-curricular learning progressions** are aligned with, and can support, the curricular competencies in all learning areas and how the **foundational learning progressions** align with the content learning standards in the curriculum.

The **content** learning standards — the **"Know"** of the know-do-understand model of learning — detail the essential topics and knowledge at each grade level.

The **foundational math proficiency descriptors** outline key knowledge which is essential to the study of mathematics. Teachers can use these descriptors to identify students' areas of strength or areas of needed support in math content.

The **curricular competencies** are the skills, strategies, and processes that students develop over time. They reflect the **"Do"** in the know-do-understand model of learning. Curricular competencies are connected to the core competencies.

Curricular Competencies (Do)	**Cross-Curricular Numeracy Proficiency Descriptors**	**Content (Know)**	**Math Foundational Skills Proficiency Descriptors**
Learning Standard – Required	*What does proficient student learning look like when students DO the Curricular Competencies?*	*Learning Standard - Required*	*What does proficient student learning look like when students KNOW the Content Learning Standards?*

Students are expected to do the following:
Reasoning and analyzing
• Use reasoning to explore and make connections
• **Estimate reasonably**
• Develop **mental math strategies** and abilities to make sense of quantities
• Use **technology** to explore mathematics
• **Model** mathematics in contextualized experiences
 	
Understanding and solving
• Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving
• Visualize to explore mathematical concepts
• Develop and use **multiple strategies** to engage in problem solving
• 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
	A Proficient Kindergarten student:
	Can demonstrate **Reasoning, Understanding, and Connecting** when they:
	Interpret: The student can
	• Make a personal connection with one aspect of the problem
	• Identify a significant fact about the problem
	• Understand that problems have parameters
	
	Can demonstrate **Understanding** and **Solving** when they:
	Apply: The student can
	• Recognize the mathematical competencies and content needed to solve the problem
	• Represent the mathematical problem, using concrete materials and/or pictures
	• Experiment with problem solving using prior knowledge
		Students are expected to know the following:
		• **number concepts** to 10
		• **ways to make 5**
		• **decomposition** of numbers to 10
		• **repeating patterns** with two or three elements
		• **change in quantity to 10**, using concrete materials
		• **equality as a balance** and inequality as an imbalance
		• **direct comparative measurement** (e.g., linear, mass, capacity)
		• **single attributes** of 2D shapes and 3D objects
		• concrete or pictorial **graphs** as a visual tool
		• likelihood of **familiar life events**
		• **financial literacy** — attributes of coins, and financial role-play
			A Proficient Kindergarten student:
			Number sense: Whole number concepts
			Can [for numbers up to 10]:
			• Accurately count (**stable order counting**):
			  ○ Forwards from 1 to 10
			  ○ Backwards from 10 to 1
			  ○ Forwards to 10 from different starting points
			  ○ Backwards to 1 from different starting points
			  ○ A group of up to 10 objects (**one-to-one correspondence**)
			  ○ A group of up to 10 objects which has been rearranged (**conservation**)
			• Visually represent the number of objects in a group in **concrete, pictorial, and symbolic forms** such as using a numeral, using manipulatives such as interlocking cubes, or using tally marks (**cardinality**), to make sense of quantities
			• Write the numerals 0-9
			• Instantly recognizes the number of objects (**subitizing**) in sets up to 5 (e.g. images, objects, dots, ten frame)

The **cross-curricular numeracy proficiency descriptors** outline the critical thinking and communication competencies which support the curricular competencies in Mathematics and in other learning areas.

The **foundational proficiency descriptor definitions** elaborate on key terms found within the proficiency descriptors for each grade. They provide further explanation of the developmental progression of key concepts, and example teaching strategies, which support the foundational proficiency descriptors.

Foundational Proficiency Descriptors - Definitions
Number Sense: **Whole Number Concepts:** Students develop an understanding that numbers can represent a quantity. They also learn how to communicate numbers: • symbolically (ie writing numerals) • orally (ie counting out loud) • visually (ie tally marks or manipulatives such as base-10 blocks)

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Curricular Competencies (Do)	Cross-Curricular Numeracy Proficiency Descriptors	Content (Know)	Math Foundational Skills Proficiency Descriptors
Learning Standard – Required	***What does proficient student learning look like when students DO the Curricular Competencies?***	***Learning Standard - Required***	***What does proficient student learning look like when students KNOW the Content Learning Standards?***

Students are expected to do the following:
 	
Reasoning and analyzing
• Use reasoning to explore and make connections
• **Estimate reasonably**
• Develop **mental math strategies** and abilities to make sense of quantities
• Use **technology** to explore mathematics
• **Model** mathematics in contextualized experiences
 	
Understanding and solving
• Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving
• Visualize to explore mathematical concepts
• Develop and use **multiple strategies** to engage in problem solving
• 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
• **Communicate** mathematical thinking in many ways
• Use mathematical vocabulary and language to contribute to mathematical discussions
• **Explain and justify** mathematical ideas and decisions
• Represent mathematical ideas in **concrete, pictorial, and symbolic forms**
 	
Connecting and reflecting
• **Reflect** on mathematical thinking
	A Proficient Kindergarten student:
	
	Can demonstrate **Reasoning, Understanding, and Connecting** when they:
	
	Interpret: The student can
	• Make a personal connection with one aspect of the problem
	• Identify a significant fact about the problem
	• Understand that problems have parameters
	
	Can demonstrate **Understanding** and **Solving** when they:
	
	Apply: The student can
	• Recognize the mathematical competencies and content needed to solve the problem
	• Represent the mathematical problem, using concrete materials and/or pictures
	• Experiment with problem solving using prior knowledge
	
	Can demonstrate **Solving** and **Analyzing** when they:
	
	Solve: The student can
	• Estimate the scope of the answer
	• Find a solution, using play, concrete materials, or models
	• Compare their solution with those of their teacher and/or peers
	
	Can demonstrate **Solving, Analyzing,** and **Reflecting** when they:
	
	Analyze: The student can
	• Identify a reasonable solution in relation to the original problem/scenario
	• Identify an alternative approach
	• Experiment with a recommended alternative approach to solve the problem
		Students are expected to know the following:
		• **number concepts** to 10
		• **ways to make 5**
		• **decomposition** of numbers to 10
		• **repeating patterns** with two or three elements
		• **change in quantity to 10**, using concrete materials
		• **equality as a balance** and inequality as an imbalance
		• **direct comparative measurement** (e.g., linear, mass, capacity)
		• **single attributes** of 2D shapes and 3D objects
		• concrete or pictorial **graphs** as a visual tool
		• likelihood of **familiar life events**
		• **financial literacy** — attributes of coins, and financial role-play
			A Proficient Kindergarten student:
			
			Number sense: Whole number concepts
			
			Can [for numbers up to 10]:
			• Accurately count (**stable order counting**):
			  ○ Forwards from 1 to 10
			  ○ Backwards from 10 to 1
			  ○ Forwards to 10 from different starting points
			  ○ Backwards to 1 from different starting points
			  ○ A group of up to 10 objects (**one-to-one correspondence**)
			  ○ A group of up to 10 objects which has been rearranged (**conservation**)
			• Visually represent the number of objects in a group in **concrete, pictorial, and symbolic forms** such as using a numeral, using manipulatives such as interlocking cubes, or using tally marks (**cardinality**), to make sense of quantities
			• Write the numerals 0-9
			• Instantly recognizes the number of objects (**subitizing**) in sets up to 5 (e.g. images, objects, dots, ten frame)
			
			Operational sense:
			
			Can:
			• Apply visual and mental math tools and strategies (such as a 10 frame, using manipulatives, or **skip counting**) to observe patterns in and relationships between numbers up to 10
			• Compare quantities using relational math vocabulary (e.g. more, less, equal)
			• Apply whole number concepts to begin to add (join sets together) or subtract (decompose or split sets) sets of up to 10 objects
			• **Decompose** a set of objects, pictures, or symbols
			
			Algebraic Thinking: Patterning and Algebraic Thinking
			
			Can:
			• Identify the **core** of a pattern consisting of 2 or 3 repeating elements
			• Sort and classify patterns using a single **attribute**
			• Identify patterns in the world: art, music, dance, movement, Indigenous beadwork, textiles

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• 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	Can demonstrate **Communicating** and **Representing** when they: **Communicate:** The student can • Represent the problem-solving process, using numbers, pictures, and/or manipulatives • Identify one step of their problem-solving approach • Identify one problem-solving decision		• Represent different types of patterns in **concrete, pictorial, and symbolic forms** e.g. visual: shape, letter; physical: rhythm, movement pattern • Model equality as balanced and inequality as imbalanced using concrete and pictorial models (e.g., using a pan balance with cubes on each side to show equal and not equal) • Accurately use **symbols of equality** (= sign) • Make connections to operational sense: decomposing and recomposing quantities to 10 (eg how many more objects are needed to make 10?) **Spatial understanding**: Measurement, 2D shapes and 3D objects, Measuring Shapes and Describing Position Can: • Use **non-standard units** to measure the length, width, height, mass, or capacity of an object • Use math vocabulary to make qualitative comparisons (e.g. bigger, smaller, longer, shorter, wider, narrower, heavier, lighter, holds more, holds less) • Identify, describe, and create **basic 2D shapes** • Create larger shapes by using smaller shapes (e.g. 2 triangles make a rectangle) by drawing, using digital technology or manipulatives like tangrams • Begin to recognize and identify similarities between **3D objects**. At this level, using specific math terminology to name and identify 3D objects is not expected • Sort 2D shapes and 3D objects using a single **attribute** and explain their thinking • Describe the position of an object qualitatively (e.g. above, below, beside, in front of, behind) **Collecting and Representing Data:** Graphs and Visual Representations, Probability Can: • Infer a piece of information from a graph or diagram (such as a tally chart, calendar, bar graph, pictograph) • Describe the likelihood of a familiar event (such as the chance of snow) using age-appropriate probability language (never, always sometimes, maybe) with supportive reasoning **Financial Literacy**: Currency and Financial Planning and Decision Making Can:

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			• Observe and describe Canadian coins (loonies and toonies) by their size and design • Role play financial transactions such as in a restaurant, bakery, or store • Make a connection to ways to make 5 and composition to 10 using visual representations of money (e.g., a muffin is $2 and juice is $1; pay with a toonie and a loonie) • Make a connection to wants and needs (Career Education, Core Competencies)

Foundational Proficiency Descriptors - Definitions

Number Sense:

Whole Number Concepts: Students develop an understanding that numbers can represent a quantity. They also learn how to communicate numbers:

- symbolically (ie writing numerals)
- orally (ie counting out loud)
- visually (ie tally marks or manipulatives such as base-10 blocks)

As students move to higher grades, they investigate relationships and patterns between numbers such as concepts of place value to be able to fluently add, subtract, multiply, and divide.
are numbers that represent an amount or quantity that is not a whole number**.** Fractions, decimals, percentages, and ratios can also represent part of an area or part of a set of objects.

Definitions:

Stable order counting: accurately counting numbers in the correct sequence
One-to-one correspondence: using one number per object for accurate counting
Cardinality: knowing that numbers can represent the quantity in a set
Conservation: knowing the number of objects remains the same despite the size of objects or how they are organized
Subitize: Instantly recognizing how many there are in a set without counting. Subitizing can usually be done for a group of up to 5 objects
Concrete forms: manipulatives such as 10 frames, base 10 blocks, counters
Pictorial forms: pictures, graphs
Symbolic forms: numerals, tallies, mathematical notation such as <. >, =

Operational sense: In kindergarten, students learn patterns and relationships between numbers up to 10 as a foundation to the development of math fact fluency and to the understanding of operations with larger numbers in later grades.

Definitions:

Decompose: Breaking down a number or shape into smaller or simpler parts. For example, 12 = 3 x 4 or 3 groups of 4
Benchmarks: standard or reference numbers that are easy to comprehend and use in mathematics, such as 5, 10, 100, 1000, 25, 50
Referent: A known or familiar quantity that is used to help estimate or understand other quantities. (e.g. A baseball bat could be used to show the length of a metre)
Concrete forms: manipulatives such as 10 frames, base 10 blocks, counters
Pictorial forms: pictures, graphs
Symbolic forms: numerals, tallies, mathematical notation such as <. >, =

Strategies:

Computational and mental math strategies: counting on and counting back, doubles and related doubles, making 10, bridging over 10, decomposing, using known facts, (aka 10-pairs, friendly numbers), benchmarks of 5 and 10, **commutative property**, skip counting and estimation

- **Skip counting:** method of counting in which students add a number to the previous number. For example, skip counting by 5, starting at 0 is 0, 5, 10, 15, …
- **Oral strategies:** stories, songs, poems, picture books

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<u>Algebraic Thinking:</u>
Patterning: Noticing repetition in patterns helps students develop skills to observe, identify, and classify, and supports developing prediction skills.
Definitions:
Core: repeating element in a pattern
Attribute: description of elements in a pattern, such as colour, shape, size, number/letter/symbol, object, direction, position

Algebraic Thinking: Algebraic thinking includes recognizing and analyzing patterns, studying and representing relationships between numbers and in context, making generalizations, and analyzing change. Students also explore concepts and symbols of equality
Definitions:
Symbols of equality and inequality: The = sign means "the same as", e.g. 4 + 6 = 3 + 7. elements on both sides of the = sign are balanced regardless of size or shape
Concrete forms: manipulatives such as counters, loose parts, or blocks
Pictorial forms: pictures, drawings, artwork
Symbolic forms: numbers, letters, symbols

<u>Spatial Understanding:</u>
Measurement: Measurements can use standard units (established systems such as metric) and/or non-standard units (ie using hands or blocks to measure height). Comparisons can be descriptive (qualitative) or numerical (quantitative). Includes concepts of time.
Definitions:
Non-standard units: measurement units using everyday objects such as a pencil, arm, shoe

2D shapes and 3D objects: Noticing attributes of shapes helps students develop skills to observe, identify, classify, and supports developing creation skills.
Definitions:
Basic 2D shapes: circle, square, rectangle, triangle, heart, diamond
3D objects: sphere, cone, cube, rectangular prism, pyramid
Attributes: Size, shape, colour, faces, edges, vertices

<u>Collecting and Representing Data:</u>
Graphs and visual representations: Graphs help to visually represent observations and data. Students build proficiency in inferring information from graphs and collecting data to represent in various types of graphs.
Teaching strategy: -create graphs and diagrams using class data

Probability: Students discuss the likelihood of an event using language of probability, such as unlikely or likely (e.g., could it snow tomorrow?). As students move to higher grades they will begin to use more numerical (quantitative) terms such as describing probability with fractions, decimals, percentages, and ratios.

<u>Financial Literacy:</u>
Currency: Identifying, understanding the value of, and combining coins and bills fluently, with an emphasis on Canadian currency

Financial Planning and Decision Making: Concepts of earning, saving, spending, and making financial plans and decisions

Grade 1 – Math Proficiency Profile

Curricular Competencies (Do)	Cross-Curricular Numeracy Proficiency Descriptors	Content (Know)	Math Foundational Skills Proficiency Descriptors
Learning Standard – Required	***What does proficient student learning look like when students DO the Curricular Competencies?***	***Learning Standard - Required***	***What does proficient student learning look like when students KNOW the Content Learning Standards?***

Students are expected to do the following:
 	
Reasoning and analyzing
• Use reasoning to explore and make connections
• **Estimate reasonably**
• Develop **mental math strategies** and abilities to make sense of quantities
• Use **technology** to explore mathematics
• **Model** mathematics in contextualized experiences
 	
Understanding and solving
• Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving
• Visualize to explore mathematical concepts
• Develop and use **multiple strategies** to engage in problem solving
• 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
• **Communicate** mathematical thinking in many ways
• Use mathematical vocabulary and language to contribute to mathematical discussions
• **Explain and justify** mathematical ideas and decisions
• Represent mathematical ideas in **concrete, pictorial, and symbolic forms**
 	
Connecting and reflecting
• **Reflect** on mathematical thinking
	A Proficient Grade 1 student:
	
	Can demonstrate **Reasoning, Understanding, and Connecting** when they:
	
	Interpret: The student can
	• Make personal connections with aspects of the problem
	• Identify a significant fact and gather other information from the problem
	• Identify a clearly defined parameter needed to solve the problem
	
	Can demonstrate **Understanding** and **Solving** when they:
	
	Apply: The student can
	• Recognize the mathematical competencies and content needed to solve the problem
	• Represent the mathematical problem, using concrete materials and diagrams
	• Develop a straightforward plan of approach, using prior knowledge and mathematical tools and strategies
	
	Can demonstrate **Solving** and **Analyzing** when they:
	
	Solve: The student can
	• Estimate the scope of the answer
	• Find a solution, using play, concrete materials, or models
	• Compare their solution with those of their teacher and/or peers
	
	Can demonstrate **Solving, Analyzing,** and **Reflecting** when they:
	
	Analyze: The student can
	• Identify a reasonable solution in relation to the original problem/scenario
	• Identify an alternative approach
	• Experiment with a recommended alternative approach to solve the problem
		Students are expected to know the following:
		
		• **number concepts** to 20
		• **ways to make 10**
		• **addition and subtraction to 20** (understanding of operation and process)
		• **repeating patterns** with multiple elements and attributes
		• **change in quantity to 20**, concretely and verbally
		• meaning of **equality and inequality**
		• **direct measurement** with non-standard units (non-uniform and uniform)
		• comparison of **2D shapes and 3D objects**
		• **concrete graphs**, using one-to-one correspondence
		• likelihood of **familiar life events**, using comparative language
		• **financial literacy** — values of coins, and monetary exchanges
			A Proficient Grade 1 student:
			
			Number sense: Whole number concepts
			
			Can [for numbers up to 20]:
			• Accurately count (**stable order counting**):
			  ○ Forwards from 1 to 20
			  ○ Backwards from 20 to 1
			  ○ Forwards to 20 from different starting points
			  ○ **Skip count** by 2, 5, and 10
			• Compare and order numbers to make sense of quantities:
			• Use relational language (e.g. more than, less than, equal to)
			• Identify surrounding numbers using tools such as a number line or hundreds chart (e.g. 1 more or 2 less)
			• Recognize numbers as odd or even
			• Visually represent the number of objects in a group in **concrete, pictorial, and symbolic forms** such as with a numeral, manipulatives such as interlocking cubes, or tally marks (**cardinality**) in order to make sense of quantities
			• Write the numbers 0-20
			
			Operational sense: Knowledge and fluency of math facts, Understanding of operations
			
			Can:
			• Apply visual and mental math tools and strategies (such as a 10 frame, using manipulatives, or **skip counting**) to observe patterns in numbers up to 20
			• Represent addition and subtraction in **concrete, pictorial, and symbolic forms**
			• Describe and use **computational and mental math strategies**
			• Understand and apply math vocabulary such as addition, subtraction, equation, plus, minus, equal, sum, take away, difference
			• Understand that addition and subtraction are related/opposite operations (e.g. **fact families** such as 2 + 7 = 9 and 9 – 7 = 2)
			• Solve addition and subtraction problems with sums up to 20
			• Apply an understanding of addition and subtraction to 20 to solve **contextual problems**
			• Choose the appropriate operation and strategy to solve a **contextual problem**

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• 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	Can demonstrate **Communicating** and **Representing** when they: **Communicate:** The student can • Represent the problem-solving process, using words, numbers, pictures, symbols, and/or manipulatives • Outline their problem-solving approach • Outline one problem-solving decision		**Algebraic thinking:** Patterning and Algebraic thinking Can: • Identify the **core** of a pattern consisting of 3 to 5 repeating elements • Compare the **attributes** of repeating patterns • Identify and describe pattern rules. Represent pattern rules in symbolic forms, e.g. using letter codes like ABABAB • Translate patterns from one representation to another (e.g., an orange-blue pattern could be represented by a circle-square pattern) • Predict an element in a repeating pattern • Create their own repeating pattern with 3 elements • Explore patterns in the environment and in daily life • Accurately use **symbols of equality and inequality** (= or ≠) • Create accurate addition and subtraction equations for numbers up to 20 • Demonstrate **change tasks** and explain reasoning **Spatial understanding**: Measurement, 2D shapes and 3D objects, Measuring shapes and describing position Can: • Accurately measure the length of an object, edge to edge • Use **non-uniform** or **uniform** units to measure the length, width, height, mass, or capacity of an object • Use math vocabulary to make qualitative comparisons (e.g. bigger, smaller, longer, shorter, wider, narrower, heavier, lighter, holds more, holds less) • Identify, describe, and sort **2D shapes** and **3D objects** using a single **attribute** and explain their thinking • Compose and decompose larger 2D shapes by using smaller shapes (e.g. decomposing a hexagon into triangles) by drawing or using digital technology or manipulatives like tangrams • Recognize and identify similarities between **3D objects** and begin to create 3D objects. At this level, using specific math terminology to name and identify 3D objects is not expected • Use mathematical vocabulary to describe **attributes** of shapes Explore 2D shapes and 3D objects in the real world (e.g. bentwood box, pit houses, soccer ball, boxes, cans, dice) • Describing relative position, using qualitative, positional language (e.g. up and down, in and out) **Collecting and Representing Data:** Graphs and visual representations, Probability Can:

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			• Record data using tally marks or manipulatives
			• Represent information on a graph using **one-to-one correspondence**
			• Represent data using different representations (e.g. bar graphs, pictographs, tally marks)
			• Interpret results using comparative language (e.g. more people liked skipping than running)
			• Describe the likelihood of a familiar event (such as the chance of snow) using age-appropriate probability language (never, always, sometimes, maybe, unlikely and likely) with supportive reasoning
			
			Financial Literacy: Currency and Financial planning and decision making
			
			Can:
			• Identify and name Canadian coins (nickels, dimes, quarters loonies, toonies) by their size, design, and value
			• Sort and count the number of types of coins in a mixed set
			• Roleplay financial transactions such as in a restaurant, bakery, or store
			• Calculate the total price (in whole numbers) by adding and subtracting to $20
			• Make connections to concepts such as
			  ○ Roles, responsibilities, and jobs in the community (Career Education)
			  ○ Integrating the concept of wants and needs (Core Competencies)

Foundational Proficiency Descriptors - Definitions

<u>Number Sense:</u>
Whole Number Concepts: Students develop an understanding that numbers can represent a quantity. They also learn how to communicate numbers:

- symbolically (ie writing numerals)
- orally (ie counting out loud)
- visually (ie tally marks or manipulatives such as base-10 blocks)

As students move to higher grades, they investigate relationships and patterns between numbers such as concepts of place value to be able to fluently add, subtract, multiply, and divide.
are numbers that represent an amount or quantity that is not a whole number**.** Fractions, decimals, percentages, and ratios can also represent part of an area or part of a set of objects.
Definitions:
Stable order counting: accurately counting numbers in the correct sequence
Cardinality: knowing that numbers can represent the quantity in a set
Skip counting: method of counting in which students add a number to the previous number. For example, skip counting by 5, starting at 0 is 0, 5, 10, 15, ...
Concrete forms: manipulatives such as 10 frames, base 10 blocks, counters
Pictorial forms: pictures, graphs
Symbolic forms: numerals, tallies, mathematical notation such as <. >, =

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<u>Operational sense:</u>
Knowledge and fluency of math facts: Students are introduced to and practice **math facts** (quick and accurate knowledge of addition/subtraction and multiplication/division facts) to build arithmetic fluency. **Fact fluency** (accurate, efficient and flexible knowledge of math facts) based on whole number understanding (ie multiplication is repeated addition, or number patterns) is encouraged rather than memorization of discrete facts. Various visual and oral methods (such as a hundred chart or multiplication table, using manipulatives, or skip counting) should be utilized in the classroom.
Definitions:

Decompose: Breaking down a number or shape into smaller or simpler parts. For example, 12 = 3 x 4 or 3 groups of 4
Benchmarks: standard or reference numbers that are easy to comprehend and use in mathematics, such as 5, 10, 100, 1000, 25, 50
Referent: A known or familiar quantity that is used to help estimate or understand other quantities. (e.g. A baseball bat could be used to show the length of a metre)
Concrete forms: manipulatives such as 10 frames, base 10 blocks, counters
Pictorial forms: pictures, graphs
Symbolic forms: numerals, tallies, mathematical notation such as <. >, =

Strategies:
Computational and mental math strategies: counting on and counting back, doubles and related doubles, making 10, bridging over 10, decomposing, using known facts, (aka 10-pairs, friendly numbers), benchmarks of 5 and 10, **commutative property**, skip counting and estimation

- **Bridging over:** A mental math strategy used to simplify addition and subtraction, by "bridging" to the closest whole number, typically a group of ten. (Ex. 8+5. The 8 can be "bridged" to 10 by adding 2. Then, just add the remaining 3)
- **Skip counting:** method of counting in which students add a number to the previous number. For example, skip counting by 5, starting at 0 is 0, 5, 10, 15, …
- **Fact families:** A group of related math facts (Ex. 2 + 3 = 5 and 5 – 2 = 3)
- **Commutative property:** the order of the numbers in an addition equation does not change the sum, ie 3 + 5 = 5 + 3 = 8
- **Oral strategies:** stories, songs, poems, picture books

Understanding of Operations: The development and practice of multiple strategies builds flexibility in doing arithmetic operations as students apply and select strategies to use in different contexts. Operational understanding builds on fluency in math facts and requires an understanding of concepts such as place value to be able to add, subtract, multiply, and divide larger numbers beyond known math facts.
Definitions:
Contextual problem/experience: a problem that is set within a real-world or practical situation, requiring students to apply mathematical concepts to solve it. Students identify and apply the best mathematical strategy to fit the context based on their current knowledge and available tools.

<u>Algebraic Thinking:</u>
Patterning: Noticing repetition in patterns helps students develop skills to observe, identify, and classify, and supports developing prediction skills.
Definitions:
Core: repeating element in a pattern
Attribute: description of elements in a pattern, such as colour, shape, size, number/letter/symbol, object, direction, position

Algebraic Thinking: Algebraic thinking includes recognizing and analyzing patterns, studying and representing relationships between numbers and in context, making generalizations, and analyzing change. Students also explore concepts and symbols of equality
Definitions:
Symbols of equality and inequality: The = sign means "the same as", e.g. 4 + 6 = 3 + 7. elements on both sides of the = sign are balanced regardless of size or shape
Change tasks: demonstrating changing a quantity using concrete, pictorial, and symbolic models (e.g. using manipulatives, showing changing 8 to 12 objects by adding 4 objects)
Concrete forms: manipulatives such as counters, loose parts, or blocks
Pictorial forms: pictures, drawings, artwork
Symbolic forms: numbers, letters, symbols

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<u>Spatial Understanding:</u>
Measurement: Measurements can use standard units (established systems such as metric) and/or non-standard units (ie using hands or blocks to measure height). Comparisons can be descriptive (qualitative) or numerical (quantitative). Includes concepts of time.
Definitions:
Non-standard units: measurement units using everyday objects such as a pencil, arm, shoe
Non-uniform units: not consistent in size e.g., children's hands, pencils)
Uniform units: consistent in size e.g., interlocking cubes, paper clips
Teaching Strategies: repeating a unit to measure an object by moving it, tiling an area, rope knots at intervals, using body parts to measure. book: *An Anishnaabe Look at Measurement,* by Rhonda Hopkins and Robin King-Stonefish (http://www.strongnations.com/store/item_display.php?i=3494&f=), hand/foot tracing for mitten/moccasin making

2D shapes and 3D objects: Noticing attributes of shapes helps students develop skills to observe, identify, classify, and supports developing creation skills.
Definitions:
Basic 2D shapes: circle, square, rectangle, triangle, heart, diamond
3D objects: sphere, cone, cube, rectangular prism, pyramid
Attributes: Size, shape, colour, faces, edges, vertices
Teaching Strategies: Creating a classroom, school, or neighbourhood map

<u>Collecting and Representing Data:</u>
Graphs and visual representations: Graphs help to visually represent observations and data. Students build proficiency in inferring information from graphs and collecting data to represent in various types of graphs.
Definitions:
One to one correspondence: on a pictograph, where each picture symbol corresponds to one unit of data
Teaching strategy: -create graphs and diagrams using class data

Probability: Students discuss the likelihood of an event using language of probability, such as unlikely or likely (e.g., could it snow tomorrow?). As students move to higher grades they will begin to use more numerical (quantitative) terms such as describing probability with fractions, decimals, percentages, and ratios.

<u>Financial Literacy:</u>
Currency: Identifying, understanding the value of, and combining coins and bills fluently, with an emphasis on Canadian currency

Financial Planning and Decision Making: Concepts of earning, saving, spending, and making financial plans and decisions

Grade 2 – Math Proficiency Profile

Curricular Competencies (Do)	Cross-Curricular Numeracy Proficiency Descriptors	Content (Know)	Math Foundational Skills Proficiency Descriptors
Learning Standard – Required	***What does proficient student learning look like when students DO the Curricular Competencies?***	***Learning Standard - Required***	***What does proficient student learning look like when students KNOW the Content Learning Standards?***

Students are expected to do the following:
 	
Reasoning and analyzing
• Use reasoning to explore and make connections
• **Estimate reasonably**
• Develop **mental math strategies** and abilities to make sense of quantities
• Use **technology** to explore mathematics
• **Model** mathematics in contextualized experiences
 	
Understanding and solving
• Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving
• Visualize to explore mathematical concepts
• Develop and use **multiple strategies** to engage in problem solving
• 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
• **Communicate** mathematical thinking in many ways
• Use mathematical vocabulary and language to contribute to mathematical discussions
• **Explain and justify** mathematical ideas and decisions
• Represent mathematical ideas in **concrete, pictorial, and symbolic forms**
 	
Connecting and reflecting
• **Reflect** on mathematical thinking
	A Proficient Grade 2 student:
	
	Can demonstrate **Reasoning, Understanding, and Connecting** when they:
	
	Interpret: The student can
	• Make personal connections to explore the problem
	• Identify and gather most of the significant information from the presented problem to assist in solving it
	• Identify some of the clearly defined parameters needed to solve the problem
	
	Can demonstrate **Understanding** and **Solving** when they:
	
	Apply: The student can
	• Identify the mathematical competencies and content needed to solve the problem
	• Represent the mathematical problem, using concrete materials and diagrams
	• Develop a basic plan of approach, using familiar mathematical tools and/or strategies
	
	Can demonstrate **Solving** and **Analyzing** when they:
	
	Solve: The student can
	• Estimate reasonably within known parameters, using benchmarks
	• Find a solution, using mathematical tools and/or strategies
	• Verify the accuracy of their solution by comparing it with a variety of proofs/checks, including estimation
	
	Can demonstrate **Solving, Analyzing,** and **Reflecting** when they:
	
	Analyze: The student can
	• Reflect on the reasonableness of a solution in relation to the original problem/scenario
	• Explore an alternative approach
	• Select an alternative approach to solve the problem
		Students are expected to know the following:
		• **number concepts to 100**
		• **benchmarks** of 25, 50, and 100 and personal referents
		• addition and subtraction **facts to 20** (introduction of computational strategies)
		• **addition and subtraction to 100**
		• repeating and increasing **patterns**
		• **change in quantity**, using pictorial and symbolic representation
		• symbolic representation of equality and inequality
		• **direct linear measurement**, introducing standard metric units
		• multiple attributes of **2D shapes and 3D objects**
		• **pictorial representation** of concrete graphs, using one-to-one correspondence
		• likelihood of **familiar life events**, using comparative language
		• **financial literacy** — coin combinations to 100 cents, and spending and saving
			A Proficient Grade 2 student:
			
			Number sense: Whole number concepts
			
			Can [for numbers up to 100]:
			• Compare and order numbers to make sense of quantities
			• **Skip-count** by 2, 5, and 10, using different starting points
			• Backward **skip count**
			• Identify surrounding numbers (+1, +2, and +10, -1, -2, and -10)
			• Recognize if a number is odd or even and explain why (concept of pairs: even numbers can be decomposed to pairs)
			• Estimate the number of objects in a set up to 100 by **decomposing** the set into smaller sets or using **referents/benchmarks**
			• Understand **place value** as the relationship between the digits within a number and their value, to 99 (e.g., the digit 4 in 49 has the value of 40)
			  ○ Understand how numbers can be decomposed into 10s and 1s. (e.g. 47 is 4 tens and 7 ones, 100 is 10 tens OR 100 ones)
			  ○ Visually represent place value concepts in **concrete, pictorial, and symbolic forms** such as using base-10 blocks or expanded form of numbers
			
			Operational sense: Knowledge and fluency of math facts, Understanding of operations
			
			Can:
			• Develop addition and subtraction fact fluency for numbers up to 20 using a variety of **strategies**
			• Represent and observe patterns in numbers up to 20 using tools and strategies such as a 10 frame or using manipulatives
			• Begin to use **computational and mental math strategies**
			• Solve addition and subtraction problems with sums up to 100
			• Visually represent adding and subtracting to 100 using **concrete, pictorial, and symbolic** forms.
			• Estimate sums and differences to 100
			• Apply an understanding of addition and subtraction to 100 to solve **contextual problems**
			• Choose an appropriate operation and strategy to solve a **contextual problem**

Grade 2 – Math Proficiency Profile

• 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	Can demonstrate **Communicating** and **Representing** when they: **Communicate:** The student can • Represent the problem-solving process, using familiar tools (e.g., manipulatives, symbols, graphic organizers, charts) • Outline their problem-solving approach, using familiar mathematical language • Describe one problem-solving decision and a supporting reason		**Algebraic thinking:** Patterning and Algebraic thinking Can: • Identify the **core** of patterns and the relationship between elements within a pattern • Represent pattern rules in symbolic forms, e.g. Using letter codes like ABBABBABB • Predict elements of and extend a pattern using reasoning • Explore repeating patterns in **concrete, pictorial, and symbolic forms** (e.g. using manipulatives, sounds, actions, numbers 0 to 100, colours, shapes, and in the real world) • Explore complex repeating patterns (e.g., positional patterns, circular patterns) • Explore increasing numerical patterns in **concrete, pictorial, and symbolic forms** (e.g., skip-counting by 2s or 5s on a hundred chart) • Use **symbols of equality and inequality (< > = ≠).** Understand that equal quantities can be made in different ways, e.g. 14 + 6 = 3 + 17 • Describe **change tasks** and explain reasoning • Explore and describe **equivalents** in the real world (connection to measurement, e.g. 1 m = 100 cm) **Spatial understanding**: Measurement, 2D shapes and 3D objects, Measuring shapes and describing position Can: • Use standard metric units (e.g. millimeter, liter, gram) to accurately measure and record the length, width, height, mass, or capacity of an object • Estimate the length, height, and width of an object, using standard metric units (centimeters and millimeters) • Identify, describe, and sort **2D shapes** and **3D objects** using **attributes** and explain their thinking • Identify 2D shapes as part of 3D objects (e.g. the face of a cube is a square) • Compose and decompose larger 2D shapes and 3D objects by using smaller shapes (e.g. slicing a round loaf of bread into ovals) by drawing, using digital technology or manipulatives like tangrams • Use mathematical vocabulary to describe **attributes** of shapes • Explore 2D shapes and 3D objects in the real world (e.g. bentwood box, pit houses, soccer ball, boxes, cans, dice) • Connect qualitative, positional language (e.g. up and down, in and out) with quantitative language (e.g. measurements with metric units)

Grade 2 – Math Proficiency Profile

			Collecting and Representing Data: Graphs and visual representations, Probability Can: ● Collect data to make sense of the world around them ○ Record data using tally marks or manipulatives ○ Represent information on a graph using **one-to-one correspondence** ○ Represent data using different representations (e.g. bar graphs, pictographs, tally charts) ○ Interpret results by making quantitative comparisons (e.g. 8 more people liked skipping than running) ● Describe the likelihood of familiar life events such as the chance of seeing an eagle, using comparative language related to probability (e.g., certain, uncertain; more, less, or equally likely) with supportive reasoning **Financial Literacy**: Currency and Financial planning and decision making Can: ● Identify and name the value of Canadian coins (nickels, dimes, loonies, quarters, toonies) ● Count the value of a mixed set of coins ● Create different combinations of coins to make 100 cents ● Solve simple addition and subtraction questions during financial role playing by using a variety of coins ● Explore the concepts of spending and saving ● Make connections to concepts such as ○ Roles, responsibilities, and jobs in the community (Career Education) ○ Integrating the concept of wants and needs (Core Competencies)

Foundational Proficiency Descriptors - Definitions

<u>Number Sense:</u>
Whole Number Concepts: Students develop an understanding that numbers can represent a quantity. They also learn how to communicate numbers:

- symbolically (ie writing numerals)
- orally (ie counting out loud)
- visually (ie tally marks or manipulatives such as base-10 blocks)

As students move to higher grades, they investigate relationships and patterns between numbers such as concepts of place value to be able to fluently add, subtract, multiply, and divide.
are numbers that represent an amount or quantity that is not a whole number**.** Fractions, decimals, percentages, and ratios can also represent part of an area or part of a set of objects.
Definitions:
Decompose: Breaking down a number or shape into smaller or simpler parts. For example, 12 = 10 + 2.
Referents: concrete object or objects that can be used to help with an estimate. For example, if I know the distance between my wrist and my elbow is about 30 cm (the length of a ruler) then I can estimate that the desk is about 60 cm in height.

Grade 2 – Math Proficiency Profile

Benchmarks: standard or reference numbers that are easy to comprehend and use in mathematics, such as 5, 10, 100, 1000, 25, 50
Concrete forms: manipulatives such as 10 frames, base 10 blocks, counters
Pictorial forms: pictures, graphs
Symbolic forms: numerals, tallies, mathematical notation such as <. >, =
Place value: the relationship between the digits within a number and their value, e.g., the digit 4 in 49 has the value of 40
Skip counting: method of counting in which students add a number to the previous number. For example, skip counting by 5, starting at 0 is 0, 5, 10, 15, …

<u>Operational sense:</u>
Knowledge and fluency of math facts: Students are introduced to and practice **math facts** (quick and accurate knowledge of addition/subtraction and multiplication/division facts) to build arithmetic fluency. **Fact fluency** (accurate, efficient and flexible knowledge of math facts) based on whole number understanding (ie multiplication is repeated addition, or number patterns) is encouraged rather than memorization of discrete facts. Various visual and oral methods (such as a hundred chart or multiplication table, using manipulatives, or skip counting) should be utilized in the classroom.
Definitions:

Decompose: Breaking down a number or shape into smaller or simpler parts. For example, 12 = 3 x 4 or 3 groups of 4
Benchmarks: standard or reference numbers that are easy to comprehend and use in mathematics, such as 5, 10, 100, 1000, 25, 50
Referent: A known or familiar quantity that is used to help estimate or understand other quantities. (e.g. A baseball bat could be used to show the length of a metre)
Concrete forms: manipulatives such as 10 frames, base 10 blocks, counters
Pictorial forms: pictures, graphs
Symbolic forms: numerals, tallies, mathematical notation such as <. >, =

Strategies:
Computational and mental math strategies: counting on and counting back, doubles and related doubles, making 10, bridging over 10, decomposing, using known facts, (aka 10-pairs, friendly numbers), benchmarks of 5 and 10, **commutative property**, skip counting and estimation

- **Bridging over:** A mental math strategy used to simplify addition and subtraction, by "bridging" to the closest whole number, typically a group of ten. (Ex. 8+5. The 8 can be "bridged" to 10 by adding 2. Then, just add the remaining 3)
- **Skip counting:** method of counting in which students add a number to the previous number. For example, skip counting by 5, starting at 0 is 0, 5, 10, 15, …
- **Fact families:** A group of related math facts (Ex. 2 + 3 = 5 and 5 – 2 = 3)
- **Commutative property:** the order of the numbers in an addition equation does not change the sum, ie 3 + 5 = 5 + 3 = 8
- **Oral strategies:** stories, songs, poems, picture books

Understanding of Operations: The development and practice of multiple strategies builds flexibility in doing arithmetic operations as students apply and select strategies to use in different contexts. Operational understanding builds on fluency in math facts and requires an understanding of concepts such as place value to be able to add, subtract, multiply, and divide larger numbers beyond known math facts.
Definitions:
Contextual problem/experience: a problem that is set within a real-world or practical situation, requiring students to apply mathematical concepts to solve it. Students identify and apply the best mathematical strategy to fit the context based on their current knowledge and available tools.
Strategies:
Addition: Develop and use multiple computational and mental math strategies with two-digit numbers such as decomposing and composing 10s and 1s, making 10 to the nearest decade number, bridging over 10s, decomposing by place value (eg 48 + 37: 40 + 30 = 70, 8 +7 = 15, 70 +15 = 85), compensation (eg: 27 + 39 is the same as 26 + 40 = 66), using benchmark numbers (ie 25 + 32 is the same as 25 + 25 + 7 = 57), using counters, base ten blocks, ten frames, number lines, and hundred charts as tools to add numbers within 100
Subtraction: Develop and use multiple computational and mental math strategies with two-digit numbers such as adding up to find the difference (eg 64-27: 27+ 3 = 30, 30+ 30= 60, 60+ 4 = 64), using an open number line or hundred chart, decomposing (eg 87 – 52, decomposing 52 into 50 and 2, compensation, using counters, base ten blocks, ten frames, number lines, and hundred charts as tools to subtract numbers within 100

<u>Algebraic Thinking:</u>

Grade 2 – Math Proficiency Profile

Patterning: Noticing repetition in patterns helps students develop skills to observe, identify, and classify, and supports developing prediction skills.
Definitions:
Core: repeating element in a pattern
Attribute: description of elements in a pattern, such as colour, shape, size, number/letter/symbol, object, direction, position

Algebraic Thinking: Algebraic thinking includes recognizing and analyzing patterns, studying and representing relationships between numbers and in context, making generalizations, and analyzing change. Students also explore concepts and symbols of equality
Definitions:
Symbols of equality and inequality: The = sign means "the same as", e.g. 4 + 6 = 3 + 7. elements on both sides of the = sign are balanced regardless of size or shape
Change tasks: demonstrating changing a quantity using concrete, pictorial, and symbolic models (e.g. using manipulatives, showing changing 8 to 12 objects by adding 4 objects)
Concrete forms: manipulatives such as counters, loose parts, or blocks
Pictorial forms: pictures, drawings, artwork
Symbolic forms: numbers, letters, symbols

<u>Spatial Understanding:</u>
Measurement: Measurements can use standard units (established systems such as metric) and/or non-standard units (ie using hands or blocks to measure height). Comparisons can be descriptive (qualitative) or numerical (quantitative). Includes concepts of time.

2D shapes and 3D objects: Noticing attributes of shapes helps students develop skills to observe, identify, classify, and supports developing creation skills.
Definitions:
Basic 2D shapes: circle, square, rectangle, triangle, heart, diamond
3D objects: sphere, cone, cube, rectangular prism, pyramid
Attributes: Size, shape, colour, faces, edges, vertices

<u>Collecting and Representing Data:</u>
Graphs and visual representations: Graphs help to visually represent observations and data. Students build proficiency in inferring information from graphs and collecting data to represent in various types of graphs.
Definitions:
One to one correspondence: on a pictograph, where each picture symbol corresponds to one unit of data
Teaching strategy: daily graph such as class graph of favourite food or transportation to school
Probability: Students discuss the likelihood of an event using language of probability, such as unlikely or likely (e.g., could it snow tomorrow?). As students move to higher grades they will begin to use more numerical (quantitative) terms such as describing probability with fractions, decimals, percentages, and ratios.

<u>Financial Literacy:</u>
Currency: Identifying, understanding the value of, and combining coins and bills fluently, with an emphasis on Canadian currency

Financial Planning and Decision Making: Concepts of earning, saving, spending, and making financial plans and decisions

Grade 3 – Math Proficiency Profile

Curricular Competencies (Do)	Cross-Curricular Numeracy Proficiency Descriptors	Content (Know)	Math Foundational Skills Proficiency Descriptors
Learning Standard – Required	***What does proficient student learning look like when students DO the Curricular Competencies?***	***Learning Standard - Required***	***What does proficient student learning look like when students KNOW the Content Learning Standards?***

Students are expected to do the following:
 	
Reasoning and analyzing
• Use reasoning to explore and make connections
• **Estimate reasonably**
• Develop **mental math strategies** and abilities to make sense of quantities
• Use **technology** to explore mathematics
• **Model** mathematics in contextualized experiences
 	
Understanding and solving
• Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving
• Visualize to explore mathematical concepts
• Develop and use **multiple strategies** to engage in problem solving
• 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
• **Communicate** mathematical thinking in many ways
• Use mathematical vocabulary and language to contribute to mathematical discussions
• **Explain and justify** mathematical ideas and decisions
• Represent mathematical ideas in **concrete, pictorial, and symbolic forms**
 	
Connecting and reflecting
• **Reflect** on mathematical thinking
	A Proficient Grade 3 student:
	
	Can demonstrate **Reasoning, Understanding, and Connecting** when they:
	
	Interpret: The student can
	• Make personal connections to explore the problem
	• Identify and gather most of the significant information from the presented problem to assist in solving it
	• Identify most of the clearly defined parameters needed to solve the problem
	
	Can demonstrate **Understanding** and **Solving** when they:
	
	Apply: The student can
	• Identify the mathematical competencies and content needed to solve the problem
	• Represent the mathematical problem, using concrete materials, diagrams, and/or some familiar equations
	• Develop a basic plan of approach, using familiar mathematical tools and/or strategies
	
	Can demonstrate **Solving** and **Analyzing** when they:
	
	Solve: The student can
	• Estimate reasonably within identified parameters, using benchmarks and information from the scenario
	• Find a solution by applying familiar mathematical tools and/or strategies
	• Verify the accuracy of their solution, using familiar mathematical strategies and/or by comparing with their estimate
	
	Can demonstrate **Solving, Analyzing,** and **Reflecting** when they:
	
	Analyze: The student can
	• Reflect on the reasonableness of a solution in relation to the original problem/scenario
		Students are expected to know the following:
		• **number concepts to 1000**
		• **fraction concepts**
		• **addition and subtraction** to 1000
		• addition and subtraction facts to 20 (emerging **computational fluency**)
		• **multiplication and division** concepts
		• increasing and decreasing **patterns**
		• **pattern rules** using words and numbers, based on concrete experiences
		• one-step addition and subtraction **equations** with an unknown number
		• measurement, using **standard units** (linear, mass, and capacity)
		• **time** concepts
		• construction of **3D shapes**
		• **one-to-one correspondence** with bar graphs, pictographs, charts, and tables
		• likelihood of **simulated events**, using comparative language
		• **financial literacy** — fluency with coins and bills to 100 dollars, and earning and payment
			A Proficient Grade 3 student:
			
			Number sense: Whole number concepts, fractions, decimals, percentages, and ratio concepts
			
			Can [for numbers up to 1 000]:
			• Compare and order numbers to make sense of quantities
			• **Skip-count** by 2, 5, and 10, using different starting points
			• Backward **skip count**
			• Recognize if a number is odd or even and explain why (concept of pairs/dividing by 2: even numbers can be divided into 2 equal groups)
			• Estimate the number of objects in a set up to 1000 by **decomposing** the set into smaller sets or using **referents/benchmarks**
			• Understand **place value** as the relationship between the digits within a number and their value, to 999 (e.g., the digit 4 in 342 has the value of 40 ones or 4 tens) to make sense of quantities
			  ○ Understand how numbers can be decomposed into 100s, 10s and 1s. (i.e. 140 is 14 tens OR 140 ones or 1 hundred, 4 tens and 0 ones)
			  ○ Use **concrete, pictorial, and symbolic forms** of number to explore place-value based counting patterns (e.g. counting by 10s, 100s)
			  ○ Understand the role of zero as a placeholder (e.g. 701 means that there are 0 tens)
			  ○ Explore patterns in base-10 numbers (e.g. six 10s is 60, six 100s is 600)
			  ○ Expanded form (e.g. 123 = 100 + 20 + 3)
			• Understand that **fractions** can represent parts of a whole or parts of a set (e.g. 2 out of 15 buttons are blue).
			• Visually represent a fraction in **concrete** (e.g. measuring cups for baking), **pictorial** (e.g. on a number line), and **symbolic** (e.g. ½) forms
			
			Operational sense: Knowledge and fluency of math facts, Understanding of operations
			
			Can:
			• Develop an understanding of, accuracy, and fluency in addition and subtraction facts for numbers up to 20 using a variety of **strategies**

Grade 3 – Math Proficiency Profile

• 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
	• Explore alternative approaches
	• Select an alternative approach to solve the problem
	
	Can demonstrate **Communicating** and **Representing** when they:
	
	Communicate: The student can
	
	• Represent processes and solution by selecting and using reasonable tools (e.g., table, manipulative, graphic organizer, array, model)
	• Describe their problem-solving approach, using familiar mathematical language
	• Describe their problem-solving decisions and supporting reasons
			• Use **oral**, **concrete, pictorial, and symbolic** representations of math facts up to 20.
			• Proficiently use **computational and mental math strategies**
			• Solve addition and subtraction problems with sums up to 1 000
			• Visually represent adding and subtracting to 1 000 using **concrete, pictorial, and symbolic** forms .
			• Estimate sums and differences to 1 000
			• Apply an understanding of addition and subtraction to 1 000 to solve **contextual problems**
			• Choose an appropriate operation and strategy to solve a **contextual problem**
			• Visually represent multiplication as groups of equal numbers of objects, arrays, repeated addition, **skip counting** mentally or using a number line or hundred chart
			• Visually represent division as equal sharing, grouping, repeated subtraction, backwards **skip counting**
			• Understand that multiplication and division are related/opposite operations (e.g. Fact families such as 2 x 7 = 14 and 14 / 7 = 2)
			
			Algebraic thinking: Patterning and Algebraic thinking
			
			Can:
			• Represent pattern rules in symbolic forms, e.g. using letter codes like ABCABCABC and extend a pattern using reasoning
			• Explore complex repeating patterns (e.g., positional patterns, circular patterns)
			• Explore increasing and decreasing numerical patterns in **concrete, pictorial, and symbolic forms** (e.g., skip-counting by 2s or 5s on a hundred chart)
			• Solve one-step addition and subtraction equations with an unknown number
			• Make connections to change in quantity e.g.:
			  ○ Start unknown (e.g., n + 15 = 20 or □ + 15 = 20)
			  ○ Change unknown (e.g., 12 + n = 20 or 12 + □ = 20)
			  ○ Result unknown (e.g., 6 + 13 = n or 6 + 13 = □)
			
			Spatial understanding: Measurement, 2D shapes and 3D objects, Measuring shapes and describing position
			
			Can:
			• Make connections between the metric system to place value concepts and base-10

Grade 3 – Math Proficiency Profile

			• Estimate measurements, using standard metric units and by using referents (e.g., If this cup holds 100 millilitres, about how much does this jug hold?)
			• Understand units of time (e.g., second, minute, hour, day, week, month, year). Telling time is not expected at this level.
			• Understand important relationships/conversions between units of time: 1 minute = 60 seconds; 1 hour = 60 minutes; 1 hour = 3600 seconds; 1 day = 24 hours; 1 week = 7 days
			• Estimate time using environmental references such as natural daily/seasonal cycles, weather patterns. Explore calendar systems from around the world
			• Identify, describe, and sort **2D shapes** and **3D objects** using mathematical vocabulary for **attributes** and explain their thinking
			• Identify 3D objects according to the 2D shapes of the faces, and the number of edges and vertices
			• Understand the **preservation of shape**
			• Explore 3D skeletons (shape representation without the faces) and nets (3D object representation if laid flat)
			• Explore 2D shapes and 3D objects in the real world (e.g. bentwood box, pit houses, soccer ball, boxes, cans, dice)
			• Measure an area using square units (e.g. with printed blocks or interlocking cubes). Connect area measurement to concepts of multiplication e.g. arrays
			• Understand the concepts of perimeter, area, and circumference (the distance around); use of a formula or pi for calculations is not intended at this level
			
			Collecting and Representing Data: Graphs and visual representations, Probability
			
			Can:
			• Collect data, create a graph, and describe, compare, and discuss the results
			  ○ Record data using a chosen method such as tally marks, numerals, or manipulatives
			  ○ Represent information on a graph using **one-to-one correspondence**
			  ○ Represent data using different representations (bar graphs, pictographs, tally charts)
			  ○ Interpret and discuss results by making quantitative comparisons (e.g. 4 people like broccoli, 7 people like brussels sprouts, and 10 people like carrots best. Therefore our class's favourite vegetable is carrots)

Grade 3 – Math Proficiency Profile

			• Choose a suitable graph or visual to represent the data (e.g. bar graphs are used to compare things between different groups or to track changes over time; pictographs are used to express large amounts of information in a simple manner as it is easy to read)
			• Describe the likelihood of simulated events (such as a coin toss), using comparative language related to probability (e.g., certain, uncertain; more, less, or equally likely)
			• Develop an understanding of chance through experimentation (e.g., tossing a coin creates a 50-50 chance of landing a head or tail; drawing from a bag, using spinners, and rolling dice all simulate probability events)
			
			Financial Literacy: Currency and Financial planning and decision making
			
			Can:
			• Count the value of mixed combinations of coins and bills up to $100
			• Solve simple addition and subtraction questions during financial role playing by using a variety of coins and bills. Make connections to addition and subtraction up to 100 and explain their thinking process.
			• Understand and explore the concept that payments can be made in flexible ways (e.g., cash, cheques, credit, electronic transactions, trading goods and services)
			• Understand and explore the concept that there are different developmentally and contextually appropriate ways of earning money to reach a financial goal (e.g., recycling, holding bake sales, selling items, walking a neighbour's dog)
			• Make connections to concepts such as
			  ○ Roles, responsibilities, and jobs in the community (Career Education)
			  ○ Integrating the concept of wants and needs (Core Competencies)
			  ○ Trading and forms of currency in First Peoples history (Social Studies)

Foundational Proficiency Descriptors - Definitions
<u>Number Sense:</u> **Whole Number Concepts:** Students develop an understanding that numbers can represent a quantity. They also learn how to communicate numbers: • symbolically (ie writing numerals) • orally (ie counting out loud) • visually (ie tally marks or manipulatives such as base-10 blocks) As students move to higher grades, they investigate relationships and patterns between numbers such as concepts of place value to be able to fluently add, subtract, multiply, and divide. are numbers that represent an amount or quantity that is not a whole number**.** Fractions, decimals, percentages, and ratios can also represent part of an area or part of a set of objects.

Grade 3 – Math Proficiency Profile

Definitions:
Decompose: Breaking down a number or shape into smaller or simpler parts. For example, 12 = 10 + 2.
Referents: concrete object or objects that can be used to help with an estimate. For example, if I know the distance between my wrist and my elbow is about 30 cm (the length of a ruler) then I can estimate that the desk is about 60 cm in height.
Benchmarks: standard or reference numbers that are easy to comprehend and use in mathematics, such as 5, 10, 100, 1000, 25, 50
Concrete forms: manipulatives such as 10 frames, base 10 blocks, counters
Pictorial forms: pictures, graphs
Symbolic forms: numerals, tallies, mathematical notation such as <. >, =
Place value: the relationship between the digits within a number and their value, e.g., the digit 4 in 49 has the value of 40
Skip counting: method of counting in which students add a number to the previous number. For example, skip counting by 5, starting at 0 is 0, 5, 10, 15, …
Fractions: quantities that are not a whole number. The denominators of fractions represent equal-sized portions of a whole or unit and the numerators represent the number of portions within the fraction. For example, 2/3 represents 2 portions out of a whole that has been divided into 3 portions.

<u>Operational sense:</u>
Knowledge and fluency of math facts: Students are introduced to and practice **math facts** (quick and accurate knowledge of addition/subtraction and multiplication/division facts) to build arithmetic fluency. **Fact fluency** (accurate, efficient and flexible knowledge of math facts) based on whole number understanding (ie multiplication is repeated addition, or number patterns) is encouraged rather than memorization of discrete facts. Various visual and oral methods (such as a hundred chart or multiplication table, using manipulatives, or skip counting) should be utilized in the classroom.
Definitions:

Decompose: Breaking down a number or shape into smaller or simpler parts. For example, 12 = 3 x 4 or 3 groups of 4
Benchmarks: standard or reference numbers that are easy to comprehend and use in mathematics, such as 5, 10, 100, 1000, 25, 50
Referent: A known or familiar quantity that is used to help estimate or understand other quantities. (e.g. A baseball bat could be used to show the length of a metre)
Concrete forms: manipulatives such as 10 frames, base 10 blocks, counters
Pictorial forms: pictures, graphs
Symbolic forms: numerals, tallies, mathematical notation such as <. >, =

Strategies:
Computational and mental math strategies: counting on and counting back, doubles and related doubles, making 10, bridging over 10, decomposing, using known facts, (aka 10-pairs, friendly numbers), benchmarks of 5 and 10, **commutative property**, skip counting and estimation

- **Bridging over:** A mental math strategy used to simplify addition and subtraction, by “bridging” to the closest whole number, typically a group of ten. (Ex. 8+5. The 8 can be “bridged” to 10 by adding 2. Then, just add the remaining 3)
- **Skip counting:** method of counting in which students add a number to the previous number. For example, skip counting by 5, starting at 0 is 0, 5, 10, 15, …
- **Fact families:** A group of related math facts (Ex. 2 + 3 = 5 and 5 – 2 = 3)
- **Commutative property:** the order of the numbers in an addition equation does not change the sum, ie 3 + 5 = 5 + 3 = 8
- **Oral strategies:** stories, songs, poems, picture books

Understanding of Operations: The development and practice of multiple strategies builds flexibility in doing arithmetic operations as students apply and select strategies to use in different contexts. Operational understanding builds on fluency in math facts and requires an understanding of concepts such as place value to be able to add, subtract, multiply, and divide larger numbers beyond known math facts.
Definitions:
Contextual problem/experience: a problem that is set within a real-world or practical situation, requiring students to apply mathematical concepts to solve it. Students identify and apply the best mathematical strategy to fit the context based on their current knowledge and available tools.
Strategies:

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Addition: Develop and use multiple computational and mental math strategies with two-digit numbers such as decomposing and composing 100s, 10s and 1s, making 10 to the nearest decade number, bridging over 10s or 100s, decomposing by place value (eg 48 + 37: 40 + 30 = 70, 8 +7 = 15, 70 +15 = 85), compensation (eg: 27 + 39 is the same as 26 + 40 = 66), using benchmark numbers (ie 25 + 32 is the same as 25 + 25 + 7 = 57), using counters, base ten blocks, ten frames, number lines, and hundred charts as tools to add numbers within 100
Subtraction: Develop and use multiple computational and mental math strategies with two-digit numbers such as adding up to find the difference (eg 64-27: 27+ 3 = 30, 30+ 30= 60, 60+ 4 = 64, therefore 64 – 27 = 3+30+4=37), using an open number line or hundred chart, decomposing (eg 87 – 52, decomposing 52 into 50 and 2, compensation, using counters, base ten blocks, ten frames, number lines, and hundred charts as tools to subtract numbers within 100
Multiplication: Concrete and pictorial representations of multiplication and division, explore patterns in numbers on a hundred chart; multiplication and division in the real world such as sharing of resources
Students' use of strategies which utilize an understanding of place value (e.g. partial quotient or area model) develop and practice both number sense and computational understanding. These strategies are encouraged, rather than teaching traditional algorithms which rely on digit math and memorization of an algorithm (e.g. long division). Students can explore alternate strategies via whole-class number talks and evaluate the pros and cons of different strategies for different problems

<u>Algebraic Thinking:</u>
Patterning: Noticing repetition in patterns helps students develop skills to observe, identify, and classify, and supports developing prediction skills.

Algebraic Thinking: Algebraic thinking includes recognizing and analyzing patterns, studying and representing relationships between numbers and in context, making generalizations, and analyzing change. Students also explore concepts and symbols of equality
Definitions:
Symbols of equality and inequality: The = sign means "the same as", e.g. 4 + 6 = 3 + 7. elements on both sides of the = sign are balanced regardless of size or shape
Change tasks: demonstrating changing a quantity using concrete, pictorial, and symbolic models (e.g. using manipulatives, showing changing 8 to 12 objects by adding 4 objects)
Concrete forms: manipulatives such as counters, loose parts, or blocks
Pictorial forms: pictures, drawings, artwork
Symbolic forms: numbers, letters, symbols
Strategies: visualize the change in quantity by using a ten-frame, hundred chart, manipulatives, counting on, math facts

<u>Spatial Understanding:</u>
Measurement: Measurements can use standard units (established systems such as metric) and/or non-standard units (ie using hands or blocks to measure height). Comparisons can be descriptive (qualitative) or numerical (quantitative). Includes concepts of time.

2D shapes and 3D objects: Noticing attributes of shapes helps students develop skills to observe, identify, classify, and supports developing creation skills.
Definitions:
Basic 2D shapes: circle, square, rectangle, triangle, heart, diamond
3D objects: sphere, cone, cube, rectangular prism, pyramid
Attributes: Size, shape, colour, faces, edges, vertices
Preservation of shape: the orientation/position of a shape will not change its attributes but will change its appearance

<u>Collecting and Representing Data:</u>
Graphs and visual representations: Graphs help to visually represent observations and data. Students build proficiency in inferring information from graphs and collecting data to represent in various types of graphs.
Definitions:
One to one correspondence: on a pictograph, where each picture symbol corresponds to one unit of data
Teaching strategy: daily graph such as class graph of favourite food or transportation to school, students' heights
Probability: Students discuss the likelihood of an event using language of probability, such as unlikely or likely (e.g., could it snow tomorrow?). As students move to higher grades they will begin to use more numerical (quantitative) terms such as describing probability with fractions, decimals, percentages, and ratios.

Grade 3 – Math Proficiency Profile

<u>Financial Literacy:</u>
Currency: Identifying, understanding the value of, and combining coins and bills fluently, with an emphasis on Canadian currency

Financial Planning and Decision Making: Concepts of earning, saving, spending, and making financial plans and decisions

Grade 4 – Math Proficiency Profile

Curricular Competencies (Do)	Cross-Curricular Numeracy Proficiency Descriptors	Content (Know)	Math Foundational Skills Proficiency Descriptors
Learning Standard – Required	***What does proficient student learning look like when students DO the Curricular Competencies?***	***Learning Standard - Required***	***What does proficient student learning look like when students KNOW the Content Learning Standards?***

Students are expected to do the following:
 	
Reasoning and analyzing
• Use reasoning to explore and make connections
• **Estimate reasonably**
• Develop **mental math strategies** and abilities to make sense of quantities
• Use **technology** to explore mathematics
• **Model** mathematics in contextualized experiences
 	
Understanding and solving
• Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving
• Visualize to explore mathematical concepts
• Develop and use **multiple strategies** to engage in problem solving
• 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
• **Communicate** mathematical thinking in many ways
• Use mathematical vocabulary and language to contribute to mathematical discussions
• **Explain and justify** mathematical ideas and decisions
• Represent mathematical ideas in **concrete, pictorial, and symbolic forms**
 	
Connecting and reflecting
• **Reflect** on mathematical thinking
	A Proficient Grade 4 student:
	
	Can demonstrate **Reasoning, Understanding, and Connecting** when they:
	
	Interpret: The student can
	• Make general connections to understand the problem in context
	• Gather relevant information from the presented problem to assist in solving it
	• Identify all clearly defined parameters needed to solve the problem
	
	Can demonstrate **Understanding** and **Solving** when they:
	
	Apply: The student can
	• Apply the mathematical understanding needed to partially translate a familiar scenario into a mathematical problem
	• Represent the mathematical problem, using concrete materials, diagrams, and/or some familiar equations
	• Develop a sequence of steps that applies familiar mathematical tools and/or strategies
	
	Can demonstrate **Solving** and **Analyzing** when they:
	
	Solve: The student can
	• Estimate reasonably within identified parameters, using benchmarks and relevant information from the scenario
	• Find a solution by applying familiar mathematical tools and/or strategies
	• Verify the accuracy of their solution, using reasonable estimates and other familiar mathematical strategies
	
	Can demonstrate **Solving, Analyzing,** and **Reflecting** when they:
	
	Analyze: The student can
	• Reflect on the reasonableness of a solution in relation to the original problem/scenario
		Students are expected to know the following:
		
		• **number concepts** to 10 000
		• **decimals to hundredths**
		• ordering and comparing **fractions**
		• **addition and subtraction** to 10 000
		• **multiplication and division** of two- or three-digit numbers by one-digit numbers
		• addition and subtraction of **decimals** to hundredths
		• addition and subtraction facts to 20 (developing **computational fluency**)
		• multiplication and division **facts** to 100 (introductory computational strategies)
		• increasing and decreasing **patterns**, using tables and charts
		• **algebraic relationships** among quantities
		• **one-step equations** with an unknown number, using all operations
		• how to **tell time** with analog and digital clocks, using 12- and 24-hour clocks
		• regular and irregular **polygons**
		• **perimeter** of regular and irregular shapes
		• **line symmetry**
		• **one-to-one correspondence** and many-to-one correspondence, using bar graphs and pictographs
		• **probability experiments**
			A Proficient Grade 4 student:
			
			Number sense: Whole number concepts, Fractions, decimals, percentages, and ratio concepts
			
			Can:
			Numbers up to 10 000
			• Visually represent numbers in **concrete, pictorial, and symbolic forms**
			• Compare and order numbers
			• Use flexible counting strategies (e.g. parts- whole knowledge, benchmark numbers like multiples of 5 and 10, 25s, **skip counting** forwards and backwards)
			• Estimate the number of objects in a set up to 10 000 by **decomposing** the set into smaller sets (**benchmarks**)
			• Understand **place value** as the relationship between the digits within a number and their value, to 9999 (e.g., the digit 4 in 8342 has the value of 40 ones or 4 tens or the digit 8 is worth 8000) to make sense of quantities
			  ○ Understand how numbers can be **decomposed** (i.e. 8342 can be decomposed to 4000 and 4342 or) and connect to expanded form (e.g. 8342 = 800 0+ 300 + 40 + 2)
			  ○ Use **concrete, pictorial, and symbolic forms** of number to explore place-value based counting patterns (e.g., counting by 10s, 100s)
			• Understand the role of zero as a placeholder (e.g. 701 means that there are 0 tens)
			Fractions and decimals to hundredths
			• Visually represent a **fraction** in **concrete, pictorial, and symbolic forms** as part of a whole (part of an area), part of a set, using a number line, or as a part of a standard measurement.
			• Order and compare fractions with the same denominators.
			• Order and compare fractions using visual representations or math vocabulary for fraction benchmarks (e.g, zero, half, whole)
			• Visually represent a **decimal** to hundredths in **concrete, pictorial, and symbolic forms**; as part of a whole (part of an area), part of a set, using a number line, or as a part of a standard measurement.
			• Order and compare decimals to hundredths using visual representations
			• Compose and decompose decimal numbers by connecting decimal place value and whole number place value concepts (e.g. by using models such as base-10 blocks, hundreds chart)

Grade 4 – Math Proficiency Profile

• 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	• Compare and contrast alternative approaches • Identifies and experiments with an alternative approach to solve the problem Can demonstrate **Communicating** and **Representing** when they: **Communicate:** The student can • Represent processes and solution by selecting and using reasonable tools (e.g., model, chart, map, table, graph, chart, array) • Describe their problem-solving approach, using familiar mathematical language • Explain their problem-solving decisions and supporting reasons	• **financial literacy** — monetary calculations, including making change with amounts to 100 dollars and making simple financial decisions	• Use math vocabulary for decimal benchmarks (e.g, tenth, half, hundredth, whole) to make connections to fractions with denominators of 2, 10, and 100 **Operational sense:** Knowledge and fluency of math facts, Understanding of operations Can: **Addition and subtraction facts to 20** • Quickly and accurately recall addition and subtraction facts for numbers up to 20 • Proficiently use **computational and mental math strategies** including additive strategies (joining groups of different sizes) and related/opposite operations (e.g. **fact families** such as 12 + 7 = 19 and 19 – 7 = 12) • Use math facts in a variety of activities such as games, discussions (number talks) and problem solving • Reflect on and adjust thinking, incorporate ideas of others, and explain and justify strategies for addition and subtraction **Multiplication and division facts to 100** • Begin to develop multiplication and division fact fluency for numbers up to 100 using a variety of **strategies** • Quickly and accurately recall the 2s, 5s, 10s multiplication facts • Use **oral, concrete, pictorial, and symbolic** representations of multiplication and division math facts for numbers up to 100. **Addition and subtraction to 10 000** **Addition and subtraction of decimals to hundredths** • Solve addition and subtraction problems with sums up to 10 000 and decimal numbers to the tenths and hundredths • Visually represent adding and subtracting using **concrete, pictorial, and symbolic** forms • Apply understanding of concepts of place value, and composition and decomposition of whole and decimal numbers, to solve addition and subtraction problems • Estimate sums and differences to 10 000 • Apply an understanding of addition and subtraction to solve **contextual problems** • Choose an appropriate operation and strategy to solve a **contextual problem.** Reflect and justify the use of a variety of strategies in problem solving. **Multiplication and division of two- or three-digit numbers by one-digit numbers**

Grade 4 – Math Proficiency Profile

			• Define **multiplication** and **division.** Understand the relationships between multiplication and repeated addition, division and repeated subtraction, and multiplication and division (inverse operations)
			• Visually represent multiplication and division using **concrete, pictorial, and symbolic** forms
			• Understand, analyze, choose, reflect, and justify the use of a variety of **strategies** for multiplication and division. Flexibly use multiple computational strategies
			• Model, understand and explain multiplication by 0 and 1, division by 1, and why division by 0 is not possible
			• Apply an understanding of multiplication and division to solve **contextual problems**. Choose an appropriate operation and strategy to solve a **contextual problem**. Reflect and justify the use of a variety of strategies in problem solving.
			
			Algebraic thinking: Patterning and Algebraic thinking
			Can:
			• Represent changes in patterns using tables, charts, and graphs. Use mathematical vocabulary to describe changes in patterns.
			• Represent pattern rules for increasing and decreasing patterns in **concrete, pictorial, and symbolic forms**
			• Explore more complex repeating, increasing, and decreasing patterns in the real world e.g. salmon counts by season, monthly average temperatures
			• Make connections to patterns and representing changes in patterns using tables, charts, and graphs
			• Explore algebraic relationships by using **ratio tables**
			• Represent and solve one-step equations for all operations involving an unknown number (e.g., ___ + 4 = 15, 15 – □ = 11)
			  ○ Start unknown (e.g., n + 15 = 20; 20 – 15 = □)
			  ○ Change unknown (e.g., 12 + n = 20)
			  ○ Result unknown (e.g., 6 + 13 = __)
			• Explain and justify thinking by using manipulatives or visual representations
			
			Spatial understanding: Measurement, 2D shapes and 3D objects, Measuring shapes and describing position
			
			Can:
			• Understand how to tell time with analog and digital clocks, including using 12 and 24-hour clocks, and the concept of a.m. and p.m.
			• Tell time in five-minute intervals; tell time to the nearest minute

Grade 4 – Math Proficiency Profile

			• Make connections to **skip counting** by 5 and 10 and **base-12** to support telling time with analog clocks
			• Make connections from benchmark fraction vocabulary to time vocabulary (e.g., half past, quarter to)
			• Understand and solve problems using important relationships/conversions between units of time: 1 minute = 60 seconds; 1 hour = 60 minutes; 1 hour = 3600 seconds; 1 day = 24 hours; 1 week = 7 days; 365 days = 1 year
			• Describe and sort regular and **irregular polygons** based on multiple **attributes**
			• Use mathematical vocabulary for **attributes** of shapes including extending descriptive vocabulary such as curved sides, parallel and perpendicular lines, angles
			• Explore polygons in the real world e.g. Indigenous blanket patterns, stop signs, building architecture, classroom windows
			• Measure perimeter and area using manipulatives such as geoboards, pattern blocks, interlocking cubes, base-10 blocks and grids
			• Connect perimeter measurement to addition and area measurement to multiplication
			• Create designs that have a mirror image within them using concrete materials such as pattern blocks
			• Explore shapes in the real world e.g. Indigenous art and engineering such as borders and canoe building, or structures
			
			Collecting and Representing Data: Graphs and visual representations, Probability
			
			Can:
			• Collect data, create a graph, and describe, compare, and discuss the results
			  ○ Record data using a chosen method such as tally marks, counters, or numerals
			  ○ Represent information on a graph using one-to-one correspondence.
			  ○ Represent data using different representations (bar graphs, pictographs, tally charts)
			  ○ Interpret and discuss results by making quantitative comparisons (e.g. average air temperature decreases 10 degrees from October to January) and provide a plausible explanation for why
			• Choose a suitable graph or visual to represent the data (e.g. bar graphs are used to compare things between different groups or to track changes over time; pictographs are used to express large information in a simple manner as it is easy to read)

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			• Understand **many-to-one correspondence** in graphs: one symbol represents a group or value (e.g., on a bar graph, one square may represent five cookies) • Predict single outcomes of simulated events (e.g., using a spinner which lands on a single colour) and explain their thinking • Predict outcomes of **independent events** and **dependent events** and explain their thinking • In probability experiments: record results using tallies, express probabilities as fractions, and compare the relative probability of different events **Financial Literacy**: Currency and Financial planning and decision making Can: • Make financial calculations in real-life contexts using decimal notation • Apply a variety of strategies to calculate totals and make change, such as counting up, counting back, decomposing and rounding to the nearest nickel (base 5), and explain their thinking process • Make simple financial decisions involving earning, spending, saving, and giving • Understand and explore the concept that payments can be made in flexible ways (e.g., cash, cheques, credit, electronic transactions, trades, goods and services) • Understanding that there are different developmentally and contextually appropriate ways of earning money to reach a financial goal (e.g., recycling, holding bake sales, selling items, walking a neighbour's dog)

Foundational Proficiency Descriptors - Definitions

<u>Number Sense:</u>

Whole Number Concepts: Students develop an understanding that numbers can represent a quantity. They also learn how to communicate numbers:

- symbolically (ie writing numerals)
- orally (ie counting out loud)
- visually (ie tally marks or manipulatives such as base-10 blocks)

As students move to higher grades, they investigate relationships and patterns between numbers such as concepts of place value to be able to fluently add, subtract, multiply, and divide.
are numbers that represent an amount or quantity that is not a whole number**.** Fractions, decimals, percentages, and ratios can also represent part of an area or part of a set of objects.

Definitions:

- **Decompose:** Breaking down a number or shape into smaller or simpler parts. For example, 12 = 10 + 2.
- **Referents:** concrete object or objects that can be used to help with an estimate. For example, if I know the distance between my wrist and my elbow is about 30 cm (the length of a ruler) then I can estimate that the desk is about 60 cm in height.
- **Benchmarks:** standard or reference numbers that are easy to comprehend and use in mathematics, such as 5, 10, 100, 1000, 25, 50
- **Concrete forms:** manipulatives such as 10 frames, base 10 blocks, counters
- **Pictorial forms:** pictures, graphs
- **Symbolic forms:** numerals, tallies, mathematical notation such as <. >, =

Grade 4 – Math Proficiency Profile

- **Place value**: the relationship between the digits within a number and their value, e.g., the digit 4 in 49 has the value of 40
- **Skip counting:** method of counting in which students add a number to the previous number. For example, skip counting by 5, starting at 0 is 0, 5, 10, 15, …
- **Fractions:** quantities that are not a whole number. The denominators of fractions represent equal-sized portions of a whole or unit and the numerators represent the number of portions within the fraction. For example, 2/3 represents 2 portions out of a whole that has been divided into 3 portions.

<u>Operational sense:</u>
Knowledge and fluency of math facts: Students are introduced to and practice **math facts** (quick and accurate knowledge of addition/subtraction and multiplication/division facts) to build arithmetic fluency. **Fact fluency** (accurate, efficient and flexible knowledge of math facts) based on whole number understanding (ie multiplication is repeated addition, or number patterns) is encouraged rather than memorization of discrete facts. Various visual and oral methods (such as a hundred chart or multiplication table, using manipulatives, or skip counting) should be utilized in the classroom.
Definitions:

- **Decompose:** Breaking down a number or shape into smaller or simpler parts. For example, 12 = 3 x 4 or 3 groups of 4
- **Benchmarks:** standard or reference numbers that are easy to comprehend and use in mathematics, such as 5, 10, 100, 1000, 25, 50
- **Referent:** A known or familiar quantity that is used to help estimate or understand other quantities. (e.g. A baseball bat could be used to show the length of a metre)
- **Concrete forms:** manipulatives such as 10 frames, base 10 blocks, counters
- **Pictorial forms:** pictures, graphs
- **Symbolic forms:** numerals, tallies, mathematical notation such as <. >, =

Understanding of Operations: The development and practice of multiple strategies builds flexibility in doing arithmetic operations as students apply and select strategies to use in different contexts. Operational understanding builds on fluency in math facts and requires an understanding of concepts such as place value to be able to add, subtract, multiply, and divide larger numbers beyond known math facts.
Definition:

- **Contextual problem/experience:** a problem that is set within a real-world or practical situation, requiring students to apply mathematical concepts to solve it. Students identify and apply the best mathematical strategy to fit the context based on their current knowledge and available tools.

Strategies:
Addition and subtraction

- Use visual models, such as base 10 blocks, place-value mats, grid paper, and number lines
- Connect addition and subtraction of whole numbers to decimal numbers using place value concepts and related strategies\

Multiplication and division: Students' use of strategies which utilize an understanding of place value (e.g. partial quotient or area model) develop and practice both number sense and computational understanding. These strategies are encouraged, rather than teaching traditional algorithms which rely on digit math and memorization of an algorithm (e.g. long division)

- additive strategies (joining groups of different sizes): repeated addition/skip counting and repeated subtraction/skip counting backwards
- multiplicative strategies (groups of): partial quotient (decomposing using repeated subtraction), distributive principle (area model), commutative property (eg A x B = B x A), doubling and halving

<u>Algebraic Thinking:</u>
Patterning: Noticing repetition in patterns helps students develop skills to observe, identify, and classify, and supports developing prediction skills.

Algebraic Thinking: Algebraic thinking includes recognizing and analyzing patterns, studying and representing relationships between numbers and in context, making generalizations, and analyzing change. Students also explore concepts and symbols of equality
Definitions:

- **Equivalents**: quantities that are equal in value, function, amount, or meaning, but not necessarily number, ie 1 m = 100 cm, 4 quarters = 1 loonie
  Ratio table: list of equivalent quantities to help understand the relationship between the quantities (e.g. a t-chart to record the total number of meals eaten at a camp, per day)**Concrete forms**: manipulatives such as counters, loose parts, or blocks
- **Pictorial forms**: pictures, drawings, artwork
- **Symbolic forms**: numbers, letters, symbols

Grade 4 – Math Proficiency Profile

<u>Spatial Understanding:</u>
Measurement: Measurements can use standard units (established systems such as metric) and/or non-standard units (ie using hands or blocks to measure height). Comparisons can be descriptive (qualitative) or numerical (quantitative). Includes concepts of time.
Definition:
Base-12: a number system that uses 12 as the basis for a whole. For example, a clock has 12 numbers with each number representing 1 hour and also 5 minutes (12 x 5 minutes = 60 minutes = 1 hour)
Strategies:

- Make connections to benchmark fractions in a circle/clock (e.g., half past, quarter to), base-12
- Explore First Peoples use of numbers in time and seasons, represented by seasonal cycles and moon cycles (e.g., how position of sun, moon, and stars is used to determine times for traditional activities, navigation)

2D shapes and 3D objects: Noticing attributes of shapes helps students develop skills to observe, identify, classify, and supports developing creation skills.
Definitions:

- **Attributes:** Size, shape, colour, faces, edges, vertices
- **Polygons:** An enclosed 2D shape made up of straight lines
- **Preservation of shape:** the orientation/position of a shape will not change its attributes but will change its appearance
- **Irregular polygons:** 2D shapes in which all sides may not be equal in length or all angles not equal in measure

Measuring shapes and describing position: Concepts of area, perimeter, and symmetry

<u>Collecting and Representing Data:</u>
Graphs and visual representations: Graphs help to visually represent observations and data. Students build proficiency in inferring information from graphs and collecting data to represent in various types of graphs.
Definition:

- **One to one correspondence:** on a pictograph, where each picture symbol corresponds to one unit of data

Teaching strategy: daily graph such as class graph of favourite food or transportation to school, students' heights

Probability: Students discuss the likelihood of an event using language of probability, such as unlikely or likely (e.g., could it snow tomorrow?). As students move to higher grades they will begin to use more numerical (quantitative) terms such as describing probability with fractions, decimals, percentages, and ratios.
Definitions:

- **Independent events**: when the occurrence of one possibility does not affect the occurrence of the next e.g. using spinners, rolling dice, tossing a coin
- **Dependent events:** when the occurrence of one possibility affects the occurrence of the next e.g. in a deck of cards: if a 5 of spades is selected, the probability of selecting another 5 or another spade is reduced

Connection: Dene/Kaska hand games, Slahal stick games

<u>Financial Literacy:</u>
Currency: Identifying, understanding the value of, and combining coins and bills fluently, with an emphasis on Canadian currency

Financial Planning and Decision Making: Concepts of earning, saving, spending, and making financial plans and decisions