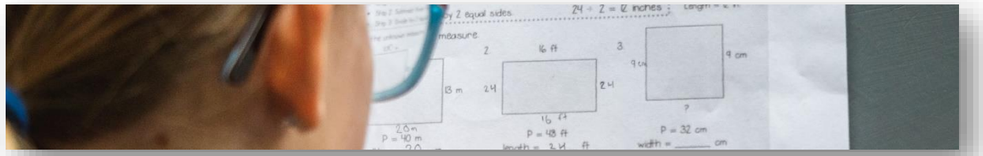
INFORMATION FOR EDUCATORS AND SCHOOL LEADERS

BRITISH COLUMBIA | Ministry of Education and Child Care

K-4 Foundational Math Learning Progressions

PURPOSE

- The K-4 Math Foundational Learning Progressions (the Learning Progressions) help teachers navigate the curriculum and give guidance about what proficient students look like against the K-4 Math content Learning Standards.
- The Learning Progressions provide additional details and clarity for teachers about the Learning Standards in the Mathematics curriculum. While they are based on the curriculum, they do not replace it or teachers' professional expertise about using teaching strategies that best meet the needs of their students.
- The proficiency descriptors in the Learning Progressions align with the curriculum Learning Standards and learning goals for students at the end of the school year, from kindergarten to Grade 4. Teachers might use the Learning Progressions for planning, teaching and classroom assessment.



GUIDING INFORMATION

- Foundational mathematics skills, alongside the learning, practice, and demonstration of math curricular competencies and cross-curricular Numeracy experiences, support students in developing necessary numeracy skills to become educated citizens.
- Most students develop along the proficiency scale continuum throughout the school year. Students may first be assessed as "emerging" or "developing" as they develop towards proficient in the foundational skills, as outlined by the high standards in the Learning Progressions.
- The K-4 Math Foundational Learning Progressions below are organized by skill. The Learning Progression Skills are Number Sense, Computational Fluency, Patterning and Algebraic Thinking, Geometry and Measurement, Data and Probability, and Financial Literacy. These skills align with and support the content learning standards of the Mathematics curriculum.

CURRICULUM-ALIGNED RESOURCES

- Teachers can use instructional strategies and learning resources recommended by professional associations, schools and districts, their own professional development, or outlined here, to help students develop toward end-of-year proficiency.
- See the Teaching and Learning Stories for examples of how current classroom teachers are supporting their students in developing cross-curricular Numeracy skills.

- **COMING SOON:**
  - Teaching and Learning stories showcasing foundational math skills – including samples of proficient student work
  - Further supporting resources in foundational mathematics and Numeracy instructional strategies in support of teachers' requests during the K-4 Foundational Learning Progressions Field Review

WHAT DOES MATH LEARNING LOOK LIKE IN THE CLASSROOM?

- Teachers are professionals who choose the strategies, resources, and applications best suited to the needs of students in their local setting (e.g., embedding mathematics in issues, projects, and passions relevant to the local community).
- Teachers can focus on "hands-on" experiential learning by incorporating the development of foundational skills through opportunities to encounter math in a wide variety of situational contexts. We encourage teachers to utilize instructional strategies in which students:
  - Reason mathematically to solve problems
  - Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving
  - Recognize that there are multiple ways to solve a problem and choose and use effective strategies and tools to solve problems
  - Communicate and reflect on their thinking process and solution using mathematical vocabulary
  - 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
- Observing, learning, and engaging in mathematical thinking empowers us to make sense of our world. Teachers who embed various ways of learning, practicing, and demonstrating mathematical knowledge and skills help students to develop as confident mathematicians who can enjoy and explore math and use math as a tool to unlock other areas of the curriculum.

Email: LearningPathways@gov.bc.ca

Website: https://curriculum.gov.bc.ca

OVERVIEW

A descriptive continuum of proficiency in foundational **MATHEMATICS** skills from Kindergarten through Grade 4.

The grade level proficiency descriptors highlight what key foundational learning may look like for a proficient student in relation to the **MATHEMATICS** curriculum

Each **SKILL** represents the ability to demonstrate a set of foundational math knowledge.

A proficient student must develop, practice, and demonstrate each skill to be proficient.

All skills are important in mathematics learning.

Each **SKILL DESCRIPTOR** provides additional information as to the development within each **SKILL**

Each **SUB-SKILL** further defines each skill

The **DESCRIPTOR** is grade specific and describes what proficient student learning looks like at the end of the year/term

K-4 Foundational Math Learning Progressions

Skill: Number Sense

Students with proficient Number Sense think flexibly and fluently. Number Sense is an understanding of numbers, ways of representing numbers, relationships among numbers, and making sense of numbers and quantities. It is developed through engaging in rich mathematical tasks in which students represent numbers in concrete, pictorial, and symbolic ways.

Sub-skill	Proficiency Descriptor *(for the end of the school year)*				
	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
Whole Number Concepts *Students develop an understanding that numbers can represent a quantity. They also learn how to communicate with and about numbers. 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.*	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, cardinality) ◦ A group of up to 10 objects which has been rearranged (conservation) • Represent the number of objects in a set in concrete, pictorial, and symbolic forms (e.g., using interlocking cubes, natural materials, counting on fingers, pictures, or using a numeral), to make sense of quantities • Identify and write the numerals 0-9 • Instantly recognize the number of objects (subitizing) in sets up to 5 (e.g., images, objects, dots, ten frame) *Note: Teachers may find it appropriate to first build number concepts of 5 as a scaffold to*	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, to 20 • 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) • Represent the number of objects in a set in concrete, pictorial, and symbolic forms (e.g., using interlocking cubes, natural materials, loose parts, tally marks, or using a numeral), to make sense of quantities • Write the numbers 0-20 • Instantly recognize the number of objects (subitizing) in sets up to 5 (e.g., images, objects, dots, ten frame)	For numbers up to 100, • Compare and order numbers to make sense of quantities ◦ Skip-count by 2, 5, and 10, to 100, using different starting points ◦ Backward skip count by 5 and 10 ◦ Identify surrounding numbers (+1, +2, and +10, -1, -2, and -10) • Represent numbers in concrete, pictorial, and symbolic forms • Estimate the number of objects in a set up to 100 by decomposing the set into smaller sets or by using referents/benchmarks ◦ Use benchmarks of 10 to support estimation • Recognize if a number is odd or even and explain why (concept of pairs: even numbers can be decomposed to pairs) • 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) ◦ Demonstrate how numbers can be decomposed into 10s and 1s using place value (e.g., 47 is 4 tens and 7 ones, 100 is 10 tens OR 100 ones) • Represent place value concepts in concrete, pictorial, and symbolic forms	For numbers up to 1000, • Compare and order numbers to make sense of quantities ◦ Skip count by 2, 3, 5, 10, 25, 100, using different starting points, to support the skills of repeated addition and learning multiples ◦ Backward skip count by 2, 5, and 10 to support the skill of repeated subtraction • Represent numbers in concrete, pictorial, and symbolic forms • Estimate the number of objects in a set up to 1000 by decomposing the set into smaller sets or by using referents/benchmarks ◦ Use benchmark numbers like multiples of 10, 50, and 100 to support estimation • 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) • 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 ◦ Demonstrate how numbers can be	For numbers up to 10 000, • Compare and order numbers to make sense of quantities ◦ Use flexible counting strategies (e.g., counting up using benchmark numbers like multiples of 5, 10, 25, 50, and 100) • Represent numbers in concrete, pictorial, and symbolic forms • Estimate the number of objects in a set up to 10 000 by decomposing the set into smaller sets or by using referents/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 ◦ Demonstrate how numbers can be flexibly decomposed (i.e., 8342 can be decomposed to 4000 and 4342 or 83 hundreds and 42 ones) ◦ Connect decomposition of numbers to expanded form (e.g., 8342 = 8000 + 300 + 40 + 2) ◦ Understand the role of zero as a

DEFINITIONS provide further explanation for key concepts found in the **foundational proficiency descriptors.**

Number Sense Definitions

Terms are found in multiple aspects and sub aspects. While the definitions are the same, in some instances the examples may vary due to the Aspect and Sub-aspect they are supporting.

Benchmarks: a familiar, measurable quantity used to help estimate or understand other quantities, (e.g., 5, 10, 100, 1000, 25, 50)
Cardinality: knowing that the last number said when counting represents the quantity of objects in a set
Concrete forms: physical objects like manipulatives (e.g., base-10 blocks, counters), natural or found materials, loose parts
Conservation: knowing that the number of objects remains the same despite changing the size of objects or how they are laid out
Decompose: breaking down a number or shape into smaller or simpler parts. For example, 12 = 10 + 2, or breaking down a rectangle into two triangles
Estimate: to approximate a number, calculation, quantity, or measurement based on an educated guess, rounding, or a visual comparison with a referent or benchmark
Expanded form: breaking down numbers as the sum of the digits and their place value, (e.g., 123 = 100 + 20 + 3)
Fractions: numbers which can represent a part of a whole, part of a region, part of a set, or part of a length. The **denominators** of fractions represent equal-sized portions of a whole or unit. The **numerators** represent the number of portions within the fraction. For

K-4 Foundational Math Learning Progressions

Skill: Number Sense

Students with proficient Number Sense think flexibly and fluently. Number Sense is an understanding of numbers, ways of representing numbers, relationships among numbers, and making sense of numbers and quantities. It is developed through engaging in rich mathematical tasks in which students represent numbers in concrete, pictorial, and symbolic ways.

Sub-skill	Proficiency Descriptor *(for the end of the school year)*				
	Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**

Whole Number Concepts
 	
Students develop an understanding that numbers can represent a quantity. They also learn how to communicate with and about numbers. 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.
	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, cardinality**)
	  ○ A group of up to 10 objects which has been rearranged (**conservation**)
	• Represent the number of objects in a set in **concrete, pictorial, and symbolic forms** (e.g., using interlocking cubes, natural materials, counting on fingers, pictures, or using a numeral), to make sense of quantities
	• Identify and write the numerals 0-9
	• Instantly recognize the number of objects (**subitizing**) in sets up to 5 (e.g., images, objects, dots, ten frame)
	
	Note: Teachers may find it appropriate to first build number concepts of 5 as a scaffold to number concepts of 10
		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, to 20
		• 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)
		• Represent the number of objects in a set in **concrete, pictorial, and symbolic forms** (e.g., using interlocking cubes, natural materials, loose parts, tally marks, or using a numeral), to make sense of quantities
		• Write the numbers 0-20
		• Instantly recognize the number of objects (**subitizing**) in sets up to 5 (e.g., images, objects, dots, ten frame)
			For numbers up to 100,
			• Compare and order numbers to make sense of quantities
			  ○ **Skip-count** by 2, 5, and 10, to 100, using different starting points
			  ○ Backward **skip count** by 5 and 10
			  ○ Identify surrounding numbers (+1, +2, and +10, -1, -2, and -10)
			• Represent numbers in **concrete, pictorial, and symbolic forms**
			• **Estimate** the number of objects in a set up to 100 by **decomposing** the set into smaller sets or by using **referents/benchmarks**
			  ○ Use benchmarks of 10 to support estimation
			• Recognize if a number is odd or even and explain why (concept of pairs: even numbers can be **decomposed** to pairs)
			• 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)
			  ○ Demonstrate how numbers can be **decomposed** into 10s and 1s using place value (e.g., 47 is 4 tens and 7 ones, 100 is 10 tens OR 100 ones)
			• Represent place value concepts in **concrete, pictorial, and symbolic forms** (e.g., using base-10 blocks or **expanded form** of numbers)
				For numbers up to 1000,
				• Compare and order numbers to make sense of quantities
				  ○ **Skip count** by 2, 3, 5, 10, 25, 100, using different starting points, to support the skills of repeated addition and learning multiples
				  ○ Backward **skip count** by 2, 5, and 10 to support the skill of repeated subtraction
				• Represent numbers in **concrete, pictorial, and symbolic forms**
				• Estimate the number of objects in a set up to 1000 by **decomposing** the set into smaller sets or by using **referents/benchmarks**
				  ○ Use benchmark numbers like multiples of 10, 50, and 100 to support estimation
				• 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)
				• 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
				  ○ Demonstrate how numbers can be **decomposed** into 100s, 10s and 1s using place value (e.g., 140 is 14 tens OR 140 ones or 1 hundred, 4 tens and 0 ones, 47 is 4 tens and 7 ones OR 3 tens and 17 ones)
				  ○ Represent place value concepts in **concrete, pictorial, and symbolic forms** (e.g., use base-10 blocks to count 10 hundred squares, showing equality to 1 thousand cube)
					For numbers up to 10 000,
					• Compare and order numbers to make sense of quantities
					  ○ Use flexible counting strategies (e.g., counting up using benchmark numbers like multiples of 5, 10, 25, 50, and 100)
					• Represent numbers in **concrete, pictorial, and symbolic forms**
					• Estimate the number of objects in a set up to 10 000 by **decomposing** the set into smaller sets or by using **referents/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
					  ○ Demonstrate how numbers can be flexibly **decomposed** (i.e., 8342 can be decomposed to 4000 and 4342 or 83 hundreds and 42 ones)
					  ○ Connect **decomposition** of numbers to expanded form (e.g., 8342 = 8000 + 300 + 40 + 2)
					  ○ Understand the role of zero as a placeholder (e.g., 701 means that there are 0 tens)

				○ Demonstrate understanding of **expanded form** (e.g., 123 = 100 + 20 + 3) ○ Understand the role of zero as a placeholder (e.g., 701 means that there are 0 tens) • Explore relationships between numbers based on place value (e.g., six 10s is 60, six 100s is 600)	
Fractions and Decimals *Fractions and decimals are numbers which can represent a part of a whole, part of a region, part of a set, or part of a length.*				• Represent fractions in **concrete, pictorial, and symbolic forms** ○ As part of a whole (e.g., $\frac{1}{2}$ of a granola bar), part of a region (e.g., half the room is covered by carpet), part of a set (e.g., 2 out of 15 buttons are blue), or part of a length (e.g., 5/10 cm) ○ Order and compare **unit fractions** (e.g., $\frac{1}{2} > \frac{1}{5}$ granola bar) ○ Understand that the size of the fraction depends on the size of the whole (e.g., half a meter is longer than half a centimeter) • Identify and write fractions in **concrete** (e.g., measuring cups for baking), **pictorial** (e.g., colouring 2 out of 15 buttons blue), and **symbolic** (e.g., ½) forms	**Fractions** • Represent fractions in **concrete, pictorial, and symbolic forms** ○ As part of a whole (e.g., $\frac{1}{2}$ of a granola bar), part of a region (e.g., half the room is covered by carpet), part of a set (e.g., 2 out of 15 buttons are blue), using a number line (e.g., 2 $\frac{1}{2}$ is halfway between 2 and 3), or as a part of a standard measurement (e.g., 5/10 cm) ○ Order and compare fractions with the same denominators (e.g., $\frac{4}{5} > \frac{3}{5} > \frac{1}{5}$) ○ Order and compare fractions with the same numerators (e.g., $\frac{4}{5} > \frac{4}{6} > \frac{4}{8}$) • Identify and write fractions in **concrete** (e.g., measuring cups for baking), **pictorial** (e.g., colouring 2 out of 15 buttons blue), and **symbolic** (e.g., ½) forms. Use mathematical language for fraction benchmarks (e.g, zero, half, whole) **Decimals to hundredths** • Represent a decimal to hundredths in **concrete, pictorial, and symbolic forms** ○ As part of a whole (e.g., $0.50), part of a region (e.g., 1.75 acres), using a number line (e.g., 3.23 is between 3 and 4), or as a part of a standard measurement (e.g., 72.36 kg) ○ Order and compare decimals to hundredths (e.g., highlighting 0.25 vs 0.70 on a hundred square) • Connect mathematical language for decimal benchmarks to fraction form (e.g., *whole* = 1.0 = $\frac{1}{1}$; *half* = 0.50 = $\frac{1}{2}$; *tenth* = $\frac{1}{10}$, three tenths = 0.3 = $\frac{3}{10}$; *hundredth* = $\frac{1}{100}$, 23 hundredths = 0.23 = $\frac{23}{100}$)

Number Sense Definitions

Terms are found in multiple skills and sub skills. While the definitions are the same, in some instances the examples may vary due to the Skill and Sub-skill they are supporting.

Benchmarks: a familiar, measurable quantity used to help estimate or understand other quantities, (e.g., 5, 10, 100, 1000, 25, 50)
Cardinality: knowing that the last number said when counting represents the quantity of objects in a set
Compose/Recompose: building or rebuilding a set of objects or a number from smaller parts. For example, 5 can be made from 1 and 4 or 2 and 3
Concrete forms: concrete materials or physical objects help students learn through actions such as placing, moving, grouping, or splitting objects. Examples include manipulatives (e.g., base-10 blocks, counters), natural or found materials, loose parts
Conservation: knowing that the number of objects remains the same despite changing the size of objects or how they are laid out
Decompose: breaking down a number into smaller parts. For example, 12 = 10 + 2, or 147 can be broken into 100, 40, and 7 OR 14 tens and 7 ones
Estimate: to approximate a number, calculation, quantity, or measurement based on an educated guess, rounding, or a visual comparison with a referent or benchmark
Expanded form: breaking down numbers as the sum of the digits and their place value, (e.g., 123 = 100 + 20 + 3)
Fractions: numbers which can represent a part of a whole, part of a region, part of a set, or part of a length. The **denominators** of fractions represent equal-sized portions of a whole or unit. The **numerators** represent the number of portions within the fraction. For example, $\frac{2}{3}$ represents 2 portions (the numerator) out of a whole that has been divided into 3 portions (the denominator).
One-to-one correspondence: when counting the number of objects in a set, using one number per object for accuracy
Pictorial forms: pictorial forms help students see a model which represents a number. Examples include pictures of counting collections, number lines, tally marks, 10-frames
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)
Referents: a known number of concrete or pictorial representations that can be used for comparison, to help estimate an unknown quantity. For example, a 10-frame (grid consisting of 2 lines of 5 squares) can be used as a referent for amounts less than or more than 5
Skip counting: method of counting in which students add a number to the previous number (also known as multiples). For example, skip counting by 5, starting at 0 is 0, 5, 10, 15, ...
Stable order counting: accurately counting numbers in the correct sequence
Subitize: instantly recognizing how many there are in a set without counting, e.g. knowing the number of dots on dice without counting. Subitizing can usually be done for a group of up to 5 objects
Symbolic forms: symbolic forms are abstract mathematical notations which represent numbers. Examples include numerals, tallies, musical notes, fractions
Unit fractions: fractions with 1 in the numerator, such as $\frac{1}{2}$ or $\frac{1}{5}$. They allow the comparison of the size of fractions (e.g., $\frac{1}{2}$ granola bar > $\frac{1}{5}$ granola bar)

Skill: Computational Fluency (Operations)

Students who are proficient in Computational Fluency understand how operations change numbers. Students are introduced to, learn, and practice math facts (fluent and automatized knowledge of addition/subtraction and multiplication/division equations), and build fact fluency. Students compute fluently by applying known math facts and through the practice of computational and mental math strategies. Students understand how to apply these foundational skills to solve contextual problems.

Sub-skill	Proficiency Descriptor *(for the end of the school year)*				
	Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**
Knowledge and Fluency of Math Facts ***Fact fluency*** *(accurate, efficient and flexible knowledge of math facts) based on conceptual understanding (e.g., whole number concepts, place value concepts, and representing math facts in* ***concrete, pictorial, and symbolic forms****) is encouraged rather than memorization of discrete facts. Rote memorization of facts should not be prioritized at this level.*	• **Compose and decompose** sets of 5 using **concrete, pictorial, and symbolic forms** (e.g., laying out three counters and adding two more) • **Compose and decompose** sets up to 10 using **concrete, pictorial, and symbolic forms** (e.g., showing how a complete 10-frame can be made with 4 and 6 10-frames) • Explore a variety of activities such as games, discussions (e.g., a number talk of ways to make 5) and problem solving • Describe their thinking to others using mathematical language (e.g., more, less, equal, add (join) or subtract (decompose or split)) *Note: In kindergarten, students develop a sense of 5 and 10, including composing and decomposing sets of up to 10 objects. These skills are foundational to the development of both math fact fluency and to the understanding of operations with larger numbers in later grades.*	• **Compose and decompose** sets up to 10 using **concrete, pictorial, and symbolic forms** (e.g., showing how 7 on a 10-frame can be made with 5 and 2 10-frames) • Use **computational and mental math strategies** such as counting on fingers to begin to learn **math facts** up to 10 • Explore a variety of activities such as games, discussions (e.g., a number talk of ways to make 7) and problem solving	• Describe and use **computational and mental math strategies** (e.g., **doubles, making groups of 10**, counting back from a starting number, and knowledge of fact families) to develop addition and subtraction math fact fluency for numbers up to 20 • Explore a variety of activities such as games, discussions (e.g., patterns observed when listing different ways to make 10) and problem solving (connect to Algebraic Thinking)	• Flexibly use a variety of **computational and mental math strategies** (e.g., **doubles, bridging to 10,** knowledge of **fact families**) to demonstrate addition and subtraction math fact fluency for numbers up to 20 • Use **concrete, pictorial, and symbolic forms** to represent math facts in a variety of activities such as games (e.g., card or dice games), discussions (e.g., a number talk of ways to make 17) and problem solving (connect to Algebraic Thinking)	• Flexibly and fluently use a variety of **computational and mental math strategies** (e.g., doubles, bridging to 10, knowledge of fact families) to support the recall of addition and subtraction facts to 20 • Flexibly use a variety of **computational and mental math strategies** (e.g., noticing patterns in multiples like 5s and 10s) to develop multiplication and division math fact fluency for numbers up to 100 ○ Fluently recall the 2s, 5s, 10s multiplication facts • Use **concrete, pictorial, and symbolic forms** (e.g., making arrays with manipulatives or pictures) to represent math facts in a variety of activities such as games (e.g., card or dice games), discussions (e.g., a number talk of ways to make 17) and problem solving (connect to Algebraic Thinking) • Explain strategies used to recall math facts. Reflect on and adjust thinking and incorporate ideas of others

Understanding of Operations
 	
Understanding of operations builds on math fact fluency. It also requires an understanding of concepts such as place value to be able to add, subtract, multiply, and divide larger numbers beyond known math facts. The development and practice of various
	• **Compose and decompose** sets of 5 using **concrete, pictorial, and symbolic forms** (e.g., laying out three counters and adding two more)
	• **Compose and decompose** sets up to 10 using **concrete, pictorial, and symbolic forms** (e.g., showing how a complete 10-frame can be made with 4 and 6 10-frames)
	• Explore a variety of activities such as games, discussions (e.g., a number talk of ways to make 5) and problem solving
	• Describe their thinking to others using mathematical language (e.g., more, less, equal, add (join) or subtract (decompose or split))
		• **Compose and decompose** sets up to 20 using **concrete, pictorial, and symbolic forms** to demonstrate understanding that addition brings sets of objects together and subtraction represents taking away from a set, or the difference between two amounts
		• Demonstrate understanding that addition and subtraction are related/opposite operations (e.g., show **fact families** such as 12 + 6 = 18 and 18 – 6 = 12 by connecting and disconnecting interlocking blocks)
		• Use **computational and mental math strategies** such as **doubles, making groups of 10,** and counting on from a starting number, to demonstrate
			• Demonstrate understanding that addition brings sets of objects together and subtraction represents taking away from a set, or the difference between two amounts, for numbers up to 100
			  ○ Use **computational and mental math strategies** such as **doubles, decomposing** by place value, and **compensating**
			  ○ Represent addition and subtraction using **concrete, pictorial, and symbolic forms** (e.g., **number line, hundred chart**, writing equations for ways to make 12)
				• Demonstrate understanding that addition brings sets of objects together and subtraction represents taking away from a set, or the difference between two amounts, for numbers up to 1000
				  ○ Use **computational and mental math strategies** such as **decomposing** and **recomposing** (regrouping) by place value and **compensating**
				  ○ Represent addition and subtraction using **concrete, pictorial, and symbolic forms** (e.g., base-10 blocks, number line, hundred chart)
				  ○ Estimate sums and differences to 1000
					• Demonstrate understanding that addition brings sets of objects together and subtraction represents taking away from a set, or the difference between two amounts, for numbers up to 10 000 and decimal numbers to the tenths and hundredths
					  ○ Use **computational and mental math strategies** such as **decomposing, recomposing** (regrouping) by place value, and **compensating.** Integrate understanding of Number Sense concepts of place value, and composition and decomposition of whole and decimal numbers

computational and mental math strategies builds flexibility in doing operations and applying these skills to solve contextual problems.	*Note: In kindergarten, students develop a sense of 5 and 10, including composing and decomposing sets of up to 10 objects. These skills are foundational to the development of both math fact fluency and to the understanding of operations with larger numbers in later grades.*	understanding of addition and subtraction for numbers up to 20 • Solve **contextual** addition and subtraction **problems** ○ Choose the appropriate operation and strategy to solve a **contextual problem** ○ Explain their thinking using mathematical language (e.g., "I added the two sets because I needed to see how many I had all together.")	○ Estimate sums and differences to 100 • Solve **contextual** addition and subtraction **problems** ○ Choose the appropriate operation and strategy to solve a **contextual problem** ○ Explain their thinking to others using mathematical language (e.g., "I subtracted because I want to see how many more they have than I have.")	• Solve **contextual** addition and subtraction **problems** which may require more than one step ○ Choose the appropriate operation and strategy to solve a **contextual problem** ○ Explain and justify their strategy and solution to others using mathematical language (e.g., "To solve 954 – 496 I bridged to 500 by adding 4, then I counted by hundreds to 900, then added 54. The answer is 458.") • **Compose and decompose** groups or arrays of objects using **concrete, pictorial, and symbolic forms** to demonstrate understanding that multiplication is the repeated addition of groups of the same size, and division is repeated subtraction of groups of the same size or splitting a group into equal sized shares • Demonstrate understanding that multiplication and division are related/opposite operations (e.g., show **fact families** of conceptual relationships such as 2 groups of 7 objects is 14 in total, and 14 can be split into 2 equal groups of 7; relate forward skip counting to multiples)	○ Represent addition and subtraction using **concrete, pictorial, and symbolic** forms (e.g., base-10 blocks, number line, hundred chart) ○ Estimate sums and differences to 10 000 • Demonstrate understanding of multiplication and division of two- or three-digit numbers by one-digit numbers ○ Use **computational and mental math strategies** such as repeated addition or repeated subtraction, **decomposing,** or **distributive property** ○ Represent multiplication and division using **concrete, pictorial, and symbolic forms** ○ Model, understand and explain multiplication by 0 and 1, division by 1, and why division by 0 is not possible • Solve **contextual problems** which may require more than one step or more than one operation ○ Choose appropriate operations and strategies to solve the problem ○ Explain and justify their strategy and solution to others using mathematical language

Computational Fluency (Operations) Definitions

Terms are found in multiple skills and sub skills. While the definitions are the same, in some instances the examples may vary due to the Skill and Sub-skill they are supporting.

Benchmarks: standard or reference numbers that are easy to comprehend and use in mathematics, (e.g., 5, 10, 100, 1000, 25, 50)
Compose/Recompose: building or rebuilding a number from smaller parts. For example, 5 can be made from 1 and 4 or 2 and 3
Concrete forms: concrete materials or physical objects help students learn through actions such as placing, moving, grouping, or splitting objects. Examples include manipulatives (e.g., base-10 blocks, counters), natural or found materials, loose parts
Contextual problem: 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 operation and strategy to fit the context, and based on their current knowledge and available tools
Decompose: breaking down a number into smaller parts. For example, 12 = 10 + 2, or 147 can be broken into 100, 40, and 7 OR 14 tens and 7 ones
Fact families: sets of related addition/subtraction or multiplication/division math facts such as 12 + 6 = 18 and 18 – 6 = 12, or 2 x 7 = 14 and 14 ÷ 7 = 2. Fact families illustrate how sets can be decomposed and recomposed.
Math facts: fluent and automatized knowledge of addition/subtraction and multiplication/division equations
Pictorial forms: pictorial forms help students see a model which represents a number or operation. Examples include grouping pictures of counting collections or tally marks, jumping back on number lines or 10-frames, or making arrays for multiplication or division
Symbolic forms: symbolic forms are abstract mathematical notations which represent numbers or operations. Examples include numerals, tallies, musical notes, fractions, mathematical notations such as = x ÷ < >

Computational and mental math strategies:
Addition and subtraction strategies

- **Compensating:** bridging to or decomposing to a benchmark or friendly number [ex: 47 + 28 → add 3 to 47 to make 50 (friendly number) → subtract 3 from 28 to compensate = 25 → 50 + 25 = 75]
- **Commutative property:** the order of the numbers in an addition equation does not change the sum, (e.g., 3 + 5 = 5 + 3 = 8)
- **Counting on and counting back:** starting from a number and counting on by the added number or back by the subtracted number
- **Decomposing:** breaking down a number into smaller or simpler parts to support computation. [ex: 47 + 28 → decompose by place value: 47 = 40 + 7; 28 = 20 + 8 → add by place value: 40 + 20 = 60; 7 + 8 = 15 → add total: 60 + 15 = 75]
- **Doubles:** e.g., 3 + 3 = 6, 7 + 7 = 14
- **Friendly numbers**: bridging to or decomposing to a benchmark or friendly number (ex. 7 = 5 + 2, 5 is a "friendly number"). Often used in conjunction compensating, decomposing, or making 10/bridging over 10 strategies
- **Hundred Chart:** jumping along the hundred chart (similar to counting up and counting back) [ex: 47 + 28 → Start at 47, add 20 (move 2 rows down) to 67, then add 8 (move 8 squares to the right) to 75]
- **Making 10/bridging over 10**: "bridging" to the nearest 10 (ex. 8 + 5. The 8 can be "bridged" to 10 by adding 2 out of 5. Then, add the remaining 3 → 8 + 5 = 8 + 2 + 3 = 10 + 3 = 13)
- **Open number line**: jumping along the number line (similar to counting up and counting back) [ex: 47 + 28 → start at 47, jump 20 to 67, jump 3 to 70, jump 5 to 75]
- **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, …

Multiplication and division strategies: The strategies below utilize an understanding of place value and are encouraged. Traditional methods (e.g., long division) can rely on memorization of a procedure and may not effectively demonstrate a true understanding that multiplication is the addition of multiple groups (e.g., 12 x 2 is 2 groups of 10 and 2 groups of 2), and division is splitting a group into equal sized shares (e.g., 36 ÷ 3 can be shown as 30 ÷ 3 shares and 6 ÷ 3 shares)

- **Decomposing:** breaking down a number into smaller or simpler parts to support computation (related to distributive property)
- **Distributive property (partial products):** a way to break down multiplication into smaller steps. Example: 5 x 23 → decompose 23 into 20 and 3 → 5 x 23 = 5 x 20 + 5 x 3 = 115

Skill: Patterning and Algebraic Thinking

Students develop proficient Algebraic Thinking through recognizing patterns and trends, identifying and representing relationships between numbers, making generalizations, and analyzing change.

Sub-skill	Proficiency Descriptor *(for the end of the school year)*				
	Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**
Patterning *Noticing relationships in patterns such as repetition helps students develop skills to observe, identify, and classify, and supports developing prediction skills.*	• Identify the **core** of a pattern consisting of 2 or 3 repeating elements • Sort and classify patterns using a single **attribute** • Identify and describe patterns in the real world (e.g., in art, music, dance, movement, Indigenous beadwork, nature, textiles) • Represent different types of patterns in **concrete, pictorial, and symbolic forms** (e.g., blocks, natural objects; shapes, letters; rhythms, movements)	• Identify the **core** of a pattern consisting of 3 to 5 repeating elements • Describe **attributes** of repeating patterns to identify the pattern rule • Represent a repeating pattern with 2 or more elements in **concrete, pictorial, and symbolic forms** (e.g., blocks, natural objects; shapes, letters; rhythms, movements) ○ 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-orange-blue pattern could be represented by a clap-snap-clap-snap pattern) ○ Predict an element in a repeating pattern	• Identify the **core** of patterns and the relationship between elements within a pattern • Represent repeating patterns with 3 or more elements in **concrete, pictorial, and symbolic forms** (e.g., using blocks, natural objects; numbers; music, movements) ○ Represent **pattern rules** in symbolic forms, (e.g., using letter codes like ABBABBABB) ○ Predict elements of, extend a pattern, and explain their reasoning • Explore complex repeating patterns such as circular or spatial patterns • Explore number patterns such as **skip-counting** by 5s starting at 0 results in numbers whose last digits are in a 0-5-0-5 pattern	• Represent increasing or decreasing **number patterns** in **concrete, pictorial, and symbolic forms** (e.g., using blocks, natural objects; numbers; music, movements) ○ Describe and represent **pattern rules** in symbolic forms, (e.g., blocks of 1, 2, 4, 8 … is doubling the number of blocks starting from 1) ○ Predict elements of, extend a pattern, and explain their reasoning • Explore more complex repeating patterns (e.g., with more than 3 elements, spatial patterns, circular patterns, patterns in which 2 or more attributes change such as colour and shape) • Explore increasing and decreasing **number patterns** such as the Fibonacci sequence	• Represent **pattern rules** for increasing and decreasing patterns in **concrete, pictorial, and symbolic forms** (e.g., adding links to a chain is +1, +1, +1 …; successively cutting a bar in half is ÷2, ÷2, ÷2 …) ○ Use pattern rules to predict elements of, extend a pattern, and explain their reasoning • Explore more complex repeating, increasing, and decreasing patterns in the real world (e.g., patterns with flipped or rotated objects, patterns with a longer core, salmon counts by season, monthly average temperatures) • Represent number patterns using a **ratio table** of values or a graph. Use mathematical language such as increasing or decreasing to describe observations
Algebraic Thinking *Students explore concepts and symbols of equality and inequality. They apply understanding of these ideas to solve for unknown values and understand relationships between numbers.*	• Model equality as balanced and inequality as unbalanced using **concrete and pictorial forms** (e.g., using a pan balance with cubes on each side to show equal and unequal) ○ Make connections to ways to make 5 and 10 (Operations) (e.g., showing 2 + 3 blocks on one side and 5 blocks on the other) • Accurately use the equal sign	• Model equality as balanced and inequality as unbalanced using **concrete and pictorial forms** (e.g., comparing lengths of interlocking cubes) ○ Make connections to ways to make 20 (Operations) (e.g., showing 2 rows of 10 blocks on one side and 20 blocks on the other) ○ Demonstrate **change tasks** and explain reasoning • Accurately use **symbols of equality and inequality** (= or ≠) • Create accurate addition and subtraction equations for numbers up to 20	• Model equality as balanced and inequality as unbalanced using **concrete and pictorial forms** (e.g., ways to make $1 with different coins) ○ Make connections to ways to make 100 (Operations) (e.g., showing 10 dimes on one side and 20 nickels on the other) (connection to Financial Literacy) ○ Explore and describe **equivalents** in the real world (connection to measurement, e.g., 1 m = 100 cm) ○ Demonstrate **change tasks** and explain reasoning • Accurately use **symbols of equality and inequality** (< > = ≠). • Create addition and subtraction equations. Understand that equal quantities can be made in different ways, (e.g., 14 + 6 = 3 + 17 or 12 + 8 = 6 + 6 + 4 + 4)	• Use **concrete, pictorial, and symbolic representations** to solve one-step addition and subtraction equations of math facts up to 20 (connection to Operations), with an unknown number e.g.: ○ Start unknown (e.g., n + 15 = 20 or n + 4 = 9) ○ Change unknown (e.g., 12 + n = 20 or 2 + n = 8) ○ Result unknown (e.g., 6 + 13 = n or 9 + 3 = n) ○ Recognize implicit start unknown, change unknown, or result unknown situations in numeracy problems. Translate these equation types to a **concrete, pictorial, and/or symbolic form** ○ Apply knowledge of **fact families** of addition and subtraction to help solve equations	• Use **concrete, pictorial, and symbolic representations** to solve one-step equations with all operations (connection to Operations), with an unknown number e.g.: ○ Start unknown (e.g., n x 5 = 20 or n ÷ 6 = 3) ○ Change unknown (e.g., 12 ÷ n = 3 or 27 – n = 19) ○ Result unknown (e.g., 6 x 12 = n or 13 + 49 = n) ○ Recognize implicit start unknown, change unknown, or result unknown situations in numeracy problems. Translate these equation types to a **concrete, pictorial, and/or symbolic form**. Explain and justify thinking ○ Apply knowledge of **fact families** of all operations to help solve equations

Patterning and Algebraic Thinking Definitions

Terms are found in multiple skills and sub skills. While the definitions are the same, in some instances the examples may vary due to the Skill and Sub-skill they are supporting.

Attribute: description of an element in a pattern, (e.g., colour, shape, size, number/letter/symbol, object, direction, position)
Change tasks: a task in which a student demonstrates changing a quantity using concrete, pictorial, and symbolic models (e.g., using blocks to show changing 8 to 12 by adding 4 more blocks)
Concrete forms: concrete materials or physical objects help students learn through actions such as placing, moving, or grouping objects. Examples include using manipulatives (e.g., base-10 blocks, counters), natural or found materials, or loose parts to create patterns
Core: repeated element in a repeating pattern, (e.g., AAB is the core of AABAABAAB)
Equivalents: quantities that are equal in value, function, amount, or meaning, but not necessarily number, i.e., 1 m = 100 cm, 4 quarters = 1 loonie
Fact families: sets of related addition/subtraction or multiplication/division math facts such as 12 + 6 = 18 and 18 – 6 = 12, or 2 x 7 = 14 and 14 ÷ 7 = 2. Fact families illustrate how sets can be decomposed and recomposed.
Number pattern: also known as number sequences, are a series of numbers that follow a specific rule or have a relationship between successive numbers. Number sequences can be arithmetic (adding or subtracting by a constant, aka increasing or decreasing patterns. (e.g., 75, 70, 65, 60, 55, ...), or geometric (multiplying or dividing by a constant e.g., 1, 2, 4, 8, 16...)
Pattern rule: Pattern rules describe the relationship between elements in the pattern. Pattern rules can be based on attributes or mathematical operations. Patterns can be repeating, or number (increasing or decreasing) patterns.
Pictorial forms: pictorial forms help students see a model which represents a pattern or operation. Examples include making patterns with pictures or drawings, or jumping back on number lines or 10-frames
Ratio table: a table to help understand the relationship between the quantities (e.g., a t-chart could record the total number of meals eaten at a camp, per day—one column could be the number of days, another column could be the number of meals). Ratio tables are also known as t-tables, function machines, or in and out machines
Symbolic forms: symbolic forms are abstract notations which represent components of a pattern. Examples include letters, numbers, or musical notes
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. Symbols of inequality include less than < ; greater than > ; and not equal ≠

Skill: Geometry and Measurement (Spatial Sense)

Students develop strong Spatial Sense in part through the study of Geometry and Measurement and can demonstrate the ability to describe objects and position with mathematical language and numerical measurement.

Sub-skill	Proficiency Descriptor *(for the end of the school year)*				
	Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**

2D Shapes and 3D Objects
 	
Noticing attributes of shapes helps students develop skills to observe, identify, classify, and supports creativity and design.
	• Identify, describe, and create **2D shapes**
	  ○ Describe shapes and design elements used by various cultures including local First Nations
	  ○ Use mathematical language (e.g., sides and corners) to describe shapes
	  ○ Count sides and corners of **2D and 3D shapes**
	• Create larger shapes by using smaller shapes (e.g., 2 triangles make a rectangle) by drawing, or using digital technology or manipulatives like tangrams and pattern blocks
	• Begin to recognize and identify similarities between **3D objects**. (At this level, using specific mathematical terminology to name and identify 3D objects is not expected)
	• Sort 2D shapes and 3D objects using a single **attribute** and explain their thinking. Identify shapes or objects which do not belong based on attribute
		• Identify, describe, and sort **2D shapes** and **3D objects** using a single **attribute** and explain their thinking
		  ○ Compare and contrast shapes and design elements from various cultures, including local First Nations
		  ○ Use mathematical language to name and describe shapes (e.g., a triangle has 3 sides, a square has 4 corners)
		• **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 mathematical terminology to name and identify 3D objects is not expected)
		• Use mathematical language to describe **attributes** of shapes
		• Identify 2D shapes and 3D objects in the real world (e.g., bentwood box, coins, longhouses, soccer ball, cans, steps in origami)
			• Identify, describe, and sort **2D shapes** and **3D objects** using more than one **attribute**, and explain their thinking
			  ○ Identify and describe defining attributes of 2D and 3D design elements from various cultures, including local First Nations
			  ○ 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 language to describe **attributes** of shapes
			• Identify and describe 2D shapes and 3D objects in the real world (e.g., bentwood box, coins, longhouses, soccer ball, cans, steps in origami)
				• Identify, describe using mathematical language, and sort **3D objects** using more than one **attribute**, and explain their thinking
				  ○ Identify and describe defining attributes of 3D design elements from various cultures, including local First Nations
				  ○ Identify 3D objects according to the number of edges and vertices
				  ○ Compare and contrast 3D **skeletons** and **nets**
				• Use mathematical language to demonstrate understanding of **preservation of shape**
				• Identify and describe 3D objects in the real world (e.g., bentwood box, ice cream cone, longhouses, house poles, soccer ball, boxes, cans, dice)
					• Identify, describe using mathematical language, and sort **regular** and **irregular polygons** based on multiple **attributes**, and explain their thinking
					  ○ Compare and contrast defining attributes of polygons and design elements from various cultures including local First Nations
					• Use mathematical language to discuss **attributes** of shapes (e.g., curved sides, parallel and perpendicular lines, angles)
					• Identify and describe polygons in the real world (e.g., Indigenous blanket patterns, stop signs, building architecture, classroom windows)
					  ○ Create designs that have a mirror image (line symmetry) within them using **concrete** materials such as pattern blocks and pictorial representations such as artwork

Measurement
 	
Measurements iteratively use standard units (from established systems such as the metric system) and/or non-standard units (e.g., using hands or blocks to measure height). Mathematical language to describe position can be descriptive (qualitative) or numerical (quantitative). This sub-
	• Use **non-standard units** (**uniform and non-uniform**) to directly measure the length, width, or height of an object
	• Use mathematical language to make direct qualitative comparisons between objects (e.g., bigger, smaller, longer, shorter, wider, narrower, heavier, lighter, holds more, holds less)
	• Describe the position of an object qualitatively (e.g., above, below, beside, in front of, behind)
		• Use **non-standard** (**uniform and non-uniform**) and **standard units** to directly measure the length, width, or height of an object
		  ○ Accurately measure an object, edge to edge
		• Use mathematical language to make direct qualitative comparisons between objects (e.g., bigger, smaller, longer, shorter, wider, narrower, heavier, lighter, holds more, holds less) and justify and explain their thinking
		• Describe the position of objects qualitatively (e.g., up and down, in and out, to the right, to the left)
			• Use **standard** metric units (e.g., millimeter) to accurately measure and record the length, width, or height of an object
			• **Estimate** the length, height, and width of an object, using quantitative mathematical language (e.g., centimeters and millimeters)
			• Describe the position of objects qualitatively (e.g., up and down, in and out) and quantitatively (e.g., measurements with metric units). For example: 3 meters above; go 1 meter to the left; draw a line 5 cm away from the other line
				• Use **standard** metric units (e.g., millimeter) to accurately measure and record the length, width, or height of an object
				• Understand the relationship between metric units of length (e.g., 100 cm = 1 m)
				• **Estimate** the length, height, width, mass, and capacity of an object, using quantitative mathematical language (e.g., centimeters, milliliters) or by using **referents** (e.g., this cup holds 100 milliliters, this jug holds about 10 times more)
					• Use **standard** metric units (e.g., millimeter) to accurately measure the **perimeter** of **regular and irregular polygons**
					  ○ Measure perimeter using tools and manipulatives (e.g., geoboards, pattern blocks, interlocking cubes, base-10 blocks and grids
					  ○ Connect perimeter measurement to addition
					  ○ Connect perimeter of regular polygons to multiplication (number of sides x side length)
					  ○ Demonstrate understanding of the concept of **circumference**; use of a formula or pi for calculations is not intended at this level

skill includes concepts of time.				• Understand units of time (e.g., second, minute, hour, day, week, month, year)
				  ○ Identify properties of time-keeping devices (e.g., analog clocks have 2-3 hands, how digital clocks look, how stop-watches work, lay-out of calendars)
				  ○ Telling time is not expected at this level
				• Identify important relationships-between units of time
				  ○ 1 minute = 60 seconds; 1 hour = 60 minutes; 1 day = 24 hours; 1 week = 7 days; 365 days = 1 year = 12 months
				  ○ State the months of the year, in order
				  ○ Estimate time using environmental references (e.g., natural daily/seasonal cycles, weather patterns)
				  ○ Describe similarities and differences between different calendar and time keeping systems or references from around the world, including from local First Nations
					• Measure and compare the perimeter of structures and objects in the local community (e.g., school, houses, cultural structures such as long houses, gardens, etc.)
					
					• Demonstrate the ability to tell time using various timekeeping devices (e.g., analog and digital 12- and 24-hour clocks)
					  ○ Explain and accurately use the concepts of a.m. and p.m.
					  ○ Explain the role of and accurately use minute and hour hands on analog clocks
					  ○ Tell time to the hour, quarter hour, half hour; 5-minute and 1-minute intervals (connect to **skip counting** by 5 and 15)
					  ○ Make connections from benchmark fraction language to time language (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 day = 24 hours; 1 week = 7 days; 365 days = 1 year = 12 months

Geometry and Measurement (Spatial Sense)

Terms are found in multiple skills and sub skills. While the definitions are the same, in some instances the examples may vary due to the Skill and Sub-skill they are supporting.

2D shapes: includes but not limited to circle, square, rectangle, triangle, heart, kite
3D objects: includes but not limited to sphere, cone, cube, rectangular prism, triangular pyramid and square pyramid
Attributes: includes but not limited to size, shape, colour, faces, edges, vertices
Compose/Recompose: building or rebuilding a 2D shape or 3D object from smaller parts. For example, combining 2 of the same triangles can make a square or rectangle
Decompose: breaking down a 2D shape or 3D object into smaller parts e.g. slicing a loaf of bread (rectangular cuboid) to reveal square-shaped slices
Estimate: To approximate a number, calculation, quantity, or measurement based on an educated guess, rounding, or a visual comparison with a referent.
Irregular polygons: 2D shapes in which all sides are not equal in length or all angles not equal in measure
Nets: representations of 3D objects if cut open and laid flat
Non-standard units: measurement units using everyday objects (e.g., a pencil, arm, shoe)
Non-uniform units: not consistent in size (e.g., children's hands, pencils)
Perimeter: total distance around the outside of a 2D shape. The perimeter of a circle is also called the circumference
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
Referents: concrete 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.
Regular polygons: 2D shapes in which all sides are equal in length and all angles equal in measure
Skeletons: representation of a 3D shape without the faces
Standard units: measurement units within established systems such as the metric system
Uniform units: consistent in size (e.g., interlocking cubes, standard paper clips)

Skill: Data and Probability (Data Literacy)

By developing proficient Data Literacy skills, students are able to demonstrate the ability to understand, analyze, and communicate data, and the ability to predict the likelihood of an event. As students move to later grades, they will use their foundational mathematics skills to collect, communicate, and discuss data across all areas of the curriculum.

Sub-skill	Proficiency Descriptor *(for the end of the school year)*				
	Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**

Understanding, Analyzing, and Communicating Data
 	
Graphs help to visually represent observations and data. Students build proficiency in collecting data to communicate in various types of graphs and inferring information from graphs.
	• Infer understanding of data (a piece of information) from a graph or diagram (e.g., a tally chart, calendar, **bar graph, pictograph**)	• Collect and communicate data
		  ○ Record data using tally marks or manipulatives
		  ○ Communicate data using different representations (e.g., **concrete graphs, bar graphs**)
		  ○ Represent information on a **concrete graph** using **one-to-one correspondence**
		• Interpret graphs using comparative language (e.g., more people like skipping than running) and direct language (e.g., 5 people like skipping)
			• Collect and communicate data
			  ○ Record data using tally marks or manipulatives
			  ○ Communicate data using different representations (e.g., **concrete graphs, bar graphs, pictographs**, tally charts)
			  ○ Represent information on a **concrete or pictograph** using **one-to-one correspondence**
			• Interpret graphs by making quantitative comparisons (e.g., 5 people like skipping or 8 more people liked skipping than running)
				• Collect and communicate data using graphs
				  ○ Record data using a chosen method (e.g., tally marks, numerals, or counters)
				  ○ Choose and use a suitable graph or visual to communicate the data (e.g., **bar graphs, pictographs**)
				  ○ Represent information on a graph using **one-to-one correspondence**
				• Describe, compare, and discuss data
				  ○ Interpret and discuss graphs 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)
					• Collect and communicate data using graphs
					  ○ Record data using a chosen method (e.g., tally marks, numerals, or counters)
					  ○ Choose and use a suitable graph or visual to communicate the data (e.g., **bar graphs, pictographs**) and explain their reasoning
					  ○ Represent information on a graph using **one-to-one or many-to-one correspondence**
					• Describe, compare, and discuss data
					  ○ Interpret and discuss graphs by making quantitative comparisons (e.g., average air temperature decreases 10 degrees from October to January). Explain and justify their thinking

Probability
 	
Students discuss the likelihood of an event using descriptive language of probability. As students move to later grades, they will begin to use quantitative descriptors such as describing probability with fractions, decimals, and percentages.
	• Describe the likelihood of a familiar event (such as the chance of snow) using age-appropriate probability language (never, always, sometimes, maybe)	• 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) and explain their thinking	• 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) and explain their thinking	• 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) and explain their thinking
				• Demonstrate an understanding of chance through inquiry
				  ○ Conduct probability experiments such as tossing a coin, drawing from a bag, using spinners, and rolling dice
				  ○ Describe results using comparative language (e.g. equal probability to flip heads or tails on a coin)
					• Predict single outcomes of simulated events (e.g., using a spinner which lands on a single colour) and explain their thinking
					• Demonstrate an understanding of chance through inquiry
					  ○ Conduct probability experiments such as tossing a coin, drawing from a bag, using spinners, and rolling dice. Record results using tallies.
					  ○ Express probabilities as fractions and compare the relative probability of different events.
					  ○ Describe results using comparative and quantitative language (e.g., there is a 1/6 chance of rolling a 5 on a 6-sided die)

Skill: Data and Probability (Data Literacy)

Terms are found in multiple skills and sub skills. While the definitions are the same, in some instances the examples may vary due to the Skill and Sub-skill they are supporting.

Bar graph: A way of showing numerical data by category using the height or length of a bar. Also known as a column chart. Bar graphs are used to compare things between different groups or to show data collected in different times or places.
Concrete graph: A graph that organizes and displays data using concrete objects like blocks or stickers, with appropriate labels.
Many-to-one correspondence: On a concrete graph or pictograph, one symbol represents a group of objects (e.g., one square may represent five cookies)
One to one correspondence: On a concrete graph or pictograph, one picture symbol corresponds to one unit of data (e.g., one dot represents one flower)
Pictograph: A way of showing data using images, where each image stands for quantity (one to one correspondence or many to one correspondence). Pictographs are used to express large amounts of information in a simple manner as it is easy to read.

Skill: Financial Literacy

Students with a strong understanding of Financial Literacy will develop the tools required to practice sound financial decision making in the future. This skill provides real world context for demonstrating learning in Number Sense and Computational Fluency.

Sub-skill	Proficiency Descriptor *(for the end of the school year)*				
	Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**

Currency
 	
Identifying, understanding the value of, and combining coins and bills fluently, with an emphasis on Canadian currency.
	• Observe and describe Canadian coins (loonies and toonies) by their size and design
	• Count the number of coins in sets of up to 10 coins (connection to Number Sense)
	• Calculate the total price to make $5 and $10 using representations such as price tags and play money (e.g., a muffin is $3 and juice is $2; pay with 5 loonies) (connection to Computational Fluency)
		• Identify, name, and describe Canadian coins (nickels, dimes, quarters, loonies, toonies) by their size, design, and value
		• Sort and count the number of different types of coins in a mixed set (connection to Number Sense)
		• Use number sense strategies such as **skip-counting** to determine the value of a group of the same type of coin
		• Calculate the total price (in whole numbers up to $20) by adding and subtracting and by using representations such as price tags and play money (connection to Computational Fluency)
			• Use number sense strategies such as sorting and **skip-counting** to determine the value of a mixed set of coins to 100 cents
			• Create different combinations of coins to make 100 cents (connection to Operations)
			• Solve 2-digit addition and subtraction questions (using cents rather than decimal notation, e.g., 25¢ + 10¢ = 35¢) by using a variety of **concrete** (play money), **pictorial, or symbolic forms** (connection to Computational Fluency)
				• Identify, name, and describe Canadian bills and coins by their size, design, and value
				• Determine the value of mixed combinations of bills and coins (using whole dollars, or cents rather than decimal notation) (connection to Operations)
				• Solve 3-digit addition and subtraction questions (using whole dollars, or cents rather than decimal notation, e.g., 125¢ + 110¢ = 235¢) (connection to Computational Fluency)
				  ○ Using a variety of **concrete** (play money), **pictorial, or symbolic forms**
				  ○ Explain their thinking process (e.g. describe the coins and bills to be used to pay)
					• Solve **contextual problems** with currency (e.g., 4-digit addition and subtraction questions including those with decimal notation, and 2- and 3-digit multiplication and division by 1-digit questions (connection to Computational Fluency))
					  ○ Using a variety of **concrete** (play money), **pictorial, or symbolic forms**
					  ○ Apply a variety of strategies to calculate totals and make change, (e.g., counting up, counting back, decomposing and rounding to the nearest nickel)
					  ○ Explain their thinking process (e.g. justifying the item(s) purchased based on budget and savings)

Financial Planning and Decision Making
 	
Concepts of earning, saving, spending, and making financial plans and decisions.
	• Role play financial transactions such as in a restaurant, bakery, or store
	• Understand and explore concepts such as wants and needs (Career Education, Core Competencies)
		• Role play financial transactions such as in a restaurant, bakery, or store. Explore trade games to understand that objects can have variable value or worth (tools, food, toys)
		• Understand and explore concepts such as
		  ○ Roles, responsibilities, and jobs in the community (Career Education)
		  ○ Integrating the concept of needs and wants (Core Competencies)
			• Understand and explore concepts such as
			  ○ Roles, responsibilities, and jobs in the community (Career Education)
			  ○ Spending and saving money connected to needs and wants (Social Studies, Core Competencies)
				• Understand and explore concepts such as
				  ○ Payments can be made in flexible ways (e.g., cash, cheques, credit, electronic transactions, trading goods and services)
				  ○ 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) (Core Competencies)
				  ○ Trading and forms of currency in First Peoples history (Social Studies)
					• Make financial decisions involving earning, spending, saving, and giving and explain their thinking process
					• Understand and explore concepts such as
					  ○ Payments can be made in flexible ways (e.g., cash, cheques, credit, electronic transactions, trading goods and services)
					  ○ 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) (Core Competencies)

Skill: Financial Literacy

Terms are found in multiple skills and sub skills. While the definitions are the same, in some instances the examples may vary due to the Skill and Sub-skill they are supporting.

Contextual problem: 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 operation and strategy to fit the context, and based on their current knowledge and available tools
Skip counting: method of counting in which students add a number to the previous number (also known as multiples). For example, skip counting nickels (5¢), starting at 0 is 0¢, 5¢, 10¢, 15¢, ...