



# The Common Curriculum Framework

for

# K–9 MATHEMATICS

---

Western and Northern Canadian Protocol

---

May 2006

Copyright © 2006, the Crown in Right of the Governments of Alberta, British Columbia, Manitoba, Northwest Territories, Nunavut Territory, Saskatchewan and Yukon Territory as represented by the Minister of Education, Alberta; the Minister of Education, British Columbia; the Minister of Education, Citizenship and Youth, Manitoba; the Minister of Education, Culture and Employment, Northwest Territories; the Minister of Education, Nunavut; the Minister of Saskatchewan Learning, Saskatchewan; and the Minister of Education, Yukon Territory.

Permission is given by the copyright owners to reproduce this document for educational purposes and on a nonprofit basis.

## ACKNOWLEDGEMENTS

*The Common Curriculum Framework for K–9 Mathematics* was developed through the cooperative efforts of the four western provinces and three territories. These jurisdictions would like to acknowledge the following mathematics consultants.

### Alberta

Vivian Abboud	Alberta Education, French Language Services Branch
Richard DeMerchant	Alberta Education, Curriculum Branch
Jennifer Dolecki	Alberta Education, Curriculum Branch
Debbie Duvall	Alberta Education, Learning and Teaching Resources Branch
Paul Lamoureux	Alberta Education, French Language Services Branch
Lorne Lindenberg	Alberta Education, Curriculum Branch

### British Columbia

Waël Affifi	British Columbia Ministry of Education, Content and Achievement Unit
Marie-Christine Barnhardt	British Columbia Ministry of Education, Content and Achievement Unit
Richard DeMerchant	British Columbia Ministry of Education, Content and Achievement Unit
Pierre Gilbert	British Columbia Ministry of Education, Content and Achievement Unit
Pamela Hagen	British Columbia Ministry of Education
Werner Liedtke	British Columbia Ministry of Education

### Manitoba

Carole Bilyk	Manitoba Education, Citizenship and Youth, Instruction, Curriculum and Assessment Branch
Paule Buors	Manitoba Education, Citizenship and Youth, Bureau de l'éducation française
Marcel Druwé	Manitoba Education, Citizenship and Youth, Bureau de l'éducation française
Gilbert Le Néal	Manitoba Education, Citizenship and Youth, Bureau de l'éducation française
Gretha Pallen	Manitoba Education, Citizenship and Youth, Instruction, Curriculum and Assessment Branch

### Northwest Territories

Steven Daniel	Northwest Territories, Department of Education, Culture and Employment
---------------	--

### Nunavut

Brian Yamamura	Nunavut, Department of Education
----------------	----------------------------------

### Saskatchewan

Gerry Craswell	Saskatchewan Learning, Curriculum and Instruction Branch
Liliane Gauthier	Saskatchewan Learning, Bureau de la minorité de langue officielle
Gale Russell	Saskatchewan Learning, Curriculum and Instruction Branch

### Yukon Territory

Lee Kubica	Yukon Department of Education
Paula Thompson	Yukon Department of Education



## TABLE OF CONTENTS

BACKGROUND .....	1
INTRODUCTION .....	2
Purpose of the Document .....	2
Beliefs about Students and Mathematics Learning .....	2
Aboriginal Perspectives .....	3
Affective Domain .....	3
Early Childhood .....	4
Goals for Students .....	4
CONCEPTUAL FRAMEWORK FOR K–9 MATHEMATICS .....	5
Mathematical Processes .....	6
Nature of Mathematics .....	10
Strands .....	13
Outcomes and Achievement Indicators .....	13
Summary .....	14
INSTRUCTIONAL FOCUS .....	15
GENERAL AND SPECIFIC OUTCOMES .....	17
General and Specific Outcomes by Strand .....	18
Number .....	18
Patterns and Relations .....	32
Shape and Space .....	38
Statistics and Probability .....	46

General and Specific Outcomes With Achievement Indicators .....	52
Kindergarten .....	52
Grade 1 .....	56
Grade 2 .....	63
Grade 3 .....	73
Grade 4 .....	86
Grade 5 .....	97
Grade 6 .....	110
Grade 7 .....	122
Grade 8 .....	134
Grade 9 .....	147
APPENDIX: REFERENCES .....	160

## BACKGROUND

*Partner jurisdictions:*

*Alberta*

*British Columbia*

*Manitoba*

*Northwest Territories*

*Nunavut*

*Saskatchewan*

*Yukon Territory*

*The Western Canadian Protocol for Collaboration in Basic Education Kindergarten to Grade 12* was signed December 1993 by the Ministers of Education from Alberta, British Columbia, Manitoba, Northwest Territories, Saskatchewan and Yukon Territory. In February 2000, following the addition of Nunavut, the protocol was renamed the Western and Northern Canadian Protocol (WNCP) for Basic Education.

In 2005, the Ministers of Education from all the WNCP jurisdictions unanimously concurred with the rationale of the original partnership because of the importance placed on:

- common educational goals
- the ability to collaborate to achieve common goals
- high standards in education
- planning an array of educational opportunities
- removing obstacles to accessibility for individual learners
- optimum use of limited educational resources.

*The Common Curriculum Framework for K–9 Mathematics* was developed by the seven ministries of education in collaboration with teachers, administrators, parents, business representatives, post-secondary educators and others.

The framework identifies beliefs about mathematics, general and specific student outcomes, and achievement indicators agreed upon by the seven jurisdictions. Each of the provinces and territories will determine when and how the framework will be implemented within its own jurisdiction.

## INTRODUCTION

### PURPOSE OF THE DOCUMENT

*The framework communicates high expectations for students.*

This document provides a common base for the curriculum expectations mandated by each province and territory, which will result in consistent student outcomes in mathematics across jurisdictions and enable easier transfer for students moving from one jurisdiction to another. Its intent is to clearly communicate high expectations for students in mathematics education to all education partners across the jurisdictions and facilitate the development of common learning resources.

### BELIEFS ABOUT STUDENTS AND MATHEMATICS LEARNING

*Mathematical understanding is fostered when students build on their own experiences and prior knowledge.*

Students are curious, active learners with individual interests, abilities and needs. They come to classrooms with varying knowledge, life experiences and backgrounds. A key component in successfully developing numeracy is making connections to these backgrounds and experiences.

Students learn by attaching meaning to what they do and need to construct their own meaning of mathematics. This meaning is best developed when learners encounter mathematical experiences that proceed from the simple to the complex and from the concrete to the abstract. The use of manipulatives and a variety of pedagogical approaches can address the diversity of learning styles and developmental stages of students, and

enhance the formation of sound, transferable, mathematical concepts. At all levels, students benefit from working with a variety of materials, tools and contexts when constructing meaning about new mathematical ideas. Meaningful student discussions can provide essential links among concrete, pictorial and symbolic representations of mathematics.

The learning environment should value and respect all students' experiences and ways of thinking, so that learners are comfortable taking intellectual risks, asking questions and posing conjectures. Students need to explore problem-solving situations in order to develop personal strategies and become mathematically literate. Learners must realize that it is acceptable to solve problems in different ways and that solutions may vary.

## ABORIGINAL PERSPECTIVES

Aboriginal students in northern and western Canada come from diverse geographic areas with varied cultural and linguistic backgrounds. Students attend schools in a variety of settings including urban, rural and isolated communities. Teachers need to understand the diversity of cultures and experiences of students.

*Teachers need to understand the diversity of cultures and experiences of students.*

Aboriginal students often have a whole-world view of the environment in which they live and learn best in a holistic way. This means that students look for connections in learning and learn best when mathematics is contextualized and not taught as discrete components.

Aboriginal students come from cultures where learning takes place through active participation. Traditionally, little emphasis was placed upon the written word. Oral communication along with practical applications and experiences are important to student learning and understanding. It is also vital that teachers understand and respond to non-verbal cues so that student learning and mathematical understanding are optimized.

A variety of teaching and assessment strategies is required to build upon the diverse knowledge, cultures, communication styles, skills, attitudes, experiences and learning styles of students. The strategies used must go beyond the incidental inclusion of topics and objects unique to a culture

or region, and strive to achieve higher levels of multicultural education (Banks and Banks, 1993).

## AFFECTIVE DOMAIN

A positive attitude is an important aspect of the affective domain that has a profound effect on learning. Environments that create a sense of belonging, encourage risk taking and provide opportunities for success, help develop and maintain positive attitudes and self-confidence. Students with positive attitudes toward learning mathematics are likely to be motivated and prepared to learn, participate willingly in classroom activities, persist in challenging situations and engage in reflective practices.

*To experience success, students must be taught to set achievable goals and assess themselves as they work toward these goals.*

Teachers, students and parents need to recognize the relationship between the affective and cognitive domains, and attempt to nurture those aspects of the affective domain that contribute to positive attitudes. To experience success, students must be taught to set achievable goals and assess themselves as they work toward these goals.

Striving toward success, and becoming autonomous and responsible learners are ongoing, reflective processes that involve revisiting the setting and assessing of personal goals.

## EARLY CHILDHOOD

*Curiosity about mathematics is fostered when children are actively engaged in their environment.*

Young children are naturally curious and develop a variety of mathematical ideas before they enter kindergarten. Children make sense of their environment through observations and interactions at home, in daycares, preschools and in the community. Mathematics learning is embedded in everyday activities, such as playing, reading, storytelling and helping around the home.

Activities can contribute to the development of number and spatial sense in children. Curiosity about mathematics is fostered when children are engaged in activities such as comparing quantities, searching for patterns, sorting objects, ordering objects, creating designs, building with blocks and talking about these activities.

Positive early experiences in mathematics are as critical to child development as are early literacy experiences.

## GOALS FOR STUDENTS

The main goals of mathematics education are to prepare students to:

- use mathematics confidently to solve problems
- communicate and reason mathematically
- appreciate and value mathematics
- make connections between mathematics and its applications
- commit themselves to lifelong learning
- become mathematically literate adults, using mathematics to contribute to society.

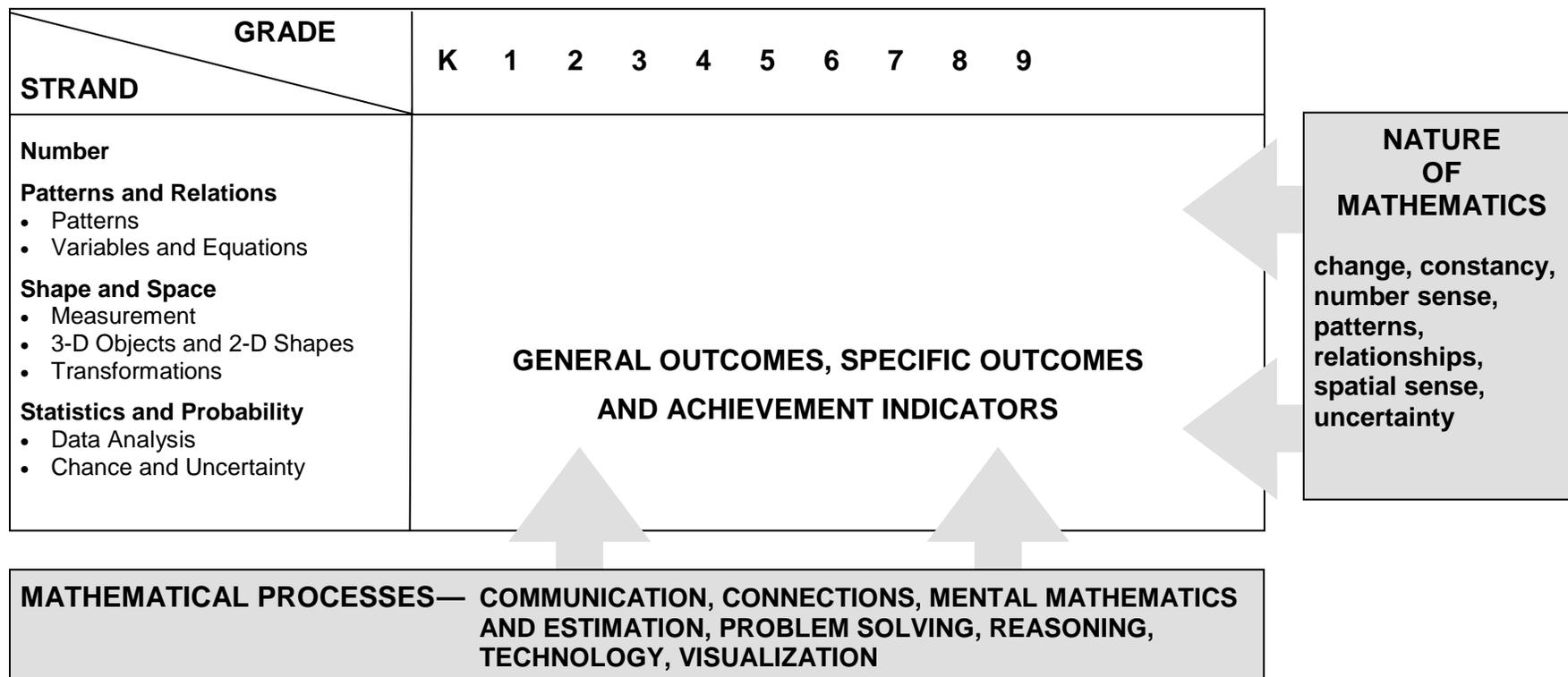
Students who have met these goals will:

- gain understanding and appreciation of the contributions of mathematics as a science, philosophy and art
- exhibit a positive attitude toward mathematics
- engage and persevere in mathematical tasks and projects
- contribute to mathematical discussions
- take risks in performing mathematical tasks
- exhibit curiosity.

*Mathematics education must prepare students to use mathematics confidently to solve problems.*

# CONCEPTUAL FRAMEWORK FOR K–9 MATHEMATICS

The chart below provides an overview of how mathematical processes and the nature of mathematics influence learning outcomes.



## MATHEMATICAL PROCESSES

There are critical components that students must encounter in a mathematics program in order to achieve the goals of mathematics education and encourage lifelong learning in mathematics.

Students are expected to:

- *Communication [C]*
  - *Connections [CN]*
  - *Mental Mathematics and Estimation [ME]*
  - *Problem Solving [PS]*
  - *Reasoning [R]*
  - *Technology [T]*
  - *Visualization [V]*
- communicate in order to learn and express their understanding
  - connect mathematical ideas to other concepts in mathematics, to everyday experiences and to other disciplines
  - demonstrate fluency with mental mathematics and estimation
  - develop and apply new mathematical knowledge through problem solving
  - develop mathematical reasoning
  - select and use technologies as tools for learning and solving problems
  - develop visualization skills to assist in processing information, making connections and solving problems.

The Common Curriculum Framework incorporates these seven interrelated mathematical processes that are intended to permeate teaching and learning along with the use of technology.

## Communication [C]

Students need opportunities to read about, represent, view, write about, listen to and discuss mathematical ideas. These opportunities allow students to create links between their own language and ideas, and the formal language and symbols of mathematics.

Communication is important in clarifying, reinforcing and modifying ideas, attitudes and beliefs about mathematics. Students should be encouraged to use a variety of forms of communication while learning mathematics. Students also need to communicate their learning using mathematical terminology.

Communication can help students make connections among concrete, pictorial, symbolic, verbal, written and mental representations of mathematical ideas.

*Students must be able to communicate mathematical ideas in a variety of ways and contexts.*

## Connections [CN]

Contextualization and making connections to the experiences of learners are powerful processes in developing mathematical understanding. When mathematical ideas are connected to each other or to real-world phenomena, students can begin to view mathematics as useful, relevant and integrated.

*Through connections, students should begin to view mathematics as useful and relevant.*

Learning mathematics within contexts and making connections relevant to learners can validate past experiences, and increase student willingness to participate and be actively engaged.

The brain is constantly looking for and making connections. *“Because the learner is constantly searching for connections on many levels, educators need to orchestrate the experiences from which learners extract understanding... Brain research establishes and confirms that multiple complex and concrete experiences are essential for meaningful learning and teaching”* (Caine and Caine, 1991, p. 5).

## Mental Mathematics and Estimation [ME]

Mental mathematics is a combination of cognitive strategies that enhances flexible thinking and number sense. It is calculating mentally without the use of external memory aids.

*Mental mathematics and estimation are fundamental components of number sense.*

Mental mathematics enables students to determine answers without paper and pencil. It improves computational fluency by developing efficiency, accuracy and flexibility.

Even more important than performing computational procedures or using calculators is the greater facility that students need—more than ever before—with estimation and mental mathematics (National Council of Teachers of Mathematics, May 2005).

Students proficient with mental mathematics *“become liberated from calculator dependence, build confidence in doing mathematics, become more flexible thinkers and are more able to use multiple approaches to problem solving”* (Rubenstein, 2001).

Mental mathematics *“provides a cornerstone for all estimation processes offering a variety of alternate algorithms and non-standard techniques for finding answers”* (Hope, 1988).

Estimation is a strategy for determining approximate values or quantities, usually by referring to benchmarks or using referents, or for determining the reasonableness of calculated values. Students need to know how, when and what strategy to use when estimating.

Estimation is used to make mathematical judgements and develop useful, efficient strategies for dealing with situations in daily life.

### **Problem Solving [PS]**

Learning through problem solving should be the focus of mathematics at all grade levels. When students encounter new situations and respond to questions of the type, “*How would you...?*” or “*How could you...?*” the problem-solving approach is being modelled. Students develop their own problem-solving strategies by being open to listening, discussing and trying different strategies.

In order for an activity to be problem-solving based, it must ask students to determine a way to get from what is known to what is sought. If students have already been given ways to solve the problem, it is not a problem, but practice. A true problem requires students to use prior learnings in new ways and contexts. Problem solving requires and builds depth of conceptual understanding and student engagement.

Problem solving is a powerful teaching tool that fosters multiple, creative and innovative solutions. Creating an environment where students openly look for and engage in finding a variety of strategies for solving problems empowers students to explore alternatives and develops confident, cognitive, mathematical risk takers.

### **Reasoning [R]**

Mathematical reasoning helps students think logically and make sense of mathematics. Students need to develop confidence in their abilities to reason and justify their mathematical thinking. High-order questions challenge students to think and develop a sense of wonder about mathematics.

Mathematical experiences in and out of the classroom provide opportunities for inductive and deductive reasoning. Inductive reasoning occurs when students explore and record results, analyze observations, make generalizations from patterns and test these generalizations. Deductive reasoning occurs when students reach new conclusions based upon what is already known or assumed to be true.

*Mathematical reasoning helps students think logically and make sense of mathematics.*

*Learning through problem solving should be the focus of mathematics at all grade levels.*

## Technology [T]

*Technology contributes to the learning of a wide range of mathematical outcomes, and enables students to explore and create patterns, examine relationships, test conjectures and solve problems.*

Technology contributes to the learning of a wide range of mathematical outcomes, and enables students to explore and create patterns, examine relationships, test conjectures and solve problems.

Calculators and computers can be used to:

- explore and demonstrate mathematical relationships and patterns
- organize and display data
- extrapolate and interpolate
- assist with calculation procedures as part of solving problems
- decrease the time spent on computations when other mathematical learning is the focus
- reinforce the learning of basic facts and test properties
- develop personal procedures for mathematical operations
- create geometric displays
- simulate situations.
- develop number sense.

Technology contributes to a learning environment in which the growing curiosity of students can lead to rich mathematical discoveries at all grade levels. While technology can be used in K–3 to enrich learning, it is expected that students will meet all outcomes without the use of technology.

## Visualization [V]

Visualization “*involves thinking in pictures and images, and the ability to perceive, transform and recreate different aspects of the visual-spatial world*” (Armstrong, 1993, p. 10). The use of visualization in the study of mathematics provides students with opportunities to understand mathematical concepts and make connections among them.

Visual images and visual reasoning are important components of number, spatial and measurement sense. Number visualization occurs when students create mental representations of numbers.

Being able to create, interpret and describe a visual representation is part of spatial sense and spatial reasoning. Spatial visualization and reasoning enable students to describe the relationships among and between 3-D objects and 2-D shapes.

Measurement visualization goes beyond the acquisition of specific measurement skills. Measurement sense includes the ability to determine when to measure, when to estimate and to know several estimation strategies (Shaw & Cliatt, 1989).

Visualization is fostered through the use of concrete materials, technology and a variety of visual representations.

*Visualization is fostered through the use of concrete materials, technology and a variety of visual representations.*

## NATURE OF MATHEMATICS

- *Change*
- *Constancy*
- *Number Sense*
- *Patterns*
- *Relationships*
- *Spatial Sense*
- *Uncertainty*

Mathematics is one way of trying to understand, interpret and describe our world. There are a number of components that define the nature of mathematics and these are woven throughout this document. These components include: change, constancy, number sense, patterns, relationships, spatial sense and uncertainty.

### Change

It is important for students to understand that mathematics is dynamic and not static. As a result, recognizing change is a key component in understanding and developing mathematics.

Within mathematics, students encounter conditions of change and are required to search for explanations of that change. To make predictions, students need to describe and quantify their observations, look for patterns, and describe those quantities that remain fixed and those that change. For example, the sequence 4, 6, 8, 10, 12, ... can be described as:

- skip counting by 2s, starting from 4
- an arithmetic sequence, with first term 4 and a common difference of 2
- a linear function with a discrete domain (Steen, 1990, p. 184).

*Change is an integral part of mathematics and the learning of mathematics.*

## Constancy

Different aspects of constancy are described by the terms stability, conservation, equilibrium, steady state and symmetry (AAAS–Benchmarks, 1993, p. 270). Many important properties in mathematics and science relate to properties that do not change when outside conditions change. Examples of constancy include:

- the area of a rectangular region is the same regardless of the methods used to determine the solution
- the sum of the interior angles of any triangle is  $180^\circ$
- the theoretical probability of flipping a coin and getting heads is 0.5.

Some problems in mathematics require students to focus on properties that remain constant. The recognition of constancy enables students to solve problems involving constant rates of change, lines with constant slope, direct variation situations or the angle sums of polygons.

*Constancy is described by the terms stability, conservation, equilibrium, steady state and symmetry.*

## Number Sense

*An intuition about number is the most important foundation of a numerate child.*

Number sense, which can be thought of as intuition about numbers, is the most important foundation of numeracy (The Primary Program, B.C., 2000, p. 146).

A true sense of number goes well beyond the skills of simply counting, memorizing facts and the situational rote use of algorithms.

Number sense develops when students connect numbers to real-life experiences, and use benchmarks and referents. This results in students who are computationally fluent, flexible with numbers and have intuition about numbers. The evolving number sense typically comes as a by-product of learning rather than through direct instruction. However, number sense can be developed by providing rich mathematical tasks that allow students to make connections.

## Patterns

Mathematics is about recognizing, describing and working with numerical and non-numerical patterns. Patterns exist in all strands and it is important that connections are made among strands. Working with patterns enables students to make connections within and beyond mathematics. These skills contribute to students' interaction with and understanding of their environment.

Patterns may be represented in concrete, visual or symbolic form. Students should develop fluency in moving from one representation to another.

Students must learn to recognize, extend, create and use mathematical patterns. Patterns allow students to make predictions, and justify their reasoning when solving routine and non-routine problems.

Learning to work with patterns in the early grades helps develop students' algebraic thinking that is foundational for working with more abstract mathematics in higher grades.

## Relationships

Mathematics is used to describe and explain relationships. As part of the study of mathematics, students look for relationships among numbers, sets, shapes, objects and concepts. The search for possible relationships involves the collection and analysis of data, and describing relationships visually, symbolically, orally or in written form.

*Mathematics is about recognizing, describing and working with numerical and non-numerical patterns.*

*Mathematics is used to describe and explain relationships.*

## Spatial Sense

*Spatial sense offers a way to interpret and reflect on the physical environment.*

Spatial sense involves visualization, mental imagery and spatial reasoning. These skills are central to the understanding of mathematics. Spatial sense enables students to reason and interpret among and between 3-D and 2-D representations and identify relationships to mathematical strands.

Spatial sense is developed through a variety of experiences and interactions within the environment. The development of spatial sense enables students to solve problems involving 3-D objects and 2-D shapes.

Spatial sense offers a way to interpret and reflect on the physical environment and its 3-D or 2-D representations.

Some problems involve attaching numerals and appropriate units (measurement) to dimensions of objects. Spatial sense allows students to make predictions about the results of changing these dimensions. For example:

- knowing the dimensions of an object enables students to communicate about the object and create representations
- the volume of a rectangular solid can be calculated from given dimensions
- doubling the length of the side of a square increases the area by a factor of four.

## Uncertainty

In mathematics, interpretations of data and the predictions made from data may lack certainty.

Events and experiments generate statistical data that can be used to make predictions. It is important to recognize that these predictions (interpolations and extrapolations) are based upon patterns that have a degree of uncertainty.

The quality of the interpretation is directly related to the quality of the data. An awareness of uncertainty allows students to assess the reliability of data and data interpretation.

Chance addresses the predictability of the occurrence of an outcome. As students develop their understanding of probability, the language of mathematics becomes more specific and describes the degree of uncertainty more accurately.

*Uncertainty is an inherent part of making predictions.*

## STRANDS

- *Number*
- *Patterns and Relations*
- *Shape and Space*
- *Statistics and Probability*

The learning outcomes in the Common Curriculum Framework are organized into four strands across the grades, K–9. Some strands are further subdivided into substrands. There is one general outcome per substrand across the grades, K–9.

The strands and substrands, including the general outcome for each, follow.

### Number

- Develop number sense.

### Patterns and Relations

Patterns

- Use patterns to describe the world and solve problems.

Variables and Equations

- Represent algebraic expressions in multiple ways.

### Shape and Space

Measurement

- Use direct and indirect measure to solve problems.

3-D Objects and 2-D Shapes

- Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.

Transformations

- Describe and analyze position and motion of objects and shapes.

## Statistics and Probability

Data Analysis

- Collect, display and analyze data to solve problems.

Chance and Uncertainty

- Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.

## OUTCOMES AND ACHIEVEMENT INDICATORS

The Common Curriculum Framework is stated in terms of general outcomes, specific outcomes and achievement indicators.

**General outcomes** are overarching statements about what students are expected to learn in each strand/substrand. The general outcome for each strand/substrand is the same throughout the grades.

*General outcomes*

**Specific outcomes** are statements that identify the specific skills, understanding and knowledge students are required to attain by the end of a given grade.

*Specific outcomes*

**Achievement indicators** are one example of a representative list of the depth, breadth and expectations for the outcome. Achievement indicators are pedagogy and context free.

*Achievement indicators*

In this document, the word “including” indicates that any ensuing items **must be addressed** to fully meet the learning outcome. The phrase “such as” indicates that the ensuing items are provided for illustrative purposes or clarification, and are **not requirements that must be addressed** to fully meet the learning outcome.

## SUMMARY

The conceptual framework for K–9 mathematics describes the nature of mathematics, mathematical processes and the mathematical concepts to be addressed in Kindergarten to Grade 9 mathematics. The components are not meant to stand alone. Activities that take place in the mathematics classroom should stem from a problem-solving approach, be based on mathematical processes and lead students to an understanding of the nature of mathematics through specific knowledge, skills and attitudes among and between strands.

## INSTRUCTIONAL FOCUS

The Common Curriculum Framework is arranged into four strands. These strands are not intended to be discrete units of instruction. The integration of outcomes across strands makes mathematical experiences meaningful. Students should make the connection between concepts both within and across strands.

Consider the following when planning for instruction.

- Integration of the mathematical processes within each strand is expected.
- By decreasing emphasis on rote calculation, drill and practice, and the size of numbers used in paper and pencil calculations, more time is available for concept development.
- Problem solving, reasoning and connections are vital to increasing mathematical fluency, and must be integrated throughout the program.
- There is to be a balance among mental mathematics and estimation, paper and pencil exercises, and the use of technology, including calculators and computers. Concepts should be introduced using manipulatives and gradually developed from the concrete to the pictorial to the symbolic.



## **GENERAL AND SPECIFIC OUTCOMES**

### **GENERAL AND SPECIFIC OUTCOMES BY STRAND** (pages 18–51)

This section presents the general and specific outcomes for each strand, Kindergarten through Grade 9.

### **GENERAL AND SPECIFIC OUTCOMES WITH ACHIEVEMENT INDICATORS** (pages 52–159)

This section presents specific outcomes with corresponding achievement indicators and is organized by strand within each grade. The list of indicators contained in this document is not intended to be exhaustive but rather to provide teachers with examples of evidence of understanding that may be used in determining whether or not students understand a given outcome. Teachers may use any number of these indicators or may choose to use other indicators as evidence that the desired learning has been achieved. Achievement indicators should also help teachers form a clear picture of the intent and scope of each mathematics outcome.

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

## GENERAL AND SPECIFIC OUTCOMES BY STRAND

### Number

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.
<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>
<ol style="list-style-type: none"> <li>Say the number sequence by 1s starting anywhere from 1 to 10 and from 10 to 1. [C, CN, V]</li> <li>Recognize, at a glance, and name familiar arrangements of 1 to 5 objects or dots. [C, CN, ME, V]</li> <li>Relate a numeral, 1 to 10, to its respective quantity. [CN, R, V]</li> <li>Represent and describe numbers 2 to 10, concretely and pictorially. [C, CN, ME, R, V]</li> <li>Compare quantities, 1 to 10, using one-to-one correspondence. [C, CN, V]</li> </ol>	<ol style="list-style-type: none"> <li>Say the number sequence, 0 to 100, by: <ul style="list-style-type: none"> <li>1s forward and backward between any two given numbers</li> <li>2s to 20, forward starting at 0</li> <li>5s and 10s to 100, forward starting at 0.</li> </ul> [C, CN, ME, V] </li> <li>Recognize, at a glance, and name familiar arrangements of 1 to 10 objects or dots. [C, CN, ME, V]</li> <li>Demonstrate an understanding of counting by: <ul style="list-style-type: none"> <li>indicating that the last number said identifies “how many”</li> <li>showing that any set has only one count</li> <li>using the counting on strategy</li> <li>using parts or equal groups to count sets.</li> </ul> [C, CN, ME, R, V] </li> </ol>	<ol style="list-style-type: none"> <li>Say the number sequence from 0 to 100 by: <ul style="list-style-type: none"> <li>2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively</li> <li>10s using starting points from 1 to 9</li> <li>2s starting from 1.</li> </ul> [C, CN, ME, R] </li> <li>Demonstrate if a number (up to 100) is even or odd. [C, CN, PS, R]</li> <li>Describe order or relative position using ordinal numbers (up to tenth). [C, CN, R]</li> <li>Represent and describe numbers to 100, concretely, pictorially and symbolically. [C, CN, V]</li> </ol>	<ol style="list-style-type: none"> <li>Say the number sequence forward and backward from 0 to 1000 by: <ul style="list-style-type: none"> <li>5s, 10s, or 100s, using any starting point</li> <li>3s using starting points that are multiples of 3</li> <li>4s using starting points that are multiples of 4</li> <li>25s, using starting points that are multiples of 25</li> </ul> [C, CN, ME] </li> <li>Represent and describe numbers to 1000, concretely, pictorially and symbolically. [C, CN, V]</li> <li>Compare and order numbers to 1000. [CN, R, V]</li> <li>Estimate quantities less than 1000 using referents. [ME, PS, R, V]</li> </ol>	<ol style="list-style-type: none"> <li>Represent and describe whole numbers to 10 000, pictorially and symbolically. [C, CN, V]</li> <li>Compare and order numbers to 10 000. [C, CN]</li> <li>Demonstrate an understanding of addition of numbers with answers to 10 000 and their corresponding subtractions (limited to 3 and 4-digit numerals) by: <ul style="list-style-type: none"> <li>using personal strategies for adding and subtracting</li> <li>estimating sums and differences</li> <li>solving problems involving addition and subtraction.</li> </ul> [C, CN, ME, PS, R] </li> </ol>

## Number

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.
<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>
<ol style="list-style-type: none"> <li>Represent and describe whole numbers to 1 000 000. [C, CN, V, T]</li> <li>Use estimation strategies, including: <ul style="list-style-type: none"> <li>front-end rounding</li> <li>compensation</li> <li>compatible numbers in problem-solving contexts. [C, CN, ME, PS, R, V]</li> </ul> </li> <li>Apply mental mathematics strategies and number properties, such as: <ul style="list-style-type: none"> <li>skip counting from a known fact</li> <li>using doubling or halving</li> <li>using patterns in the 9s facts</li> <li>using repeated doubling or halving</li> </ul>                     to determine answers for basic multiplication facts to 81 and related division facts. [C, CN, ME, R, V]                 </li> </ol>	<ol style="list-style-type: none"> <li>Demonstrate an understanding of place value for numbers: <ul style="list-style-type: none"> <li>greater than one million</li> <li>less than one thousandth. [C, CN, R, T]</li> </ul> </li> <li>Solve problems involving large numbers, using technology. [ME, PS, T]</li> <li>Demonstrate an understanding of factors and multiples by: <ul style="list-style-type: none"> <li>determining multiples and factors of numbers less than 100</li> <li>identifying prime and composite numbers</li> <li>solving problems involving multiples. [PS, R, V]</li> </ul> </li> <li>Relate improper fractions to mixed numbers. [CN, ME, R, V]</li> </ol>	<ol style="list-style-type: none"> <li>Determine and explain why a number is divisible by 2, 3, 4, 5, 6, 8, 9 or 10, and why a number cannot be divided by 0. [C, R]</li> <li>Demonstrate an understanding of the addition, subtraction, multiplication and division of decimals (for more than 1-digit divisors or 2-digit multipliers, the use of technology is expected) to solve problems. [ME, PS, T]</li> <li>Solve problems involving percents from 1% to 100%. [C, CN, PS, R, T]</li> <li>Demonstrate an understanding of the relationship between positive repeating decimals and positive fractions, and positive terminating decimals and positive fractions. [C, CN, R, T]</li> </ol>	<ol style="list-style-type: none"> <li>Demonstrate an understanding of perfect squares and square roots, concretely, pictorially and symbolically (limited to whole numbers). [C, CN, R, V]</li> <li>Determine the approximate square root of numbers that are not perfect squares (limited to whole numbers). [C, CN, ME, R, T]</li> <li>Demonstrate an understanding of percents greater than or equal to 0%. [CN, PS, R, V]</li> <li>Demonstrate an understanding of ratio and rate. [C, CN, V]</li> <li>Solve problems that involve rates, ratios and proportional reasoning. [C, CN, PS, R]</li> </ol>	<ol style="list-style-type: none"> <li>Demonstrate an understanding of powers with integral bases (excluding base 0) and whole number exponents by: <ul style="list-style-type: none"> <li>representing repeated multiplication using powers</li> <li>using patterns to show that a power with an exponent of zero is equal to one</li> <li>solving problems involving powers. [C, CN, PS, R]</li> </ul> </li> <li>Demonstrate an understanding of operations on powers with integral bases (excluding base 0) and whole number exponents. [C, CN, PS, R, T]</li> <li>Demonstrate an understanding of rational numbers by: <ul style="list-style-type: none"> <li>comparing and ordering rational numbers</li> <li>solving problems that involve arithmetic operations on rational numbers. [C, CN, PS, R, T, V]</li> </ul> </li> </ol>

## Number (continued)

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.
	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>
	<p>4. Represent and describe numbers to 20 concretely, pictorially and symbolically. [C, CN, V]</p> <p>5. Compare sets containing up to 20 elements to solve problems using:</p> <ul style="list-style-type: none"> <li>• referents</li> <li>• one-to-one correspondence.</li> </ul> <p>[C, CN, ME, PS, R, V]</p> <p>6. Estimate quantities to 20 by using referents. [C, ME, PS, R, V]</p> <p>7. Demonstrate, concretely and pictorially, how a given number can be represented by a variety of equal groups with and without singles. [C, R, V]</p> <p>8. Identify the number, up to 20, that is one more, two more, one less and two less than a given number. [C, CN, ME, R, V]</p>	<p>5. Compare and order numbers up to 100. [C, CN, R, V]</p> <p>6. Estimate quantities to 100 using referents. [C, ME, PS, R]</p> <p>7. Illustrate, concretely and pictorially, the meaning of place value for numerals to 100. [C, CN, R, V]</p> <p>8. Demonstrate and explain the effect of adding zero to or subtracting zero from any number. [C, R]</p>	<p>5. Illustrate, concretely and pictorially, the meaning of place value for numerals to 1000. [C, CN, R, V]</p> <p>6. Describe and apply mental mathematics strategies for adding two 2-digit numerals, such as:</p> <ul style="list-style-type: none"> <li>• adding from left to right</li> <li>• taking one addend to the nearest multiple of ten and then compensating</li> <li>• using doubles.</li> </ul> <p>[C, ME, PS, R, V]</p> <p>7. Describe and apply mental mathematics strategies for subtracting two 2-digit numerals, such as:</p> <ul style="list-style-type: none"> <li>• taking the subtrahend to the nearest multiple of ten and then compensating</li> <li>• thinking of addition</li> <li>• using doubles.</li> </ul> <p>[C, ME, PS, R, V]</p>	<p>4. Explain the properties of 0 and 1 for multiplication and the property of 1 for division. [C, CN, R]</p> <p>5. Describe and apply mental mathematics strategies, such as:</p> <ul style="list-style-type: none"> <li>• skip counting from a known fact</li> <li>• using doubling or halving</li> <li>• using doubling or halving and adding or subtracting one more group</li> <li>• using patterns in the 9s facts</li> <li>• using repeated doubling to determine basic multiplication facts to <math>9 \times 9</math> and related division facts.</li> </ul> <p>[C, CN, ME, PS, R]</p>

## Number

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.
<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>
<p>4. Apply mental mathematics strategies for multiplication, such as:</p> <ul style="list-style-type: none"> <li>• annexing then adding zero</li> <li>• halving and doubling</li> <li>• using the distributive property.</li> </ul> <p>[C, ME, R]</p> <p>5. Demonstrate an understanding of multiplication (2-digit by 2-digit) to solve problems. [C, CN, PS, V]</p> <p>6. Demonstrate, with and without concrete materials, an understanding of division (3-digit by 1-digit) and interpret remainders to solve problems. [C, CN, PS]</p>	<p>5. Demonstrate an understanding of ratio, concretely, pictorially and symbolically. [C, CN, PS, R, V]</p> <p>6. Demonstrate an understanding of percent, (limited to whole numbers) concretely, pictorially and symbolically. [C, CN, PS, R, V]</p> <p>7. Demonstrate an understanding of integers, concretely, pictorially and symbolically. [C, CN, R, V]</p>	<p>5. Demonstrate an understanding of adding and subtracting positive fractions and mixed numbers, with like and unlike denominators, concretely, pictorially and symbolically (limited to positive sums and differences). [C, CN, ME, PS, R, V]</p> <p>6. Demonstrate an understanding of addition and subtraction of integers, concretely, pictorially and symbolically. [C, CN, PS, R, V]</p> <p>7. Compare and order positive fractions, positive decimals (to thousandths) and whole numbers by using:</p> <ul style="list-style-type: none"> <li>• benchmarks</li> <li>• place value</li> <li>• equivalent fractions and/or decimals.</li> </ul> <p>[CN, R, V]</p>	<p>6. Demonstrate an understanding of multiplying and dividing positive fractions and mixed numbers, concretely, pictorially and symbolically. [C, CN, ME, PS]</p> <p>7. Demonstrate an understanding of multiplication and division of integers, concretely, pictorially and symbolically. [C, CN, PS, R, V]</p>	<p>4. Explain and apply the order of operations, including exponents, with and without technology. [PS, T]</p> <p>5. Determine the square root of positive rational numbers that are perfect squares. [C, CN, PS, R, T]</p> <p>6. Determine an approximate square root of positive rational numbers that are non-perfect squares. [C, CN, PS, R, T]</p>

## Number (continued)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.
	<b>Specific Outcomes</b>  9. Demonstrate an understanding of addition of numbers with answers to 20 and their corresponding subtraction facts, concretely, pictorially and symbolically by: <ul style="list-style-type: none"> <li>• using familiar and mathematical language to describe additive and subtractive actions from their experience</li> <li>• creating and solving problems in context that involve addition and subtraction</li> <li>• modelling addition and subtraction using a variety of concrete and visual representations, and recording the process symbolically.</li> </ul> [C, CN, ME, PS, R, V]	<b>Specific Outcomes</b>  9. Demonstrate an understanding of addition (limited to 1 and 2-digit numerals) with answers to 100 and the corresponding subtraction by: <ul style="list-style-type: none"> <li>• using personal strategies for adding and subtracting with and without the support of manipulatives</li> <li>• creating and solving problems that involve addition and subtraction</li> <li>• explaining that the order in which numbers are added does not affect the sum</li> <li>• explaining that the order in which numbers are subtracted may affect the difference.</li> </ul> [C, CN, ME, PS, R, V]	<b>Specific Outcomes</b>  8. Apply estimation strategies to predict sums and differences of two 2-digit numerals in a problem-solving context. [C, ME, PS, R]  9. Demonstrate an understanding of addition and subtraction of numbers with answers to 1000 (limited to 1, 2 and 3-digit numerals) by: <ul style="list-style-type: none"> <li>• using personal strategies for adding and subtracting with and without the support of manipulatives</li> <li>• creating and solving problems in contexts that involve addition and subtraction of numbers concretely, pictorially and symbolically.</li> </ul> [C, CN, ME, PS, R]	<b>Specific Outcomes</b>  6. Demonstrate an understanding of multiplication (2- or 3-digit by 1-digit) to solve problems by: <ul style="list-style-type: none"> <li>• using personal strategies for multiplication with and without concrete materials</li> <li>• using arrays to represent multiplication</li> <li>• connecting concrete representations to symbolic representations</li> <li>• estimating products.</li> </ul> [C, CN, ME, PS, R, V]  7. Demonstrate an understanding of division (1-digit divisor and up to 2-digit dividend) to solve problems by: <ul style="list-style-type: none"> <li>• using personal strategies for dividing with and without concrete materials</li> <li>• estimating quotients</li> <li>• relating division to multiplication.</li> </ul> [C, CN, ME, PS, R, V]

**Number (continued)**

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.			
<b>Specific Outcomes</b>	<b>Specific Outcomes</b>			
<p>7. Demonstrate an understanding of fractions by using concrete and pictorial representations to:</p> <ul style="list-style-type: none"> <li>• create sets of equivalent fractions</li> <li>• compare fractions with like and unlike denominators.</li> </ul> <p>[C, CN, PS, R, V]</p> <p>8. Describe and represent decimals (tenths, hundredths, thousandths) concretely, pictorially and symbolically. [C, CN, R, V]</p> <p>9. Relate decimals to fractions (to thousandths). [CN, R, V]</p> <p>10. Compare and order decimals (to thousandths), by using:</p> <ul style="list-style-type: none"> <li>• benchmarks</li> <li>• place value</li> <li>• equivalent decimals.</li> </ul> <p>[CN, R, V]</p>	<p>8. Demonstrate an understanding of multiplication and division of decimals (1-digit whole number multipliers and 1-digit natural number divisors). [C, CN, ME, PS, R, V]</p> <p>9. Explain and apply the order of operations, excluding exponents, with and without technology (limited to whole numbers). [CN, ME, PS, T]</p>			

**Number (continued)**

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
	<b>General Outcome</b> Develop number sense.		<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.
	<b>Specific Outcomes</b>  10. Describe and use mental mathematics strategies (memorization not intended), such as: <ul style="list-style-type: none"> <li>• counting on and counting back</li> <li>• making 10</li> <li>• doubles</li> <li>• using addition to subtract for the basic addition and subtraction facts to 18.</li> </ul> [C, CN, ME, PS, R, V]	10. Apply mental mathematics strategies, such as: <ul style="list-style-type: none"> <li>• using doubles</li> <li>• making 10</li> <li>• one more, one less</li> <li>• two more, two less</li> <li>• addition for subtraction to determine basic addition facts to 18 and related subtraction facts.</li> </ul> [C, CN, ME, R, V]	<b>Specific Outcomes</b>  10. Apply mental mathematics strategies and number properties, such as: <ul style="list-style-type: none"> <li>• using doubles</li> <li>• making 10</li> <li>• using the commutative property</li> <li>• using the property of zero</li> <li>• thinking addition for subtraction to determine answers for basic addition facts and related subtraction facts (to 18).</li> </ul> [C, CN, ME, R, V]	<b>Specific Outcomes</b>  8. Demonstrate an understanding of fractions less than or equal to one by using concrete and pictorial representations to: <ul style="list-style-type: none"> <li>• name and record fractions for the parts of a whole or a set</li> <li>• compare and order fractions</li> <li>• model and explain that for different wholes, two identical fractions may not represent the same quantity</li> <li>• provide examples of where fractions are used.</li> </ul> [C, CN, PS, R, V]
				9. Describe and represent decimals (tenths and hundredths) concretely, pictorially and symbolically. [C, CN, R, V]

**Number (continued)**

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
<b>General Outcome</b> Develop number sense.				
<b>Specific Outcomes</b>				
11. Demonstrate an understanding of addition and subtraction of decimals (limited to thousandths). [C, CN, PS, R, V]				

**Number (continued)**

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
			<b>General Outcome</b> Develop number sense.	<b>General Outcome</b> Develop number sense.
			<b>Specific Outcomes</b>  11. Demonstrate an understanding of multiplication to $5 \times 5$ by: <ul style="list-style-type: none"> <li>• representing and explaining multiplication using equal grouping and arrays</li> <li>• creating and solving problems in context that involve multiplication</li> <li>• modelling multiplication using concrete and visual representations, and recording the process symbolically</li> <li>• relating multiplication to repeated addition</li> <li>• relating multiplication to division.</li> </ul> [C, CN, PS, R]	<b>Specific Outcomes</b>  10. Relate decimals to fractions (to hundredths). [CN, R, V]  11. Demonstrate an understanding of addition and subtraction of decimals (limited to hundredths) by: <ul style="list-style-type: none"> <li>• using compatible numbers</li> <li>• estimating sums and differences</li> <li>• using mental math strategies to solve problems.</li> </ul> [C, ME, PS, R, V]

**Number (continued)**

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9

**Number (continued)**

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
			<p><b>General Outcome</b> Develop number sense.</p> <p><b>Specific Outcomes</b></p> <p>12. Demonstrate an understanding of division by:</p> <ul style="list-style-type: none"> <li>• representing and explaining division using equal sharing and equal grouping</li> <li>• creating and solving problems in context that involve equal sharing and equal grouping</li> <li>• modelling equal sharing and equal grouping using concrete and visual representations, and recording the process symbolically</li> <li>• relating division to repeated subtraction</li> <li>• relating division to multiplication.</li> </ul> <p>(limited to division related to multiplication facts up to <math>5 \times 5</math>) [C, CN, PS, R]</p>	

**Number (continued)**

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9

**Number (continued)**

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
			<p><b>General Outcome</b> Develop number sense.</p> <p><b>Specific Outcomes</b></p> <p>13. Demonstrate an understanding of fractions by:</p> <ul style="list-style-type: none"> <li>• explaining that a fraction represents a part of a whole</li> <li>• describing situations in which fractions are used</li> <li>• comparing fractions of the same whole with like denominators.</li> </ul> <p>[C, CN, ME, R, V]</p>	

**Number (continued)**

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9

## Patterns and Relations (Patterns)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
<b>General Outcome</b> Use patterns to describe the world and solve problems.	<b>General Outcome</b> Use patterns to describe the world and solve problems.	<b>General Outcome</b> Use patterns to describe the world and solve problems.	<b>General Outcome</b> Use patterns to describe the world and solve problems.	<b>General Outcome</b> Use patterns to describe the world and solve problems.
<b>Specific Outcomes</b>  1. Demonstrate an understanding of repeating patterns (two or three elements) by: <ul style="list-style-type: none"> <li>• identifying</li> <li>• reproducing</li> <li>• extending</li> <li>• creating</li> </ul> patterns using manipulatives, sounds and actions. [C, CN, PS, V]	<b>Specific Outcomes</b>  1. Demonstrate an understanding of repeating patterns (two to four elements) by: <ul style="list-style-type: none"> <li>• describing</li> <li>• reproducing</li> <li>• extending</li> <li>• creating</li> </ul> patterns using manipulatives, diagrams, sounds and actions. [C, PS, R, V]  2. Translate repeating patterns from one representation to another. [C, R, V]	<b>Specific Outcomes</b>  1. Demonstrate an understanding of repeating patterns (three to five elements) by: <ul style="list-style-type: none"> <li>• describing</li> <li>• extending</li> <li>• comparing</li> <li>• creating</li> </ul> patterns using manipulatives, diagrams, sounds and actions. [C, CN, PS, R, V]  2. Demonstrate an understanding of increasing patterns by: <ul style="list-style-type: none"> <li>• describing</li> <li>• reproducing</li> <li>• extending</li> <li>• creating</li> </ul> patterns using manipulatives, diagrams, sounds and actions (numbers to 100). [C, CN, PS, R, V]	<b>Specific Outcomes</b>  1. Demonstrate an understanding of increasing patterns by: <ul style="list-style-type: none"> <li>• describing</li> <li>• extending</li> <li>• comparing</li> <li>• creating</li> </ul> patterns using manipulatives, diagrams, sounds and actions (numbers to 1000). [C, CN, PS, R, V]  2. Demonstrate an understanding of decreasing patterns by: <ul style="list-style-type: none"> <li>• describing</li> <li>• extending</li> <li>• comparing</li> <li>• creating</li> </ul> patterns using manipulatives, diagrams, sounds and actions (numbers to 1000). [C, CN, PS, R, V]	<b>Specific Outcomes</b>  1. Identify and describe patterns found in tables and charts, including a multiplication chart. [C, CN, PS, V]  2. Reproduce a pattern shown in a table or chart using concrete materials. [C, CN, V]  3. Represent and describe patterns and relationships using charts and tables to solve problems. [C, CN, PS, R, V]  4. Identify and explain mathematical relationships using charts and diagrams to solve problems. [CN, PS, R, V]

## Patterns and Relations (Patterns)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
<b>General Outcome</b> Use patterns to describe the world and solve problems.	<b>General Outcome</b> Use patterns to describe the world and solve problems.	<b>General Outcome</b> Use patterns to describe the world and solve problems.	<b>General Outcome</b> Use patterns to describe the world and solve problems.	<b>General Outcome</b> Use patterns to describe the world and solve problems.
<b>Specific Outcomes</b>  1. Determine the pattern rule to make predictions about subsequent elements. [C, CN, PS, R, V]	<b>Specific Outcomes</b>  1. Demonstrate an understanding of the relationship within tables of values to solve problems. [C, CN, PS, R]  2. Represent and describe patterns and relationships using graphs and tables. [C, CN, ME, PS, R, V]	<b>Specific Outcomes</b>  1. Demonstrate an understanding of oral and written patterns and their equivalent linear relations. [C, CN, R]  2. Create a table of values from a linear relation, graph the table of values, and analyze the graph to draw conclusions and solve problems. [C, CN, R, V]	<b>Specific Outcomes</b>  1. Graph and analyze two-variable linear relations. [C, ME, PS, R, T, V]	<b>Specific Outcomes</b>  1. Generalize a pattern arising from a problem-solving context using linear equations and verify by substitution. [C, CN, PS, R, V]  2. Graph linear relations, analyze the graph and interpolate or extrapolate to solve problems. [C, CN, PS, R, T, V]

## Patterns and Relations (Variables and Equations)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
	<b>General Outcome</b> Represent algebraic expressions in multiple ways.	<b>General Outcome</b> Represent algebraic expressions in multiple ways.	<b>General Outcome</b> Represent algebraic expressions in multiple ways.	<b>General Outcome</b> Represent algebraic expressions in multiple ways.
	<b>Specific Outcomes</b>  3. Describe equality as a balance and inequality as an imbalance, concretely and pictorially (0 to 20). [C, CN, R, V]  4. Record equalities using the equal symbol. [C, CN, PS, V]	<b>Specific Outcomes</b>  3. Demonstrate and explain the meaning of equality and inequality by using manipulatives and diagrams (0 to 100). [C, CN, R, V]  4. Record equalities and inequalities symbolically using the equal symbol or the not equal symbol. [C, CN, R, V]	<b>Specific Outcomes</b>  3. Solve one-step addition and subtraction equations involving symbols representing an unknown number. [C, CN, PS, R, V]	<b>Specific Outcomes</b>  5. Express a given problem as an equation in which a symbol is used to represent an unknown number. [CN, PS, R]  6. Solve one-step equations involving a symbol to represent an unknown number. [C, CN, PS, R, V]

## Patterns and Relations (Variables and Equations)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
<b>General Outcome</b> Represent algebraic expressions in multiple ways.	<b>General Outcome</b> Represent algebraic expressions in multiple ways.	<b>General Outcome</b> Represent algebraic expressions in multiple ways.	<b>General Outcome</b> Represent algebraic expressions in multiple ways.	<b>General Outcome</b> Represent algebraic expressions in multiple ways.
<b>Specific Outcomes</b>  2. Solve problems involving single-variable, one-step equations with whole number coefficients and whole number solutions. [C, CN, PS, R]	<b>Specific Outcomes</b>  3. Represent generalizations arising from number relationships using equations with letter variables. [C, CN, PS, R, V]  4. Demonstrate and explain the meaning of preservation of equality concretely, pictorially and symbolically. [C, CN, PS, R, V]	<b>Specific Outcomes</b>  3. Demonstrate an understanding of preservation of equality by: <ul style="list-style-type: none"> <li>• modelling preservation of equality, concretely, pictorially and symbolically</li> <li>• applying preservation of equality to solve equations.</li> </ul> [C, CN, PS, R, V]  4. Explain the difference between an expression and an equation. [C, CN]  5. Evaluate an expression given the value of the variable(s). [CN, R]  6. Model and solve problems that can be represented by one-step linear equations of the form $x + a = b$ , concretely, pictorially and symbolically, where $a$ and $b$ are integers. [CN, PS, R, V]	<b>Specific Outcomes</b>  2. Model and solve problems using linear equations of the form: <ul style="list-style-type: none"> <li>• <math>ax = b</math></li> <li>• <math>\frac{x}{a} = b, a \neq 0</math></li> <li>• <math>ax + b = c</math></li> <li>• <math>\frac{x}{a} + b = c, a \neq 0</math></li> <li>• <math>a(x + b) = c</math></li> </ul> concretely, pictorially and symbolically, where $a, b$ and $c$ are integers. [C, CN, PS, V]	<b>Specific Outcomes</b>  3. Model and solve problems using linear equations of the form: <ul style="list-style-type: none"> <li>• <math>ax = b</math></li> <li>• <math>\frac{x}{a} = b, a \neq 0</math></li> <li>• <math>ax + b = c</math></li> <li>• <math>\frac{x}{a} + b = c, a \neq 0</math></li> <li>• <math>ax = b + cx</math></li> <li>• <math>a(x + b) = c</math></li> <li>• <math>ax + b = cx + d</math></li> <li>• <math>a(bx + c) = d(ex + f)</math></li> <li>• <math>\frac{a}{x} = b, x \neq 0</math></li> </ul> where $a, b, c, d, e$ and $f$ are rational numbers. [C, CN, PS, V]  4. Explain and illustrate strategies to solve single variable linear inequalities with rational coefficients within a problem-solving context. [C, CN, PS, R, V]  5. Demonstrate an understanding of polynomials (limited to polynomials of degree less than or equal to 2). [C, CN, R, V]

**Patterns and Relations (Variables and Equations) (continued)**

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4

**Patterns and Relations (Variables and Equations) (continued)**

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
		<p><b>General Outcome</b> Represent algebraic expressions in multiple ways.</p>		<p><b>General Outcome</b> Represent algebraic expressions in multiple ways.</p>
		<p><b>Specific Outcomes</b></p> <p>7. Model and solve problems that can be represented by linear equations of the form:</p> <ul style="list-style-type: none"> <li>• <math>ax + b = c</math></li> <li>• <math>ax = b</math></li> <li>• <math>\frac{x}{a} = b, a \neq 0</math></li> </ul> <p>concretely, pictorially and symbolically, where <math>a, b</math> and <math>c</math> are whole numbers. [CN, PS, R, V]</p>		<p><b>Specific Outcomes</b></p> <p>6. Model, record and explain the operations of addition and subtraction of polynomial expressions, concretely, pictorially and symbolically (limited to polynomials of degree less than or equal to 2). [C, CN, PS, R, V]</p> <p>7. Model, record and explain the operations of multiplication and division of polynomial expressions (limited to polynomials of degree less than or equal to 2) by monomials, concretely, pictorially and symbolically. [C, CN, R, V]</p>

## Shape and Space (Measurement)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
<b>General Outcome</b> Use direct or indirect measurement to solve problems.	<b>General Outcome</b> Use direct or indirect measurement to solve problems.	<b>General Outcome</b> Use direct or indirect measurement to solve problems.	<b>General Outcome</b> Use direct or indirect measurement to solve problems.	<b>General Outcome</b> Use direct or indirect measurement to solve problems.
<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>
1. Use direct comparison to compare two objects based on a single attribute, such as length (height), mass (weight) and volume (capacity). [C, CN, PS, R, V]	1. Demonstrate an understanding of measurement as a process of comparing by: <ul style="list-style-type: none"> <li>identifying attributes that can be compared</li> <li>ordering objects</li> <li>making statements of comparison</li> <li>filling, covering or matching.</li> </ul> [C, CN, PS, R, V]	1. Relate the number of days to a week and the number of months to a year in a problem-solving context. [C, CN, PS, R] 2. Relate the size of a unit of measure to the number of units (limited to non-standard units) used to measure length and mass (weight). [C, CN, ME, R, V] 3. Compare and order objects by length, height, distance around and mass (weight) using non-standard units, and make statements of comparison. [C, CN, ME, R, V] 4. Measure length to the nearest non-standard unit by: <ul style="list-style-type: none"> <li>using multiple copies of a unit</li> <li>using a single copy of a unit (iteration process).</li> </ul> [C, ME, R, V]	1. Relate the passage of time to common activities using non-standard and standard units (minutes, hours, days, weeks, months, years). [CN, ME, R] 2. Relate the number of seconds to a minute, the number of minutes to an hour and the number of days to a month in a problem-solving context. [C, CN, PS, R, V] 3. Demonstrate an understanding of measuring length (cm, m) by: <ul style="list-style-type: none"> <li>selecting and justifying referents for the units cm and m</li> <li>modelling and describing the relationship between the units cm and m</li> <li>estimating length using referents</li> <li>measuring and recording length, width and height.</li> </ul> [C, CN, ME, PS, R, V]	1. Read and record time using digital and analog clocks, including 24-hour clocks. [C, CN, V] 2. Read and record calendar dates in a variety of formats. [C, V] 3. Demonstrate an understanding of area of regular and irregular 2-D shapes by: <ul style="list-style-type: none"> <li>recognizing that area is measured in square units</li> <li>selecting and justifying referents for the units <math>\text{cm}^2</math> or <math>\text{m}^2</math></li> <li>estimating area by using referents for <math>\text{cm}^2</math> or <math>\text{m}^2</math></li> <li>determining and recording area (<math>\text{cm}^2</math> or <math>\text{m}^2</math>)</li> <li>constructing different rectangles for a given area (<math>\text{cm}^2</math> or <math>\text{m}^2</math>) in order to demonstrate that many different rectangles may have the same area.</li> </ul> [C, CN, ME, PS, R, V]

## Shape and Space (Measurement)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
<b>General Outcome</b> Use direct or indirect measurement to solve problems.	<b>General Outcome</b> Use direct or indirect measurement to solve problems.	<b>General Outcome</b> Use direct or indirect measurement to solve problems.	<b>General Outcome</b> Use direct or indirect measurement to solve problems.	<b>General Outcome</b> Use direct or indirect measurement to solve problems.
<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>	<b>Specific Outcomes</b>
<ol style="list-style-type: none"> <li>Design and construct different rectangles given either perimeter or area, or both (whole numbers) and draw conclusions. [C, CN, PS, R, V]</li> <li>Demonstrate an understanding of measuring length (mm) by: <ul style="list-style-type: none"> <li>selecting and justifying referents for the unit mm</li> <li>modelling and describing the relationship between mm and cm units, and between mm and m units. [C, CN, ME, PS, R, V]</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>Demonstrate an understanding of angles by: <ul style="list-style-type: none"> <li>identifying examples of angles in the environment</li> <li>classifying angles according to their measure</li> <li>estimating the measure of angles using <math>45^\circ</math>, <math>90^\circ</math> and <math>180^\circ</math> as reference angles</li> <li>determining angle measures in degrees</li> <li>drawing and labelling angles when the measure is specified. [C, CN, ME, V]</li> </ul> </li> <li>Demonstrate that the sum of interior angles is: <ul style="list-style-type: none"> <li><math>180^\circ</math> in a triangle</li> <li><math>360^\circ</math> in a quadrilateral. [C, R]</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>Demonstrate an understanding of circles by: <ul style="list-style-type: none"> <li>describing the relationships among radius, diameter and circumference of circles</li> <li>relating circumference to pi</li> <li>determining the sum of the central angles</li> <li>constructing circles with a given radius or diameter</li> <li>solving problems involving the radii, diameters and circumferences of circles. [C, CN, R, V]</li> </ul> </li> <li>Develop and apply a formula for determining the area of: <ul style="list-style-type: none"> <li>triangles</li> <li>parallelograms</li> <li>circles. [CN, PS, R, V]</li> </ul> </li> </ol>	<ol style="list-style-type: none"> <li>Develop and apply the Pythagorean theorem to solve problems. [CN, PS, R, V, T]</li> <li>Draw and construct nets for 3-D objects. [C, CN, PS, V]</li> <li>Determine the surface area of: <ul style="list-style-type: none"> <li>right rectangular prisms</li> <li>right triangular prisms</li> <li>right cylinders to solve problems. [C, CN, PS, R, V]</li> </ul> </li> <li>Develop and apply formulas for determining the volume of right prisms and right cylinders. [C, CN, PS, R, V]</li> </ol>	<ol style="list-style-type: none"> <li>Solve problems and justify the solution strategy using circle properties, including: <ul style="list-style-type: none"> <li>the perpendicular from the centre of a circle to a chord bisects the chord</li> <li>the measure of the central angle is equal to twice the measure of the inscribed angle subtended by the same arc</li> <li>the inscribed angles subtended by the same arc are congruent</li> <li>a tangent to a circle is perpendicular to the radius at the point of tangency. [C, CN, PS, R, T, V]</li> </ul> </li> </ol>

**Shape and Space (Measurement) (continued)**

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
		<p><b>General Outcome</b> Use direct or indirect measurement to solve problems.</p>	<p><b>General Outcome</b> Use direct or indirect measurement to solve problems.</p>	
		<p><b>Specific Outcomes</b></p> <p>5. Demonstrate that changing the orientation of an object does not alter the measurements of its attributes. [C, R, V]</p>	<p><b>Specific Outcomes</b></p> <p>4. Demonstrate an understanding of measuring mass (g, kg) by:</p> <ul style="list-style-type: none"> <li>• selecting and justifying referents for the units g and kg</li> <li>• modelling and describing the relationship between the units g and kg</li> <li>• estimating mass using referents</li> <li>• measuring and recording mass.</li> </ul> <p>[C, CN, ME, PS, R, V]</p> <p>5. Demonstrate an understanding of perimeter of regular and irregular shapes by:</p> <ul style="list-style-type: none"> <li>• estimating perimeter using referents for centimetre or metre</li> <li>• measuring and recording perimeter (cm, m)</li> <li>• constructing different shapes for a given perimeter (cm, m) to demonstrate that many shapes are possible for a perimeter.</li> </ul> <p>[C, ME, PS, R, V]</p>	

## Shape and Space (Measurement) (continued)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
<p><b>General Outcome</b> Use direct or indirect measurement to solve problems.</p>	<p><b>General Outcome</b> Use direct or indirect measurement to solve problems.</p>			
<p><b>Specific Outcomes</b></p> <p>3. Demonstrate an understanding of volume by:</p> <ul style="list-style-type: none"> <li>selecting and justifying referents for <math>\text{cm}^3</math> or <math>\text{m}^3</math> units</li> <li>estimating volume by using referents for <math>\text{cm}^3</math> or <math>\text{m}^3</math></li> <li>measuring and recording volume (<math>\text{cm}^3</math> or <math>\text{m}^3</math>)</li> <li>constructing rectangular prisms for a given volume.</li> </ul> <p>[C, CN, ME, PS, R, V]</p> <p>4. Demonstrate an understanding of capacity by:</p> <ul style="list-style-type: none"> <li>describing the relationship between mL and L</li> <li>selecting and justifying referents for mL or L units</li> <li>estimating capacity by using referents for mL or L</li> <li>measuring and recording capacity (mL or L).</li> </ul> <p>[C, CN, ME, PS, R, V]</p>	<p><b>Specific Outcomes</b></p> <p>3. Develop and apply a formula for determining the:</p> <ul style="list-style-type: none"> <li>perimeter of polygons</li> <li>area of rectangles</li> <li>volume of right rectangular prisms.</li> </ul> <p>[C, CN, PS, R, V]</p>			

## Shape and Space (3-D Objects and 2-D Shapes)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
<p><b>General Outcome</b> Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</p>	<p><b>General Outcome</b> Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</p>	<p><b>General Outcome</b> Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</p>	<p><b>General Outcome</b> Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</p>	<p><b>General Outcome</b> Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</p>
<p><b>Specific Outcomes</b></p> <p>2. Sort 3-D objects using a single attribute. [C, CN, PS, R, V]</p> <p>3. Build and describe 3-D objects. [CN, PS, V]</p>	<p><b>Specific Outcomes</b></p> <p>2. Sort 3-D objects and 2-D shapes using one attribute, and explain the sorting rule. [C, CN, R, V]</p> <p>3. Replicate composite 2-D shapes and 3-D objects. [CN, PS, V]</p> <p>4. Compare 2-D shapes to parts of 3-D objects in the environment. [C, CN, V]</p>	<p><b>Specific Outcomes</b></p> <p>6. Sort 2-D shapes and 3-D objects using two attributes, and explain the sorting rule. [C, CN, R, V]</p> <p>7. Describe, compare and construct 3-D objects, including:</p> <ul style="list-style-type: none"> <li>• cubes</li> <li>• spheres</li> <li>• cones</li> <li>• cylinders</li> <li>• pyramids.</li> </ul> <p>[C, CN, R, V]</p> <p>8. Describe, compare and construct 2-D shapes, including:</p> <ul style="list-style-type: none"> <li>• triangles</li> <li>• squares</li> <li>• rectangles</li> <li>• circles.</li> </ul> <p>[C, CN, R, V]</p> <p>9. Identify 2-D shapes as parts of 3-D objects in the environment. [C, CN, R, V]</p>	<p><b>Specific Outcomes</b></p> <p>6. Describe 3-D objects according to the shape of the faces, and the number of edges and vertices. [C, CN, PS, R, V]</p> <p>7. Sort regular and irregular polygons, including:</p> <ul style="list-style-type: none"> <li>• triangles</li> <li>• quadrilaterals</li> <li>• pentagons</li> <li>• hexagons</li> <li>• octagons</li> </ul> <p>according to the number of sides. [C, CN, R, V]</p>	<p><b>Specific Outcomes</b></p> <p>4. Describe and construct rectangular and triangular prisms. [C, CN, R, V]</p>

## Shape and Space (3-D Objects and 2-D Shapes)

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
<p><b>General Outcome</b> Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</p>	<p><b>General Outcome</b> Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</p>	<p><b>General Outcome</b> Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</p>	<p><b>General Outcome</b> Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</p>	<p><b>General Outcome</b> Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</p>
<p><b>Specific Outcomes</b></p> <p>5. Describe and provide examples of edges and faces of 3-D objects and sides of 2-D shapes that are:</p> <ul style="list-style-type: none"> <li>• parallel</li> <li>• intersecting</li> <li>• perpendicular</li> <li>• vertical</li> <li>• horizontal.</li> </ul> <p>[C, CN, R, T, V]</p> <p>6. Identify and sort quadrilaterals, including:</p> <ul style="list-style-type: none"> <li>• rectangles</li> <li>• squares</li> <li>• trapezoids</li> <li>• parallelograms</li> <li>• rhombuses</li> </ul> <p>according to their attributes. [C, R, V]</p>	<p><b>Specific Outcomes</b></p> <p>4. Construct and compare triangles, including:</p> <ul style="list-style-type: none"> <li>• scalene</li> <li>• isosceles</li> <li>• equilateral</li> <li>• right</li> <li>• obtuse</li> <li>• acute</li> </ul> <p>in different orientations. [C, PS, R, V]</p> <p>5. Describe and compare the sides and angles of regular and irregular polygons. [C, PS, R, V]</p>	<p><b>Specific Outcomes</b></p> <p>3. Perform geometric constructions, including:</p> <ul style="list-style-type: none"> <li>• perpendicular line segments</li> <li>• parallel line segments</li> <li>• perpendicular bisectors</li> <li>• angle bisectors.</li> </ul> <p>[CN, R, V]</p>	<p><b>Specific Outcomes</b></p> <p>5. Draw and interpret top, front and side views of 3-D objects composed of right rectangular prisms. [C, CN, R, T, V]</p>	<p><b>Specific Outcomes</b></p> <p>2. Determine the surface area of composite 3-D objects to solve problems. [C, CN, PS, R, V]</p> <p>3. Demonstrate an understanding of similarity of polygons. [C, CN, PS, R, V]</p>

## Shape and Space (Transformations)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
				<b>General Outcome</b> Describe and analyze position and motion of objects and shapes.
				<b>Specific Outcomes</b>  5. Demonstrate an understanding of line symmetry by: <ul style="list-style-type: none"> <li>• identifying symmetrical 2-D shapes</li> <li>• creating symmetrical 2-D shapes</li> <li>• drawing one or more lines of symmetry in a 2-D shape.</li> </ul> [C, CN, V]

## Shape and Space (Transformations)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
<b>General Outcome</b> Describe and analyze position and motion of objects and shapes.	<b>General Outcome</b> Describe and analyze position and motion of objects and shapes.	<b>General Outcome</b> Describe and analyze position and motion of objects and shapes.	<b>General Outcome</b> Describe and analyze position and motion of objects and shapes.	<b>General Outcome</b> Describe and analyze position and motion of objects and shapes.
<b>Specific Outcomes</b>  7. Perform a single transformation (translation, rotation or reflection) of a 2-D shape, (with and without technology) and draw and describe the image. [C, CN, T, V]  8. Identify a single transformation including a translation, a rotation and a reflection of 2-D shapes. [C, T, V]	<b>Specific Outcomes</b>  6. Perform a combination of translation(s), rotation(s) and/or reflection(s) on a single 2-D shape, with and without technology, and draw and describe the image. [C, CN, PS, T, V]  7. Perform a combination of successive transformations of 2-D shapes to create a design, and identify and describe the transformations. [C, CN, T, V]  8. Identify and plot points in the first quadrant of a Cartesian plane using whole number ordered pairs. [C, CN, V]  9. Perform and describe single transformations of a 2-D shape in the first quadrant of a Cartesian plane (limited to whole number vertices). [C, CN, PS, T, V]	<b>Specific Outcomes</b>  4. Identify and plot points in the four quadrants of a Cartesian plane using integral ordered pairs. [C, CN, V]  5. Perform and describe transformations (translations, rotations or reflections) of a 2-D shape in all four quadrants of a Cartesian plane (limited to integral number vertices). [C, CN, PS, T, V]	<b>Specific Outcomes</b>  6. Demonstrate an understanding of tessellation by: <ul style="list-style-type: none"> <li>• explaining the properties of shapes that make tessellating possible</li> <li>• creating tessellations</li> <li>• identifying tessellations in the environment.</li> </ul> [C, CN, PS, T, V]	<b>Specific Outcomes</b>  4. Draw and interpret scale diagrams of 2-D shapes. [CN, R, T, V]  5. Demonstrate an understanding of line and rotation symmetry. [C, CN, PS, V]

## Statistics and Probability (Data Analysis)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
		<p><b>General Outcome</b> Collect, display and analyze data to solve problems.</p>	<p><b>General Outcome</b> Collect, display and analyze data to solve problems.</p>	<p><b>General Outcome</b> Collect, display and analyze data to solve problems.</p>
		<p><b>Specific Outcomes</b></p> <ol style="list-style-type: none"> <li>Gather and record data about self and others to answer questions. [C, CN, PS, V]</li> <li>Construct and interpret concrete graphs and pictographs to solve problems. [C, CN, PS, R, V]</li> </ol>	<p><b>Specific Outcomes</b></p> <ol style="list-style-type: none"> <li>Collect first-hand data and organize it using: <ul style="list-style-type: none"> <li>tally marks</li> <li>line plots</li> <li>charts</li> <li>lists</li> </ul> to answer questions. [C, CN, V]</li> <li>Construct, label and interpret bar graphs to solve problems. [PS, R, V]</li> </ol>	<p><b>Specific Outcomes</b></p> <ol style="list-style-type: none"> <li>Demonstrate an understanding of many-to-one correspondence. [C, R, T, V]</li> <li>Construct and interpret pictographs and bar graphs involving many-to-one correspondence to draw conclusions. [C, PS, R, V]</li> </ol>

## Statistics and Probability (Data Analysis)

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
<b>General Outcome</b> Collect, display and analyze data to solve problems.	<b>General Outcome</b> Collect, display and analyze data to solve problems.	<b>General Outcome</b> Collect, display and analyze data to solve problems.	<b>General Outcome</b> Collect, display and analyze data to solve problems.	<b>General Outcome</b> Collect, display and analyze data to solve problems.
<b>Specific Outcomes</b>  1. Differentiate between first-hand and second-hand data. [C, R, T, V]  2. Construct and interpret double bar graphs to draw conclusions. [C, PS, R, T, V]	<b>Specific Outcomes</b>  1. Create, label and interpret line graphs to draw conclusions. [C, CN, PS, R, V]  2. Select, justify and use appropriate methods of collecting data, including: <ul style="list-style-type: none"> <li>• questionnaires</li> <li>• experiments</li> <li>• databases</li> <li>• electronic media.</li> </ul> [C, PS, T]  3. Graph collected data and analyze the graph to solve problems. [C, CN, PS]	<b>Specific Outcomes</b>  1. Demonstrate an understanding of central tendency and range by: <ul style="list-style-type: none"> <li>• determining the measures of central tendency (mean, median, mode) and range</li> <li>• determining the most appropriate measures of central tendency to report findings.</li> </ul> [C, PS, R, T]  2. Determine the effect on the mean, median and mode when an outlier is included in a data set. [C, CN, PS, R]  3. Construct, label and interpret circle graphs to solve problems. [C, CN, PS, R, T, V]	<b>Specific Outcomes</b>  1. Critique ways in which data is presented. [C, R, T, V]	<b>Specific Outcomes</b>  1. Describe the effect of: <ul style="list-style-type: none"> <li>• bias</li> <li>• use of language</li> <li>• ethics</li> <li>• cost</li> <li>• time and timing</li> <li>• privacy</li> <li>• cultural sensitivity on the collection of data.</li> </ul> [C, CN, R, T]  2. Select and defend the choice of using either a population or a sample of a population to answer a question. [C, CN, PS, R]

**Statistics and Probability (Data Analysis) (continued)**

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4

## Statistics and Probability (Data Analysis) (continued)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
				<b>General Outcome</b> Collect, display and analyze data to solve problems.
				<b>Specific Outcomes</b>  3. Develop and implement a project plan for the collection, display and analysis of data by: <ul style="list-style-type: none"> <li>• formulating a question for investigation</li> <li>• choosing a data collection method that includes social considerations</li> <li>• selecting a population or a sample</li> <li>• collecting the data</li> <li>• displaying the collected data in an appropriate manner</li> <li>• drawing conclusions to answer the question.</li> </ul> [C, PS, R, T, V]

## Statistics and Probability (Chance and Uncertainty)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4

## Statistics and Probability (Chance and Uncertainty)

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

Grade 5	Grade 6	Grade 7	Grade 8	Grade 9
<p><b>General Outcome</b> Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.</p>	<p><b>General Outcome</b> Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.</p>	<p><b>General Outcome</b> Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.</p>	<p><b>General Outcome</b> Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.</p>	<p><b>General Outcome</b> Use experimental or theoretical probabilities to represent and solve problems involving uncertainty.</p>
<p><b>Specific Outcomes</b></p> <p>3. Describe the likelihood of a single outcome occurring using words, such as:</p> <ul style="list-style-type: none"> <li>impossible</li> <li>possible</li> <li>certain.</li> </ul> <p>[C, CN, PS, R]</p> <p>4. Compare the likelihood of two possible outcomes occurring using words, such as:</p> <ul style="list-style-type: none"> <li>less likely</li> <li>equally likely</li> <li>more likely.</li> </ul> <p>[C, CN, PS, R]</p>	<p><b>Specific Outcomes</b></p> <p>4. Demonstrate an understanding of probability by:</p> <ul style="list-style-type: none"> <li>identifying all possible outcomes of a probability experiment</li> <li>differentiating between experimental and theoretical probability</li> <li>determining the theoretical probability of outcomes in a probability experiment</li> <li>determining the experimental probability of outcomes in a probability experiment</li> <li>comparing experimental results with the theoretical probability for an experiment.</li> </ul> <p>[C, ME, PS, T]</p>	<p><b>Specific Outcomes</b></p> <p>4. Express probabilities as ratios, fractions and percents. [C, CN, R, T, V]</p> <p>5. Identify the sample space (where the combined sample space has 36 or fewer elements) for a probability experiment involving two independent events. [C, ME, PS]</p> <p>6. Conduct a probability experiment to compare the theoretical probability (determined using a tree diagram, table or another graphic organizer) and experimental probability of two independent events. [C, PS, R, T]</p>	<p><b>Specific Outcomes</b></p> <p>2. Solve problems involving the probability of independent events. [C, CN, PS, T]</p>	<p><b>Specific Outcomes</b></p> <p>4. Demonstrate an understanding of the role of probability in society. [C, CN, R, T]</p>

**GENERAL AND SPECIFIC OUTCOMES  
WITH ACHIEVEMENT INDICATORS**

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

<b>Kindergarten</b> <b>Strand:</b> Number	<b>General Outcome:</b> Develop number sense.
<b>Specific Outcomes</b> <i>It is expected that students will:</i>	<b>Achievement Indicators</b> <i>The following set of indicators <b>may</b> be used to determine whether students have met the corresponding specific outcome.</i>
1. Say the number sequence by 1s starting anywhere from 1 to 10 and from 10 to 1. [C, CN, V]	<ul style="list-style-type: none"> <li>➤ Name the number that comes after a given number, one to nine.</li> <li>➤ Name the number that comes before a given number, two to ten.</li> <li>➤ Recite number names from a given number to a stated number (forward – one to ten, backward – ten to one) using visual aids.</li> </ul>
2. Recognize, at a glance, and name familiar arrangements of 1 to 5 objects or dots. [C, CN, ME, V]	<ul style="list-style-type: none"> <li>➤ Look briefly at a given familiar arrangement of 1 to 5 objects or dots and identify the number represented without counting.</li> <li>➤ Identify the number represented by a given dot arrangement on a five frame.</li> </ul>
3. Relate a numeral, 1 to 10, to its respective quantity. [CN, R, V]	<ul style="list-style-type: none"> <li>➤ Construct a set of objects corresponding to a given numeral.</li> <li>➤ Name the number for a given set of objects.</li> <li>➤ Hold up the appropriate number of fingers for a given numeral.</li> <li>➤ Match numerals with their given pictorial representations.</li> </ul>
4. Represent and describe numbers 2 to 10, concretely and pictorially. [C, CN, ME, R, V]	<ul style="list-style-type: none"> <li>➤ Show a given number as two parts, using fingers, counters or other objects, and name the number of objects in each part.</li> <li>➤ Show a given number as two parts using pictures and name the number of objects in each part.</li> </ul>
5. Compare quantities, 1 to 10, using one-to-one correspondence. [C, CN, V]	<ul style="list-style-type: none"> <li>➤ Construct a set to show more than, fewer than or as many as a given set.</li> <li>➤ Compare two given sets through direct comparison and describe the sets using words, such as more, fewer, as many as or the same number.</li> </ul>

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

<b>Kindergarten</b> <b>Strand:</b> Patterns and Relations (Patterns)	<b>General Outcome:</b> Use patterns to describe the world and solve problems.
<p style="text-align: center;"><b>Specific Outcomes</b></p> <p><i>It is expected that students will:</i></p>	<p style="text-align: center;"><b>Achievement Indicators</b></p> <p><i>The following set of indicators <b>may</b> be used to determine whether students have met the corresponding specific outcome.</i></p>
<p>1. Demonstrate an understanding of repeating patterns (two or three elements) by:</p> <ul style="list-style-type: none"> <li>• identifying</li> <li>• reproducing</li> <li>• extending</li> <li>• creating</li> </ul> <p>patterns using manipulatives, sounds and actions. [C, CN, PS, V]</p>	<ul style="list-style-type: none"> <li>➤ Distinguish between repeating patterns and non-repeating sequences in a given set by identifying the part that repeats.</li> <li>➤ Copy a given repeating pattern, e.g., actions, sound, colour, size, shape, orientation, and describe the pattern.</li> <li>➤ Extend a variety of given repeating patterns to two more repetitions.</li> <li>➤ Create a repeating pattern using manipulatives, musical instruments or actions and describe the pattern.</li> <li>➤ Identify and describe a repeating pattern in the classroom, the school and outdoors, e.g., in a familiar song, in a nursery rhyme.</li> </ul>

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

<b>Kindergarten</b> <b>Strand:</b> Shape and Space (Measurement)	<b>General Outcome:</b> Use direct or indirect measurement to solve problems.
<p style="text-align: center;"><b>Specific Outcomes</b></p> <p><i>It is expected that students will:</i></p>	<p style="text-align: center;"><b>Achievement Indicators</b></p> <p><i>The following set of indicators <b>may</b> be used to determine whether students have met the corresponding specific outcome.</i></p>
<p>1. Use direct comparison to compare two objects based on a single attribute, such as length (height), mass (weight) and volume (capacity). [C, CN, PS, R, V]</p>	<ul style="list-style-type: none"> <li>➤ Compare the length (height) of two given objects and explain the comparison using the words shorter, longer (taller) or almost the same.</li> <li>➤ Compare the mass (weight) of two given objects and explain the comparison using the words lighter, heavier or almost the same.</li> <li>➤ Compare the volume (capacity) of two given objects and explain the comparison using the words less, more, bigger, smaller or almost the same.</li> </ul>

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

<b>Kindergarten</b> <b>Strand:</b> Shape and Space (3-D Objects and 2-D Shapes)	<b>General Outcome:</b> Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.
<p style="text-align: center;"><b>Specific Outcomes</b></p> <p><i>It is expected that students will:</i></p>	<p style="text-align: center;"><b>Achievement Indicators</b></p> <p><i>The following set of indicators <b>may</b> be used to determine whether students have met the corresponding specific outcome.</i></p>
2. Sort 3-D objects using a single attribute. [C, CN, PS, R, V]	<ul style="list-style-type: none"> <li>➤ Sort a given set of familiar 3-D objects using a single attribute, such as size or shape, and explain the sorting rule.</li> <li>➤ Determine the difference between two given pre-sorted sets by explaining a sorting rule used to sort them.</li> </ul>
3. Build and describe 3-D objects. [CN, PS, V]	<ul style="list-style-type: none"> <li>➤ Create a representation of a given 3-D object using materials, such as modelling clay and building blocks, and compare the representation to the original 3-D object.</li> <li>➤ Describe a given 3-D object using words, such as big, little, round, like a box and like a can.</li> </ul>

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

<b>Grade 1</b> <b>Strand:</b> Number	<b>General Outcome:</b> Develop number sense.
<b>Specific Outcomes</b> <i>It is expected that students will:</i>	<b>Achievement Indicators</b> <i>The following set of indicators <b>may</b> be used to determine whether students have met the corresponding specific outcome.</i>
1. Say the number sequence, 0 to 100, by: <ul style="list-style-type: none"> <li>• 1s forward and backward between any two given numbers</li> <li>• 2s to 20, forward starting at 0</li> <li>• 5s and 10s to 100, forward starting at 0.</li> </ul> [C, CN, V, ME]	<ul style="list-style-type: none"> <li>➤ Recite forward by 1s the number sequence between two given numbers (0 to 100).</li> <li>➤ Recite backward by 1s the number sequence between two given numbers.</li> <li>➤ Record a given numeral (0 to 100) symbolically when it is presented orally.</li> <li>➤ Read a given numeral (0 to 100) when it is presented symbolically.</li> <li>➤ Skip count by 2s to 20 starting at 0.</li> <li>➤ Skip count by 5s to 100 starting at 0.</li> <li>➤ Skip count forward by 10s to 100 starting at 0.</li> <li>➤ Identify and correct errors and omissions in a given number sequence.</li> </ul>
2. Recognize, at a glance, and name familiar arrangements of 1 to 10 objects or dots. [C, CN, ME, V]	<ul style="list-style-type: none"> <li>➤ Look briefly at a given familiar arrangement of objects or dots and identify the number represented without counting.</li> <li>➤ Look briefly at a given familiar arrangement and identify how many objects there are without counting.</li> <li>➤ Identify the number represented by a given arrangement of objects or dots on a ten frame.</li> </ul>
3. Demonstrate an understanding of counting by: <ul style="list-style-type: none"> <li>• indicating that the last number said identifies “how many”</li> <li>• showing that any set has only one count</li> <li>• using the counting on strategy</li> <li>• using parts or equal groups to count sets.</li> </ul> [C, CN, ME, R, V]	<ul style="list-style-type: none"> <li>➤ Answer the question, “How many are in the set?” using the last number counted in a given set.</li> <li>➤ Identify and correct counting errors in a given counting sequence.</li> <li>➤ Show that the count of the number of objects in a given set does not change regardless of the order in which the objects are counted.</li> <li>➤ Count the number of objects in a given set, rearrange the objects, predict the new count and recount to verify the prediction.</li> <li>➤ Determine the total number of objects in a given set, starting from a known quantity and counting on.</li> <li>➤ Count quantity using groups of 2s, 5s or 10s and counting on.</li> </ul>

<b>[C]</b> Communication	<b>[PS]</b> Problem Solving
<b>[CN]</b> Connections	<b>[R]</b> Reasoning
<b>[ME]</b> Mental Mathematics and Estimation	<b>[T]</b> Technology
	<b>[V]</b> Visualization

<b>Grade 1</b> <b>Strand:</b> Number (continued)	<b>General Outcome:</b> Develop number sense.
4. Represent and describe numbers to 20 concretely, pictorially and symbolically. [C, CN, V]	<ul style="list-style-type: none"> <li>➤ Represent a given number up to 20 using a variety of manipulatives, including ten frames and base ten materials.</li> <li>➤ Read given number words to 20.</li> <li>➤ Partition any given quantity up to 20 into 2 parts and identify the number of objects in each part.</li> <li>➤ Model a given number using two different objects, e.g., 10 desks represents the same number as 10 pencils.</li> <li>➤ Place given numerals on a number line with benchmarks 0, 5, 10 and 20.</li> </ul>
5. Compare sets containing up to 20 elements to solve problems using: <ul style="list-style-type: none"> <li>• referents</li> <li>• one-to-one correspondence.</li> </ul> [C, CN, ME, PS, R, V]	<ul style="list-style-type: none"> <li>➤ Build a set equal to a given set that contains up to 20 elements.</li> <li>➤ Build a set that has more, fewer or as many elements as a given set.</li> <li>➤ Build several sets of different objects that have the same given number of elements in the set.</li> <li>➤ Compare two given sets using one-to-one correspondence and describe them using comparative words, such as more, fewer or as many.</li> <li>➤ Compare a set to a given referent using comparative language.</li> <li>➤ Solve a given story problem (pictures and words) that involves the comparison of two quantities.</li> </ul>
6. Estimate quantities to 20 by using referents. [C, ME, PS, R, V]	<ul style="list-style-type: none"> <li>➤ Estimate a given quantity by comparing it to a given referent (known quantity).</li> <li>➤ Select an estimate for a given quantity by choosing between at least two possible choices and explain the choice.</li> </ul>
7. Demonstrate, concretely and pictorially, how a given number can be represented by a variety of equal groups with and without singles. [C, R, V]	<ul style="list-style-type: none"> <li>➤ Represent a given number in a variety of equal groups with and without singles, e.g., 17 can be represented by 8 groups of 2 and one single, 5 groups of 3 and two singles, 4 groups of 4 and one single, and 3 groups of 5 and two singles.</li> <li>➤ Recognize that for a given number of counters, no matter how they are grouped, the total number of counters does not change.</li> <li>➤ Group a set of given counters into equal groups in more than one way.</li> </ul>

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

<b>Grade 1</b> <b>Strand:</b> Number (continued)	<b>General Outcome:</b> Develop number sense.
8. Identify the number, up to 20, that is one more, two more, one less and two less than a given number. [C, CN, ME, R, V]	<ul style="list-style-type: none"> <li>➤ Name the number that is one more, two more, one less or two less than a given number, up to 20.</li> <li>➤ Represent a number on a ten frame that is one more, two more, one less or two less than a given number.</li> </ul>
9. Demonstrate an understanding of addition of numbers with answers to 20 and their corresponding subtraction facts, concretely, pictorially and symbolically by: <ul style="list-style-type: none"> <li>• using familiar and mathematical language to describe additive and subtractive actions from their experience</li> <li>• creating and solving problems in context that involve addition and subtraction</li> <li>• modelling addition and subtraction using a variety of concrete and visual representations, and recording the process symbolically.</li> </ul> [C, CN, ME, PS, R, V]	<ul style="list-style-type: none"> <li>➤ Act out a given story problem presented orally or through shared reading.</li> <li>➤ Indicate if the scenario in a given story problem represents additive or subtractive action.</li> <li>➤ Represent the numbers and actions presented in a given story problem by using manipulatives, and record them using sketches and/or number sentences.</li> <li>➤ Create a story problem for addition that connects to student experience and simulate the action with counters.</li> <li>➤ Create a story problem for subtraction that connects to student experience and simulate the action with counters.</li> <li>➤ Create a word problem for a given number sentence.</li> <li>➤ Represent a given story problem pictorially or symbolically to show the additive or subtractive action and solve the problem.</li> </ul>
10. Describe and use mental mathematics strategies (memorization not intended), such as: <ul style="list-style-type: none"> <li>• counting on and counting back</li> <li>• making 10</li> <li>• doubles</li> <li>• using addition to subtract</li> </ul> to determine the basic addition facts to 18 and related subtraction facts. [C, CN, ME, PS, R, V]	<p>(It is not intended that students recall the basic facts but become familiar with strategies to mentally determine sums and differences.)</p> <ul style="list-style-type: none"> <li>➤ Use and describe a personal strategy for determining a given sum.</li> <li>➤ Use and describe a personal strategy for determining a given difference.</li> <li>➤ Write the related subtraction fact for a given addition fact.</li> <li>➤ Write the related addition fact for a given subtraction fact.</li> </ul>

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

<b>Grade 1</b> <b>Strand:</b> Patterns and Relations (Patterns)	<b>General Outcome:</b> Use patterns to describe the world and solve problems.
<b>Specific Outcomes</b> <i>It is expected that students will:</i>	<b>Achievement Indicators</b> <i>The following set of indicators <b>may</b> be used to determine whether students have met the corresponding specific outcome.</i>
1. Demonstrate an understanding of repeating patterns (two to four elements) by: <ul style="list-style-type: none"> <li>• describing</li> <li>• reproducing</li> <li>• extending</li> <li>• creating</li> </ul> patterns using manipulatives, diagrams, sounds and actions. [C, PS, R, V]	<ul style="list-style-type: none"> <li>➤ Describe a given repeating pattern containing two to four elements in its core.</li> <li>➤ Identify errors in a given repeating pattern.</li> <li>➤ Identify the missing element(s) in a given repeating pattern.</li> <li>➤ Create and describe a repeating pattern using a variety of manipulatives, musical instruments and actions.</li> <li>➤ Reproduce and extend a given repeating pattern using manipulatives, diagrams, sounds and actions.</li> <li>➤ Identify and describe a repeating pattern in the environment, e.g., classroom, outdoors, using everyday language.</li> <li>➤ Identify repeating events, e.g., days of the week, birthdays, seasons.</li> </ul>
2. Translate repeating patterns from one representation to another. [C, R, V]	<ul style="list-style-type: none"> <li>➤ Represent a given repeating pattern using another mode, e.g., actions to sound, colour to shape, ABC ABC to blue yellow green blue yellow green.</li> <li>➤ Describe a given repeating pattern using a letter code, e.g., ABC ABC...</li> </ul>

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

<p><b>Grade 1</b> <b>Strand:</b> Patterns and Relations (Variables and Equations)</p>	<p><b>General Outcome:</b> Represent algebraic expressions in multiple ways.</p>
<p style="text-align: center;"><b>Specific Outcomes</b></p> <p><i>It is expected that students will:</i></p>	<p style="text-align: center;"><b>Achievement Indicators</b></p> <p><i>The following set of indicators <b>may</b> be used to determine whether students have met the corresponding specific outcome.</i></p>
<p>3. Describe equality as a balance and inequality as an imbalance, concretely and pictorially (0 to 20). [C, CN, R, V]</p>	<ul style="list-style-type: none"> <li>➤ Construct two equal sets using the same objects (same shape and mass) and demonstrate their equality of number using a balance scale.</li> <li>➤ Construct two unequal sets using the same objects (same shape and mass) and demonstrate their inequality of number using a balance scale.</li> <li>➤ Determine if two given concrete sets are equal or unequal and explain the process used.</li> </ul>
<p>4. Record equalities using the equal symbol. [C, CN, PS, V]</p>	<ul style="list-style-type: none"> <li>➤ Represent a given equality using manipulatives or pictures.</li> <li>➤ Represent a given pictorial or concrete equality in symbolic form.</li> <li>➤ Provide examples of equalities where the given sum or difference is on either the left or right side of the equal symbol (=).</li> <li>➤ Record different representations of the same quantity (0 to 20) as equalities.</li> </ul>

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

<b>Grade 1</b> <b>Strand:</b> Shape and Space (Measurement)	<b>General Outcome:</b> Use direct or indirect measurement to solve problems.
<p style="text-align: center;"><b>Specific Outcomes</b></p> <p><i>It is expected that students will:</i></p>	<p style="text-align: center;"><b>Achievement Indicators</b></p> <p><i>The following set of indicators <b>may</b> be used to determine whether students have met the corresponding specific outcome.</i></p>
<p>1. Demonstrate an understanding of measurement as a process of comparing by:</p> <ul style="list-style-type: none"> <li>• identifying attributes that can be compared</li> <li>• ordering objects</li> <li>• making statements of comparison</li> <li>• filling, covering or matching.</li> </ul> <p>[C, CN, PS, R, V]</p>	<ul style="list-style-type: none"> <li>➤ Identify common attributes, such as length (height), mass (weight), volume (capacity) and area, that could be used to compare a given set of two objects.</li> <li>➤ Compare two given objects and identify the attributes used to compare.</li> <li>➤ Determine which of two or more given objects is longest/shortest by matching and explain the reasoning.</li> <li>➤ Determine which of two or more given objects is heaviest/lightest by comparing and explain the reasoning.</li> <li>➤ Determine which of two or more given objects holds the most/least by filling and explain the reasoning.</li> <li>➤ Determine which of two or more given objects has the greatest/least area by covering and explain the reasoning.</li> </ul>

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

<p><b>Grade 1</b> <b>Strand:</b> Shape and Space (3-D Objects and 2-D Shapes)</p>	<p><b>General Outcome:</b> Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</p>
<p style="text-align: center;"><b>Specific Outcomes</b></p> <p><i>It is expected that students will:</i></p>	<p style="text-align: center;"><b>Achievement Indicators</b></p> <p><i>The following set of indicators <b>may</b> be used to determine whether students have met the corresponding specific outcome.</i></p>
<p>2. Sort 3-D objects and 2-D shapes using one attribute, and explain the sorting rule. [C, CN, R, V]</p>	<ul style="list-style-type: none"> <li>➤ Sort a given set of familiar 3-D objects or 2-D shapes using a given sorting rule.</li> <li>➤ Sort a given set of familiar 3-D objects using a single attribute determined by the student and explain the sorting rule.</li> <li>➤ Sort a given set of 2-D shapes using a single attribute determined by the student and explain the sorting rule.</li> <li>➤ Determine the difference between two given pre-sorted sets of familiar 3-D objects or 2-D shapes and explain a possible sorting rule used to sort them.</li> </ul>
<p>3. Replicate composite 2-D shapes and 3-D objects. [CN, PS, V]</p>	<ul style="list-style-type: none"> <li>➤ Select 2-D shapes from a given set of 2-D shapes to reproduce a given composite 2-D shape.</li> <li>➤ Select 3-D objects from a given set of 3-D objects to reproduce a given composite 3-D object.</li> <li>➤ Predict and select the 2-D shapes used to produce a composite 2-D shape, and verify by deconstructing the composite shape.</li> <li>➤ Predict and select the 3-D objects used to produce a composite 3-D object, and verify by deconstructing the composite object.</li> </ul>
<p>4. Compare 2-D shapes to parts of 3-D objects in the environment. [C, CN, V]</p>	<ul style="list-style-type: none"> <li>➤ Identify 3-D objects in the environment that have parts similar to a given 2-D shape.</li> </ul>

[C] Communication	[PS] Problem Solving
[CN] Connections	[R] Reasoning
[ME] Mental Mathematics and Estimation	[T] Technology
	[V] Visualization

<b>Grade 2</b> <b>Strand:</b> Number	<b>General Outcome:</b> Develop number sense.
<b>Specific Outcomes</b> <i>It is expected that students will:</i>	<b>Achievement Indicators</b> <i>The following set of indicators <b>may</b> be used to determine whether students have met the corresponding specific outcome.</i>
1. Say the number sequence from 0 to 100 by: <ul style="list-style-type: none"> <li>• 2s, 5s and 10s, forward and backward, using starting points that are multiples of 2, 5 and 10 respectively</li> <li>• 10s using starting points from 1 to 9</li> <li>• 2s starting from 1.</li> </ul> [C, CN, ME, R]	<ul style="list-style-type: none"> <li>➤ Extend a given skip counting sequence (by 2s, 5s or 10s) forward and backward.</li> <li>➤ Skip count by 10s, given any number from 1 to 9 as a starting point.</li> <li>➤ Identify and correct errors and omissions in a given skip counting sequence.</li> <li>➤ Count a given sum of money with pennies, nickels or dimes (to 100¢).</li> <li>➤ Count quantity using groups of 2s, 5s or 10s and counting on.</li> </ul>
2. Demonstrate if a number (up to 100) is even or odd. [C, CN, PS, R]	<ul style="list-style-type: none"> <li>➤ Use concrete materials or pictorial representations to determine if a given number is even or odd.</li> <li>➤ Identify even and odd numbers in a given sequence, such as in a hundred chart.</li> <li>➤ Sort a given set of numbers into even and odd.</li> </ul>
3. Describe order or relative position using ordinal numbers (up to tenth). [C, CN, R]	<ul style="list-style-type: none"> <li>➤ Indicate a position of a specific object in a sequence by using ordinal numbers up to tenth.</li> <li>➤ Compare the ordinal position of a specific object in two different given sequences.</li> </ul>
4. Represent and describe numbers to 100, concretely, pictorially and symbolically. [C, CN, V]	<ul style="list-style-type: none"> <li>➤ Represent a given number using concrete materials, such as ten frames and base ten materials.</li> <li>➤ Represent a given number using coins (pennies, nickels, dimes and quarters).</li> <li>➤ Represent a given number using tallies.</li> <li>➤ Represent a given number pictorially.</li> <li>➤ Represent a given number using expressions, e.g., <math>24 + 6</math>, <math>15 + 15</math>, <math>40 - 10</math>.</li> <li>➤ Read a given number (0–100) in symbolic or word form.</li> <li>➤ Record a given number (0–20) in words.</li> </ul>













































































































































































































