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Acknowledgements

The Department of Education would like to thank Western and Northern Canadian Protocol (WNCP) for Collaboration in Education, *The Common Curriculum Framework for K-9 Mathematics* - May 2006 and *The Common Curriculum Framework for Grades 10-12* - January 2008. Reproduced (and/or adapted) by permission. All rights reserved.

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Foreword

The *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics* released in 2006 by the National Council of Teachers in Mathematics (NCTM) and the *WNCP Common Curriculum Frameworks for Mathematics K – 9 (WNCP, 2006)*, assists many provinces in developing a mathematics curriculum framework. Newfoundland and Labrador has used this curriculum framework to direct the development of this curriculum guide.

This curriculum guide is intended to provide teachers with the overview of the outcomes framework for mathematics education. It also includes suggestions to assist teachers in designing learning experiences and assessment tasks.
BACKGROUND

The province of Newfoundland and Labrador commissioned an independent review of mathematics curriculum in the summer of 2007. This review resulted in a number of significant recommendations. In March of 2008, it was announced that this province accepted all recommendations. The first and perhaps most significant of the recommendations were as follows:

• That the WNCP Common Curriculum Frameworks for Mathematics K – 9 and Mathematics 10 – 12 (WNCP, 2006 and 2008) be adopted as the basis for the K – 12 mathematics curriculum in this province.

• That implementation commence with Grades K, 1, 4, 7 in September 2008, followed by in Grades 2, 5, 8 in 2009 and Grades 3, 6, 9 in 2010.

• That textbooks and other resources specifically designed to match the WNCP frameworks be adopted as an integral part of the proposed program change.

• That implementation be accompanied by an introductory professional development program designed to introduce the curriculum to all mathematics teachers at the appropriate grade levels prior to the first year of implementation.

As recommended, the implementation schedule for K - 6 mathematics is as follows:

<table>
<thead>
<tr>
<th>Implementation Year</th>
<th>Grade Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>K, 1 and 4</td>
</tr>
<tr>
<td>2009</td>
<td>2, 5</td>
</tr>
<tr>
<td>2010</td>
<td>3, 6</td>
</tr>
</tbody>
</table>

All teachers assigned to these grades will receive professional development opportunities related to the new curriculum and resources.
INTRODUCTION

Purpose of the Document

The Mathematics Curriculum Guides for Newfoundland and Labrador have been derived from The Common Curriculum Framework for K–9 Mathematics: Western and Northern Canadian Protocol, May 2006 (the Common Curriculum Framework). These guides incorporate the conceptual framework for Kindergarten to Grade 9 Mathematics and the general outcomes, specific outcomes and achievement indicators established in the common curriculum framework. They also include suggestions for teaching and learning, suggested assessment strategies, and an identification of the associated resource match between the curriculum and authorized, as well as recommended, resource materials.

Beliefs About Students and Mathematics Learning

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 they 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. Through the use of manipulatives and a variety of pedagogical approaches, teachers can address the diverse learning styles, cultural backgrounds and developmental stages of students, and enhance within them the formation of sound, transferable mathematical understandings. 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 provide essential links among concrete, pictorial and symbolic representations of mathematical concepts.

The learning environment should value and respect the diversity of students’ experiences and ways of thinking, so that students 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. They must realize that it is acceptable to solve problems in a variety of ways and that a variety of solutions may be acceptable.
A positive attitude is an important aspect of the affective domain and has a profound impact 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 within students. 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.

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.

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, in preschools and in the community. Mathematics learning is embedded in everyday activities, such as playing, reading, beading, baking, 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, and talking about, such activities as comparing quantities, searching for patterns, sorting objects, ordering objects, creating designs and building with blocks.

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

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

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.

CONCEPTUAL FRAMEWORK FOR K-9 MATHEMATICS

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

<table>
<thead>
<tr>
<th>STRAND</th>
<th>GRADE</th>
<th>K 1 2 3 4 5 6 7 8 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patterns and Relations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Patterns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Variables and Equations</td>
<td></td>
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</tr>
<tr>
<td>Shape and Space</td>
<td></td>
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<tr>
<td>• Measurement</td>
<td></td>
<td></td>
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<tr>
<td>• 3-D Objects and 2-D Shapes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Transformations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistics and Probability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Data Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Chance and Uncertainty</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GENERAL OUTCOMES, SPECIFIC OUTCOMES AND ACHIEVEMENT INDICATORS</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MATHEMATICAL PROCESSES** - Communication, Connections, Mental Mathematics and Estimation, Problem Solving, Reasoning, Technology, Visualization

**NATURE OF MATHEMATICS**

- Change, Constancy, Number Sense, Patterns, Relationships, Spatial Sense, Uncertainty
There are critical components that students must encounter in a mathematics program in order to achieve the goals of mathematics education and embrace lifelong learning in mathematics.

Students are expected to:

- 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 for solving problems
- develop visualization skills to assist in processing information, making connections and solving problems.

The program of studies incorporates these seven interrelated mathematical processes that are intended to permeate teaching and learning.

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 helps students make connections among concrete, pictorial, symbolic, oral, written and mental representations of mathematical ideas.
Contextualization and making connections to the experiences of learners are powerful processes in developing mathematical understanding. This can be particularly true for First Nations, Métis and Inuit learners. When mathematical ideas are connected to each other or to real-world phenomena, students begin to view mathematics as useful, relevant and integrated.

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

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 math” (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, p. 442).

Mental mathematics “provides the cornerstone for all estimation processes, offering a variety of alternative algorithms and nonstandard techniques for finding answers” (Hope, 1988, p. v).

Estimation is used for determining approximate values or quantities or for determining the reasonableness of calculated values. It often uses benchmarks or referents. Students need to know when to estimate, how to estimate and what strategy to use.

Estimation assists individuals in making mathematical judgements and in developing useful, efficient strategies for dealing with situations in daily life.
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 listening to, discussing and trying different strategies.

A problem-solving activity 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.

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 students to develop their ability to reason. Students can explore and record results, analyze observations, make and test generalizations from patterns, and reach new conclusions by building upon what is already known or assumed to be true.

Reasoning skills allow students to use a logical process to analyze a problem, reach a conclusion and justify or defend that conclusion.
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.

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
• develop personal procedures for mathematical operations
• create geometric patterns
• 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.

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 which estimation strategies to use (Shaw and Cliatt, 1989).
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 program of studies. The components are change, constancy, number sense, patterns, relationships, spatial sense and uncertainty.

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:

• the number of a specific colour of beads in each row of a beaded design
• 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).

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 following:

• The ratio of the circumference of a teepee to its diameter is the same regardless of the length of the teepee poles.
• The sum of the interior angles of any triangle is 180°.
• 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.
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 (British Columbia Ministry of Education, 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. Mastery of number facts is expected to be attained by students as they develop their number sense. This mastery allows for facility with more complex computations but should not be attained at the expense of an understanding of number.

Number sense develops when students connect numbers to their own real-life experiences and when students use benchmarks and referents. This results in students who are computationally fluent and flexible with numbers and who 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 to their own experiences and their previous learning.

Patterns

Mathematics is about recognizing, describing and working with numerical and non-numerical patterns. Patterns exist in all strands of this program of studies.

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 nonroutine problems.

Learning to work with patterns in the early grades helps students develop algebraic thinking, which is foundational for working with more abstract mathematics in higher grades.
### Relationships

Mathematics is one way to describe interconnectedness in a holistic worldview. 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 collecting and analyzing data and describing relationships visually, symbolically, orally or in written form.

### Spatial Sense

Spatial sense involves visualization, mental imagery and spatial reasoning. These skills are central to the understanding of mathematics. 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 and 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 shapes and objects. Spatial sense allows students to make predictions about the results of changing these dimensions; e.g., doubling the length of the side of a square increases the area by a factor of four. Ultimately, spatial sense enables students to communicate about shapes and objects and to create their own representations.

### 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.
The learning outcomes in the program of studies are organized into four strands across the grades K–9. Some strands are 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.

**STRANDS**

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

**Number**

- Develop number sense.

**Patterns and Relations**

- Use patterns to describe the world and to solve problems.

**Variables and Equations**

- Represent algebraic expressions in multiple ways.

**Shape and Space**

- Use direct and indirect measurement 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**

- 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 program of studies is stated in terms of general outcomes, specific outcomes and achievement indicators.

<table>
<thead>
<tr>
<th>General Outcomes</th>
<th>Specific Outcomes</th>
<th>Achievement Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>Specific outcomes are statements that identify the specific skills, understanding and knowledge that students are required to attain by the end of a given grade.</td>
<td>Achievement indicators are samples of how students may demonstrate their achievement of the goals of a specific outcome. The range of samples provided is meant to reflect the scope of the specific outcome. Achievement indicators are context-free.</td>
</tr>
<tr>
<td>In the specific outcomes, 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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUMMARY</td>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>
INSTRUCTIONAL FOCUS

Planning for Instruction

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 be developed concretely, pictorially and symbolically.
• Students bring a diversity of learning styles and cultural backgrounds to the classroom. They will be at varying developmental stages.

Resources

The resource selected by Newfoundland and Labrador for students and teachers is Math Makes Sense K (Pearson). Schools and teachers have this as their primary resource offered by the Department of Education. Column four of the curriculum guide references Math Makes Sense K for this reason.

Teachers may use any resource or combination of resources to meet the required specific outcomes listed in column one of the curriculum guide.
**Teaching Sequence**

The curriculum guide for Kindergarten is organized in a sequence that suggests the outcomes from three strands to be taught concurrently within each term. The purpose of this timeline is to assist in planning. The use of this timeline is not mandatory; however, it is mandatory that all outcomes are taught during the school year so a long term plan is advised. There are a number of combinations of sequences that would be appropriate for teaching this course. The arrow showing ‘estimated focus’ does not mean the outcomes are never addressed again. The teaching of the outcomes is ongoing and may be revisited as necessary.

**Instruction Time Per Unit**

The suggested percentage of time for instruction per unit is listed in the guide at the beginning of each unit with the number strand receiving the most attention.
This section presents the general and specific outcomes for each strand, for Kindergarten, Grade 1 and 2.

Refer to Appendix A for the general and specific outcomes with corresponding achievement indicators organized by strand for Kindergarten.

This section presents general and specific outcomes with corresponding achievement indicators and is organized by unit. The list of indicators contained in this section is not intended to be exhaustive but rather to provide teachers with examples of evidence of understanding to be used to determine whether or not students have achieved a given specific outcome. Teachers should use these indicators but other indicators may be added 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 specific outcome.
GENERAL AND SPECIFIC OUTCOMES BY STRAND

(Kindergarten and Grade 1)
## Number

<table>
<thead>
<tr>
<th>Kindergarten</th>
<th>Grade 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Outcome</strong></td>
<td><strong>General Outcome</strong></td>
</tr>
<tr>
<td>Develop number sense.</td>
<td>Develop number sense.</td>
</tr>
<tr>
<td><strong>Specific Outcomes</strong></td>
<td><strong>Specific Outcomes</strong></td>
</tr>
<tr>
<td>1. Say the number sequence by 1s:</td>
<td>1. Say the number sequence 0 to 100 by:</td>
</tr>
<tr>
<td>- starting anywhere from 1 to 10 and from 10 to 1</td>
<td>• 1s forward between any two given numbers</td>
</tr>
<tr>
<td>- forward from 1 to 30.</td>
<td>• 1s backward between any two given numbers</td>
</tr>
<tr>
<td>[C, CN, V]</td>
<td>• 2s forward from 0 to 20</td>
</tr>
<tr>
<td>2. Subitize (recognize at a glance) and name familiar arrangements of 1 to 6 objects, dots or pictures.</td>
<td>• 5s and 10s forward from 0 to 100.</td>
</tr>
<tr>
<td>[C, CN, ME, V]</td>
<td>[C, CN, ME, V]</td>
</tr>
<tr>
<td>3. Relate a numeral, 1 to 10, to its respective quantity.</td>
<td>2. Subitize (recognize at a glance) and name familiar arrangements of 1 to 10 objects or dots.</td>
</tr>
<tr>
<td>[CN, R, V]</td>
<td>[C, CN, ME, V]</td>
</tr>
<tr>
<td>4. Represent and describe numbers 2 to 10, in two parts, concretely and pictorially.</td>
<td>3. Demonstrate an understanding of counting by:</td>
</tr>
<tr>
<td>[C, CN, ME, R, V]</td>
<td>• indicating that the last number said identifies “how many”</td>
</tr>
<tr>
<td>5. Compare quantities 1 to 10,</td>
<td>• showing that any set has only one count</td>
</tr>
<tr>
<td>- using one-to-one correspondence</td>
<td>• using the counting-on strategy</td>
</tr>
<tr>
<td>- by ordering numbers representing different quantities</td>
<td>• using parts or equal groups to count sets.</td>
</tr>
<tr>
<td>[C, CN, V]</td>
<td>[C, CN, ME, R, V]</td>
</tr>
</tbody>
</table>
### Number

<table>
<thead>
<tr>
<th>Kindergarten</th>
<th>Grade 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Outcome</td>
<td>General Outcome</td>
</tr>
<tr>
<td>Develop number sense.</td>
<td>Develop number sense.</td>
</tr>
<tr>
<td>Specific Outcomes</td>
<td>Specific Outcomes</td>
</tr>
<tr>
<td>4. Represent and describe numbers to 20, concretely, pictorially and symbolically. [C, CN, V]</td>
<td></td>
</tr>
</tbody>
</table>
| 5. Compare sets containing up to 20 elements to solve problems, using:  
  - referents  
  - one-to-one correspondence. [C, CN, ME, PS, R, V] | |
| 6. Estimate quantities to 20 by using referents. [C, CN, ME, PS, R, V] | |
| 7. (No Outcome) | |
| 8. Identify the number, up to 20, that is:  
  - one more  
  - two more  
  - one less  
  - two less than a given number. [C, CN, ME, R, V] | |
### Kindergarten Mathematics Curriculum Guide - Interim

#### General and Specific Outcomes by Strand

<table>
<thead>
<tr>
<th></th>
<th>Communication</th>
<th>Problem Solving</th>
<th>Connections</th>
<th>Reasoning</th>
<th>Mental Mathematics</th>
<th>Technology</th>
<th>Visualization</th>
</tr>
</thead>
<tbody>
<tr>
<td>[C]</td>
<td></td>
<td></td>
<td>[CN]</td>
<td>[R]</td>
<td>[ME]</td>
<td>[T]</td>
<td>[V]</td>
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<td></td>
<td></td>
<td></td>
<td>Connections</td>
<td></td>
<td>Mental Mathematics</td>
<td>Technology</td>
<td>Visualization</td>
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<td></td>
<td></td>
<td>Reasoning</td>
<td>and Estimation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Number

<table>
<thead>
<tr>
<th>Kindergarten</th>
<th>Grade 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Outcome</td>
<td>General Outcome</td>
</tr>
<tr>
<td>Develop number sense.</td>
<td>Develop number sense.</td>
</tr>
<tr>
<td>Specific Outcomes</td>
<td>Specific Outcomes</td>
</tr>
<tr>
<td>9. Demonstrate an understanding of addition of numbers with answers to 20 and their corresponding subtraction facts, concretely, pictorially and symbolically, by:</td>
<td></td>
</tr>
<tr>
<td>• using familiar mathematical language to describe additive and subtractive actions</td>
<td></td>
</tr>
<tr>
<td>• creating and solving problems in context that involve addition and subtraction</td>
<td></td>
</tr>
<tr>
<td>• modelling addition and subtraction, using a variety of concrete and visual representations, and recording the process symbolically.</td>
<td></td>
</tr>
<tr>
<td>[C, CN, ME, PS, R, V]</td>
<td></td>
</tr>
</tbody>
</table>
Number

<table>
<thead>
<tr>
<th>Kindergarten</th>
<th>Grade 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Outcome</td>
<td>General Outcome</td>
</tr>
<tr>
<td>Develop number sense.</td>
<td>Develop number sense.</td>
</tr>
<tr>
<td>Specific Outcomes</td>
<td>Specific Outcomes</td>
</tr>
<tr>
<td>10. Describe and use mental mathematics strategies (memorization not intended), such as:</td>
<td></td>
</tr>
<tr>
<td>• counting on and counting back</td>
<td></td>
</tr>
<tr>
<td>• making 10</td>
<td></td>
</tr>
<tr>
<td>• using doubles</td>
<td></td>
</tr>
<tr>
<td>• thinking addition for subtraction to determine the basic addition facts and related subtraction facts to 18.</td>
<td></td>
</tr>
<tr>
<td>[C, CN, ME, PS, R, V]</td>
<td></td>
</tr>
</tbody>
</table>
Patterns and Relations
(Patterns)

<table>
<thead>
<tr>
<th>General Outcome</th>
<th>Grade 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use patterns to describe the world and to solve problems.</td>
<td>Use patterns to describe the world and to solve problems.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific Outcomes</th>
<th>Kindergarten</th>
<th>Grade 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate an understanding of repeating patterns (two or three elements) by:</td>
<td>1. Demonstrate an understanding of repeating patterns (two to four elements) by:</td>
<td></td>
</tr>
<tr>
<td>• identifying</td>
<td>• describing</td>
<td></td>
</tr>
<tr>
<td>• reproducing</td>
<td>• reproducing</td>
<td></td>
</tr>
<tr>
<td>• extending</td>
<td>• extending</td>
<td></td>
</tr>
<tr>
<td>• creating</td>
<td>• creating</td>
<td></td>
</tr>
<tr>
<td>patterns using manipulatives, sounds and actions.</td>
<td>patterns using manipulatives, diagrams, sounds and actions.</td>
<td></td>
</tr>
<tr>
<td>[C, CN, PS, V]</td>
<td>[C, PS, R, V]</td>
<td></td>
</tr>
<tr>
<td>2. Translate repeating patterns from one representation to another.</td>
<td>2. Sort objects, using one attribute, and explain the sorting rule.</td>
<td></td>
</tr>
<tr>
<td>[C, CN, R, V]</td>
<td>[C, CN, R, V]</td>
<td></td>
</tr>
<tr>
<td>3. Sort objects, using one attribute, and explain the sorting rule.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Patterns and Relations
(Variables and Equations)

<table>
<thead>
<tr>
<th>Kindergarten</th>
<th>Grade 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Outcome</strong></td>
<td><strong>General Outcome</strong></td>
</tr>
<tr>
<td>Represent algebraic expressions in multiple ways.</td>
<td>Represent algebraic expressions in multiple ways.</td>
</tr>
<tr>
<td><strong>Specific Outcomes</strong></td>
<td><strong>Specific Outcomes</strong></td>
</tr>
<tr>
<td>4. Describe equality as a balance and inequality as an imbalance, concretely and pictorially (0 to 20). [C, CN, R, V]</td>
<td>4. Describe equality as a balance and inequality as an imbalance, concretely and pictorially (0 to 20). [C, CN, R, V]</td>
</tr>
<tr>
<td>5. Record equalities, using the equal symbol (0 to 20). [C, CN, PS, V]</td>
<td>5. Record equalities, using the equal symbol (0 to 20). [C, CN, PS, V]</td>
</tr>
</tbody>
</table>
### Shape and Space
(Measurement)

<table>
<thead>
<tr>
<th>Kindergarten</th>
<th>Grade 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Outcome</strong></td>
<td>Use direct or indirect measurement to solve problems.</td>
</tr>
<tr>
<td>Use direct or indirect measurement to solve problems.</td>
<td>Use direct or indirect measurement to solve problems.</td>
</tr>
<tr>
<td><strong>Specific Outcomes</strong></td>
<td>Specific Outcomes</td>
</tr>
<tr>
<td>1. Use direct comparison to compare two objects based on a single attribute, such as:</td>
<td>1. Demonstrate an understanding of measurement as a process of comparing by:</td>
</tr>
<tr>
<td>- length including height</td>
<td>• identifying attributes that can be compared</td>
</tr>
<tr>
<td>- mass</td>
<td>• ordering objects</td>
</tr>
<tr>
<td>- capacity</td>
<td>• making statements of comparison</td>
</tr>
<tr>
<td>[C, CN, PS, R, V]</td>
<td>• filling, covering or matching.</td>
</tr>
<tr>
<td>[C, CN, PS, R, V]</td>
<td>[C, CN, PS, R, V]</td>
</tr>
</tbody>
</table>
# Shape and Space

*(3-D Objects and 2-D Shapes)*

<table>
<thead>
<tr>
<th>Kindergarten</th>
<th>Grade 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Outcome</strong></td>
<td><strong>General Outcome</strong></td>
</tr>
<tr>
<td>Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</td>
<td>Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</td>
</tr>
<tr>
<td><strong>Specific Outcomes</strong></td>
<td><strong>Specific Outcomes</strong></td>
</tr>
<tr>
<td>2. Sort objects, including 3-D objects, using a single attribute and explain the sorting rule. [C, CN, PS, R, V]</td>
<td>2. Sort 3-D objects and 2-D shapes, using one attribute, and explain the sorting rule. [C, CN, R, V]</td>
</tr>
<tr>
<td>3. Build and describe 3-D objects. [CN, PS, V]</td>
<td>3. Replicate composite 2-D shapes and 3-D objects. [CN, PS, V]</td>
</tr>
<tr>
<td></td>
<td>4. Compare 2-D shapes to parts of 3-D objects in the environment. [C, CN, V]</td>
</tr>
</tbody>
</table>
Exploring Number

Suggested Percentage of Time: 70%

- Exploring Number - 1 to 5
  Lessons 1 - 9
- Exploring Patterns (sorting and classifying)
- Exploring Geometry (describing/sorting)
- Measurement (length/height)
Unit Overview

Focus and Context

An understanding of the number combinations to 10 is critical in building a strong math foundation. If students are to develop number concepts and number sense, considerable instructional time must be devoted to number and numeration. In Kindergarten, number concepts will be explored using numbers 1 to 10. It is important that students experience activities using a variety of manipulatives such as counters, snap cubes, and five and ten frames.

In term one, students will work with numbers to 5. Focus will be given to counting activities, where students will learn the word names for numbers and will be able to use them in the correct order. Students will be provided meaningful daily experiences to refine their understanding of counting. They will begin to develop counting strategies, learning to assign each object with one number (one to one correspondence). Students will recognize that when counting, the last number named represents the total number of objects in a set. Students will begin to recognize small groups of objects without having to count (subitizing). The five frame will be introduced and there will be a focus on building a relationship with five as an anchor for the other numbers. Learning the relationship between numbers is a complex process and should begin with the smaller numbers. Students will begin to develop the part-part-whole relationship of numbers. This is an important foundation for developing number sense and an understanding of mathematical operations taught in grade one. Students will need many opportunities experiencing repetition of activities for each number before introducing the next number in the sequence.

Math Connects

Number concepts are intimately tied to the world around us. Applying number relationships to the real world marks the beginning of making sense of the world in a mathematical manner. Number sense develops naturally when students connect numbers to their own life experiences, and begin to use numbers as benchmarks and referents. Students will develop multiple ways of thinking about and representing numbers. Opportunities to explain their thinking and reasoning through questions and discussion will strengthen their connections and deepen their sense of number concepts.
### Process Standards Key

<table>
<thead>
<tr>
<th>Key</th>
<th>Curriculum Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>[C] Communication</td>
<td>[PS] Problem Solving</td>
</tr>
<tr>
<td>[CN] Connections</td>
<td>[R] Reasoning</td>
</tr>
<tr>
<td>[V] Visualization</td>
<td></td>
</tr>
</tbody>
</table>

### Curriculum Outcomes

<table>
<thead>
<tr>
<th>STRAND</th>
<th>OUTCOME</th>
<th>PROCESS STANDARDS</th>
</tr>
</thead>
</table>
| Number | KN1 Say the number sequence by 1s:  
• starting anywhere from 1 to 10 and from 10 to 1  
• forward from 1 to 30. | [C, CN, V] |
| Number | KN2 Subitize (recognize at a glance) and name familiar arrangements of 1 to 5 objects, dots or pictures. | [C, CN, ME, V] |
| Number | KN3 Relate a numeral, 1 to 10, to its respective quantity. | [CN, R, V] |
| Number | KN4 Represent and describe numbers 2 to 10, in two parts, concretely and pictorially. | [C, CN, ME, R, V] |
| Number | KN5 Compare quantities 1 to 10 by:  
• using one-to-one correspondence  
• by ordering numbers representing different quantities | [C, CN, V] |
Strand: Number

Outcomes

Students will be expected to

KN5. Compare quantities 1 to 10 by:
- using one-to-one correspondence
- by ordering numbers representing different quantities.

[C, CN, V]

Achievement Indicator:

KN5.2 Compare two given sets through direct comparison and describe the sets, using words such as more, fewer, as many as or the same number.

Elaborations—Strategies for Learning and Teaching

Comparing is something students do many times a day. The majority of students start Kindergarten with a beginning understanding of comparing. For example, some students will have found a way to identify the cluster with the ‘most grapes’ or the bag with the ‘most raisins’.

Most students have an intuitive idea that, in deciding whether one group is more than another, it is possible to match items in one-to-one correspondence to see if one group has any leftovers.

One-to-one correspondence is the truest step for comparison at this stage. Objects from one set are matched with objects from the other set to see which set has objects left over. Concrete objects should be used when comparing sets and exploring one-to-one correspondence. Avoid using drawings in workbooks because the students are unable to manipulate them. When students are unable to move the objects they can not experiment and start over again. Drawing a line from one image to another can be challenging for a student in Kindergarten. In addition, drawing lines does not easily allow the use of the trial-and-error strategy. Students may choose to work alone; however, working in pairs or small groups facilitates conversations and shared thinking.

In Kindergarten, the term ‘fewer than’ is used when describing sets of objects. Later, when numbers are compared, the term ‘less than’ is more appropriate. When talking about sets that have the same number of objects, use the terms ‘the same number’ and ‘as many as’. Though the concept of fewer is logically equivalent to the concept of more, the word ‘fewer’ proves to be more difficult for students than the term ‘more’. A possible explanation is that students have many opportunities to use the word ‘more’, but have limited exposure to the word ‘fewer’. To help students with the concept of fewer, frequently pair it with the word ‘more’ and make a conscious effort to ask ‘which is fewer’ as well as ‘which is more’ questions.

When comparing, students may use strategies that involve sight recognition which means the student can recognize the number of objects without counting. This strategy becomes more challenging as the number of objects increases. The student compares the sets according to size. Although this works in some cases, this strategy can cause confusion. The size of objects and the amount of space between objects can give the impression that there are more objects in one set than the other, even when there is the same number of objects in both sets or even fewer objects in the first set.
General Outcome: Develop Number Sense

Suggested Assessment Strategies

Performance

- Ask students a yes or no question such as “Do you like blueberries?” To clarify the results, the students who said yes, line up together. The students who said no, line up together. The students in the “yes” line pair up with students in the “no” line to form a one-to-one correspondence in order to find which line has more, fewer, or the same. (KN5.2)

- Using two sets of objects of differing sizes (e.g., 4 large objects in one set and 5 small objects in the other set) ask: Which has more? How do you know? (KN5.2)

- Provide students with a cup and up to 10 double sided counters. Student shakes and spills counters. Student compares colours using the words ‘more’, ‘fewer’, ‘as many as’ or ‘the same as’. (KN5.2)

Journal

- Group students in pairs. Each pair of students will be given a bag of snap cubes. Taking turns, each student grabs a handful of snap cubes. Students make a train with their snap cubes and compare their ‘cube trains’ using the words ‘more’, ‘fewer’, ‘as many as’, or ‘the same as’. Have students draw a picture of both trains in their journal and write a simple comparison statement. E.g., Jayne’s train had more cubes. (KN5.2)

Pencil and Paper

- Counting Pockets - Provide students with snap cubes and ask them to place one snap cube in each pocket of their clothing. Students remove snap cubes from their pockets and build a tower. Students compare their towers with other student’s towers using the words ‘more’, ‘fewer’, ‘as many as’, or ‘the same as’. This may be done as a comparison between two individual students to see who has the most pockets. To extend the task, have students work in groups of 4. They can then compare the number of pockets in their group to the number of pockets in another group. This may be recorded in journals. (KN5.2)

Resources/Notes

Math Makes Sense K
Launch
Teacher Guide (TG) p. 13
Lesson 1: As Many As, More, or Fewer?
KN5
TG pp.14 - 17
Audio CD 1:
Selection 11
Strand: Number

Outcomes

Students will be expected to

KN5 Continued

Achievement Indicator:

KN5.1 Construct a set to show more than, fewer than or as many as a given set.

Elaborations—Strategies for Learning and Teaching

Constructing sets is very closely related to comparing sets. For a good indication of students’ understanding of comparing quantities, show them a set (3), ask them to complete a second set as per instructions (e.g., Make a set with fewer than 3).

One-to-one correspondence is a very important concept to understand relationships among numbers, in problem solving, and later in constructing and analyzing graphs. In Kindergarten, most students use one-to-one correspondence when comparing sets of concrete objects. In other words, students make direct comparisons. The objects should be identical and placed in the same position. The concept can then be developed to related objects such as heads and hats or students and chairs. After students compare sets of related objects, they can progress to one-to-one correspondence with unrelated objects, arranged randomly.
General Outcome: Develop Number Sense

Suggested Assessment Strategies

Performance

- Give each student a blank plate and 5 counters. In small groups, provide one dot plate with dots up to 5. As the students to:
  - make a set the ‘same as’,
  - make a set with ‘more,
  - make a set with ‘fewer’

- Working with a partner, each pair of students will be given a bag of snap cubes. Partner 1 will grab a handful of snap cubes and build a tower. Partner 2 will build a tower that is the ‘same as’ Partner 1’s tower. Partners switch roles. Activity can be repeated having partners building towers that have ‘more’ snap cubes or ‘fewer’ snap cubes than their partner’s tower.

- Provide each student with a die (1 - 5) and 6 counters. The student rolls the die and builds a set that shows the ‘same as’ the dots rolled on the die. Activity can be repeated having the student show a set that is ‘more’ and ‘fewer’ than the dots rolled on the die.

Student–Teacher Dialogue

- Use yarn to form two circles on the table. Have small objects or counters available. Make a set in one circle. Ask student to construct a set that contains the same/fewer/more number of objects as your set. Ask, “How do you know that it has the same/fewer/more number(s) of objects as my set?” Repeat using two or three different sets. Record the strategy that the student uses. Observe if he/she understands one-one correspondence. Also, see how the student responds when shown an empty set (zero). Encourage students to use appropriate mathematical language to respond to these questions, for example ‘fewer’, ‘more’, and ‘the same as’ or ‘the same number’.

Resources/Notes

Math Makes Sense K
Lesson 2: Constructing Sets
KN5
TG pp.18 - 21

Unit Centres:
TG p.10
Imaginative Play: Zookeeper
**Strand: Number**

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Elaborations—Strategies for Learning and Teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will be expected to</td>
<td>Most students arrive at school with prior knowledge of the number sequence 1 - 10. This is an important prerequisite for counting items in a set. As early as two years of age, students can repeat words such as ‘one’, ‘two’, and ‘three’; however, students do not always understand the quantity represented by the number. It is possible that the student has learned that the numeral ‘3’ can be represented by three fingers. This might be a spontaneous reflex without knowing that the word or the symbol represents three of something. It is necessary to assess each student to determine their understanding of number, not only in the oral expression of numbers, but also in counting abilities and sense of number. The challenge is to plan activities that will help the student understand that characteristics, such as size, does not influence the number that represents the objects in a set, or that the counting order does not change the quantity of objects. Counting skills, which are essential for ordering and comparing numbers, are an important component of the development of number ideas. Counting on, counting back, and skip counting mark advances in students’ development of number ideas. (NCTM Curriculum and Evaluation Standards, p. 39)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Achievement Indicators:</th>
<th>In the beginning, students should experience counting concrete objects before counting images printed on paper. Students should have a variety of materials available, such as links, counters, Pattern Blocks, Unifix cubes, beans, popsicle sticks, etc. Containers of small toys, cubes, cars, and pasta, as well as plates, meat trays, or hula hoops can be used to make sets of a given quantity. Students pass through many stages when learning to visually count a set of objects at their own pace. Often students will:</th>
</tr>
</thead>
</table>
| **KN3.1 Construct a set of objects corresponding to a given numeral.** | - move objects as they count them  
- touch the object to keep track  
- group the objects  
- scan the set  
- count pictures or drawings of objects  
- recognize a known quantity  
- use the “counting on” strategy to count one or more objects at a time. |
**General Outcome: Develop Number Sense**

### Suggested Assessment Strategies

**Performance**
- Provide a bag of snap cubes. Present one numeral card at a time (with numerals 1 - 10, depending on your focus) to the student, and ask the student to place the correct number cubes on the card with the corresponding numeral.  
  
  *(KN3.1)*

**Journal**
- Provide the student with numeral cards 1 - 3. Have the student pick a card and in their journal draw a set to represent the number and record the numeral.  
  
  *(KN3.1, 3.3)*

### Resources/Notes

- **Math Makes Sense K**
- **Lesson 3: Counting and Creating Sets of 1 to 3**
- **KN3, KN4**
- **TG pp. 22 - 25**

Although this lesson focuses on counting and creating sets 1 to 3, the elaboration and assessment tasks on these pages apply to the numbers 0 to 5 and may simply be adjusted to reflect the number being focused on in upcoming lessons.

- **Audio CD 1:**
  - Selection 12, 13

- **Little Books:**
  - The Number One
  - The Number Two
  - The Number Three
Strand: Number

Outcomes

Students will be expected to

KN3 Continued

Elaborations—Strategies for Learning and Teaching

Counting situations should occur naturally in the course of daily tasks. As contrasted with rote counting in which students say number names in sequence, meaningful counting involves an understanding that:

- One number is said for each item in the group and is counted once and only once. Students who are still not secure with the idea may say words faster or slower than they point, having noticed only that they must stop pointing and stop saying words at the same time. In this process they may skip or even recount an object. Students should be encouraged to move objects as they count. It takes a while for students to recognize that we say one word for each object we count. (one-to-one correspondence)

- Counting begins with the number 1 and there is a set number sequence. (stable order)

- The number in the set is the last number said. (cardinality)

- The starting point and order of counting does not affect the quantity. (conservation)

- The arrangement or types of objects does not affect the count. (conservation)

It is important that students develop an efficient means of recording numerals, numeral writing should be taught. As students are ready to record information by recording the appropriate numeral(s), specific instruction and practice will be necessary. Integrating digits in an emergent writing opportunity supports students in the development of writing skills. Students can “write” the digits using a variety of materials such as plasticine, sand, water, and paint. At this level, writing digits should not include the use of lined paper. Allow the students to experiment freely on unlined paper using markers, crayons, and pencils. Observe students as they write their numerals, both when copying from a model and when forming them from memory. Students should be encouraged to start at the top when printing numerals. One suggestion for practice is to use their index fingers to form the numerals on their desks, in the air, or in the sandbox.

Give students snap cubes to place on the tips of their fingers, on one or two hands. Show a number card and ask students to hold up the corresponding number of fingers. (E.g., 4 - 2 fingers and 2 fingers, or 4 fingers on one hand.)
General Outcome: Develop Number Sense

Suggested Assessment Strategies

Journal

- Provide a variety of manipulatives in sets of 1 - 3. E.g., 1 penny, 2 green blocks, 3 dinosaurs, 1 red bear, 2 yellow counters, 3 buttons. Using numeral mats with numerals 1 - 3 written on them, ask the student to sort the sets of manipulatives by placing the set on the mat with the corresponding number. (KN3.2)

- Provide sets of objects for numerals 1 - 3. Place the sets of objects under plastic tubs. Have students look under the tubs and count the objects. Students can record the numeral on a square of paper and place by the tub. (KN3.2, 3.3)

- Shake and spill a handful of two different colors of transparent counters (for numbers 3 - 10) on the overhead. Have the students record (with pictures or numerals) how many counters there are altogether and how many of each color there are. (KN3.3)

Resources/Notes

Math Makes Sense K
Lesson 3 (Continued): Counting and Creating Sets of 1 to 3
KN3, KN4
TG pp. 22 - 25

The recording of numerals is not taught explicitly in the Math Makes Sense resource. However, as each numeral is introduced, instruction of the focus numeral should be taught and practiced.
### Outcomes

*Students will be expected to*

**KN3 Continued**

**Achievement Indicators:**

<table>
<thead>
<tr>
<th>Kn3.5</th>
<th>Match numerals with pictorial representations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kn3.6</td>
<td>Count the number of objects in a set and recognize that when the objects are re-arranged the original count is maintained (conservation of number).</td>
</tr>
</tbody>
</table>

### Elaborations—Strategies for Learning and Teaching

Many representations of numbers can be used in activities such as sorting and matching activities, memory games, construction of sets, and activities that require the counting of counters or coins in a set.

Conservation of number is the understanding that the number of objects remains the same when they are rearranged spatially. When students do not demonstrate conservation of number, they may believe that the number of objects can increase or decrease when they are moved around.

As it is a developmental skill, provide experiences to promote the development of conservation of number. Also observe to see if students have reached this developmental level. It is important for students to develop confidence in their counting. For example, if they count out some objects and decide that there are 4 of them, they need to recognize immediately that if the objects are rearranged, they do not need to recount, because the count is still 4.
**General Outcome: Develop Number Sense**

### Suggested Assessment Strategies

**Performance**
- Place 3 cubes in a row and ask the student to count them. Ensure the student watches as you move the cubes into a different arrangement (spreading out or bunching them together). Ask them to tell you how many there are now. If the student recounts the cubes, he/she is not yet demonstrating conservation of number. If a student gives you the correct answer, ask, “How do you know?” He/she may say, “I watched you move them,” or “You did not add any so it is still 3.”

(KN3.6)

- Play a concentration/memory game with matching pairs of cards that show numerals and matching pictorial representations. Students take turns flipping over cards to find matching pairs.

(KN3.5)

- Provide students with dot plates and numeral cards representing numerals 1 - 3. Students match dot plates with numeral cards.

(KN3.5)

### Resources/Notes

*Math Makes Sense K*
Lesson 3 (Continued): Counting and Creating Sets of 1 to 3
KN3, KN4
TG pp. 22 - 25

**Unit Centres:**
TG p. 10
Arts and Crafts: Beads Necklaces
Strand: Number

### Outcomes

*Students will be expected to*

**KN3 Continued**

The elaborations for outcome N3 and indicators for this lesson were discussed in relation to numbers 1 - 3 on previous pages. Although this lesson focuses on counting and creating sets 4, the elaboration and assessment tasks for counting sets 1-3 on the previous page may simply be modified to apply to sets of 4.

### Achievement Indicators:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>KN3.1</td>
<td>34</td>
</tr>
<tr>
<td>KN3.2</td>
<td>36</td>
</tr>
<tr>
<td>KN3.3</td>
<td>36</td>
</tr>
<tr>
<td>KN3.4</td>
<td>36</td>
</tr>
<tr>
<td>KN3.5</td>
<td>36</td>
</tr>
<tr>
<td>KN3.6</td>
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</tbody>
</table>

**KN4 Represent and describe numbers 2 to 10, in two parts, concretely and pictorially.**

[C, CN, ME, R, V]

In Kindergarten, as in all grades, it is important to encourage students to create their own representations of mathematical ideas. When students represent mathematical ideas, they are making sense by constructing and refining thinking. Representations may involve acting out situations, drawing, painting, or using concrete materials. Some students might even begin to use numerals and words. Opportunities for students to generate multiple representations of the same idea are a critical component of developing a deeper understanding of mathematical concepts. Students need to develop flexibility in thinking about numbers to develop number sense. Provide students with opportunities to demonstrate many ways of representing a number, both concretely and pictorially. Students need to talk about where and when they might use specific numbers and their parts.
**General Outcome: Develop Number Sense**

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**Math Makes Sense K**

Lesson 4: Counting and Creating Sets of 4

KN3, KN4

TG pp. 26 - 29

Audio CD 1:
Selection 14

Little Books:

The Number Four
Which One Is It?
Strand: Number

Outcomes

Students will be expected to

KN4 Continued

Achievement Indicators:

**KN4.1 Show a given number as two parts, using fingers, counters or other objects, and name the number of objects in each part.**

Elaborations—Strategies for Learning and Teaching

Counting a set of objects will not cause a child to focus on the fact that it could be made of two parts. Focusing on a quantity in terms of its parts has important implications for developing number sense. The ability to think about a number in terms of parts is a major milestone in the development of number (Van de Walle and Lovin, 2006, p. 48).

A number can be partitioned into two or more smaller sets. Understanding the relationship among the parts and the relation between the parts and the whole is essential to developing a sense of numbers and an understanding of mathematical operations. It is important to understand that the action of partitioning a set of objects does not affect the count. A student that demonstrates an understanding of these connections can also determine a larger quantity without counting each object.

To conceptualize a number as being made up of two or more parts is the most important relationship that can be developed about numbers. The number 4 can be represented by raising three fingers on one hand and one finger on the other hand, or by raising four fingers on one hand and none on the other, and again by two fingers on each hand. By participating in such an activity, a child begins to understand that 4 can be represented in many ways, for example by 3 and 1, 0 and 4, and 2 and 2 as well as several other representations. Using representations other than fingers avoids the misconception that partitioning can only be represented using fingers.

The principle tool that students will use as they construct part-part-whole relationships is counting.

**KN4.2 Show a given number as two parts, using pictures, and name the number of objects in each part.**

While using objects to represent part-part-whole relationships, is a good beginning, students may also represent numbers into two parts using pictures.
General Outcome: Develop Number Sense

Suggested Assessment Strategies

**Performance**

- Shake and spill a handful of two different colours of transparent counters (4 or less) on the overhead. Have the students record (with pictures or numerals) how many counters there are altogether and how many of each colour. (KN4.1)

- Provide the student with a given number (4 or less) and ask students to make 3-colour trains, using snap cubes. (E.g., 3 blue and 1 red to represent 4.) Have the student tell you about the number of cubes used. (KN4.1)

- Using part-part-whole mats and counters, show students a set of 4 counters. Ask the students to count how many are in the set. Then partition the counters into two parts, for example 3 and 1, and ask: “How many objects are there? How do you know?” Observe whether the student must recount all of the objects of if he/she knows that partitioning the objects has not changed the quantity. (KN4.1)

- Provide students with dot plates representing numerals to 4 using two different colour dots. (E.g., 3 blue and 2 yellow or 2 blue and 2 yellow.) Ask students to name the number of dots altogether and how many of each colour. (KN4.2)

- Provide students with dominos that represent numbers up to 4.

![Domino Examples]

Ask students to name the number of dots on the domino, and the number of dots on each. (KN4.2)

**Resources/Notes**

Lesson 4 (Continued): Counting and Creating Sets of 4
TG pp. 26 - 29

Unit Centres:
TG p. 10
Arts and Crafts: Bead Necklaces
Strand: Number

Outcomes

Students will be expected to

KN3 Continued

Elaborations—Strategies for Learning and Teaching

The elaborations for outcome N3 and indicators for this lesson were discussed in relation to numbers 1 - 3 on previous pages. Although this lesson focuses on counting and creating sets 5, the elaboration and assessment tasks for counting sets 1- 3 on the previous pages may simply be modified to apply to sets of 5.

Achievement Indicators:

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<tr>
<td>KN3.6 Continued</td>
<td>See page 38</td>
</tr>
</tbody>
</table>
General Outcome: Develop Number Sense

Suggested Assessment Strategies

Performance

- Have students form a circle with shoelaces, or provide a hula hoop, and choose some objects. Ask the students to place a certain number of objects in the circle for the given number up to 5. As a group, the students count aloud. (KN3.1)

- Display a set of 5 objects. Ask the student, “How many are in your set?” Observe whether the student is able to say the numbers in the correct order, if he/she must move the objects to avoid confusion, if he/she can easily determine the quantity by looking at the set, and if he/she realizes that the last number said is the number in the set. Repeat varying the number of objects. (KN3.2)

- Place five cubes in a row and ask the student to count them. Ensure the student watches as you move the cubes into a different arrangement (spreading the out or bunching them together). Ask them to tell you how many now. If the student recounts the cubes, he/she is not yet demonstrating conservation of number. If a student gives you the correct answer, ask “How do you know?” He/she may say, “I watched you move them,” or “You did not add any so it is still 5.” (KN3.6)

- Provide the lid of a shoe box or a tray and snap cubes. Tell the student you are going to tell stories about playful kittens (represented by kitten counters or cubes) and when you are finished you want the student to place the correct number of ‘kittens in the sandbox’. Create several different stories. E.g., Say: One day a little girl looked out her window and 5 kittens ere playing in her sandbox. Show me what she saw. Two kittens jumped out and ran away. What did she see in her sand box now? Continue in this manner to observe the student’s understanding of counting.

- Provide sets of objects for numerals 1 - 5. Place the sets of objects under plastic tubs. Have students look under the tubs and count the objects. Students can record the numeral on a square of paper and place by the tub. (KN3.2, 3.3)

Resources/Notes

Math Makes Sense K
Lesson 5: Counting and Creating Sets of 5
KN3, KN4
TG pp. 30 - 33

Audio CD 1:
Selections 15, 16

Little Books:
The Number Five

Unit Centres:
TG pp. 10 - 11
Arts and Crafts: Bead Necklaces
Construction: Tower Centre
Literacy: Number Books
Sand and Water: Shell Collections
### Strand: Number

#### Outcomes

*Students will be expected to*

**KN4 Continued**

#### Achievement Indicators:

- **KN4.1** Show a given number as two parts, using fingers, counters or other objects, and name the number of objects in each part.

- **N4.2** Show a given number as two parts, using pictures, and name the number of objects in each part.

#### Elaborations—Strategies for Learning and Teaching

The elaborations for outcome N4 and indicators for this lesson were discussed in relation to numbers 4 on previous pages. Although this lesson focuses on number combinations for sets to 5, the elaboration on the previous page may be modified to apply to sets of 5.

See page 42

See page 42
General Outcome: Develop Number Sense

Suggested Assessment Strategies

Performance

- Shake and spill a handful of two different colors of transparent counters (5 or less) on the overhead. Have the students record (with pictures or numerals) how many counters there are altogether and how many of each color. (KN4.1)

- Have students sit in a circle. Ask students to give a “high five” to the student sitting next to him or her. Ask students: “How can you give a “high five” using two hands?” Observe the ways students represent five using their fingers on both hands. Throughout the day, repeat the activity calling “high five” and have students give each other “high fives”. (KN4.1)

- Provide the student with a given number (5 or less) and ask students to make 2-color trains, using snap cubes (e.g., 2 blue and 3 red to represent 5). Have the student tell you about the number of cubes used by drawing their train in their journal and recording the number. (KN4.2)

- Provide a student with a large sheet of paper with 5 two-part mats drawn on the paper, and two different colour bingo dabbers. Have students come up with five different combinations of five.

Resources/Notes

Math Makes Sense K
Lesson 6: Combinations for Sets to 5
KN3, KN4
TG pp. 34 - 37

Audio CD 1:
Selection 17

Little Books:
The Number Six
Who Is Missing?
Strand: Number

Outcomes

Students will be expected to

KN2 Subitize (recognize at a glance) and name familiar arrangements of 1 to 5 objects, dots or pictures.
[C, CN, ME, V]

Elaborations—Strategies for Learning and Teaching

Subitizing is the ability to recognize, without counting, dot arrangements in different patterns. Students should recognize that there are many ways to arrange a set of objects and that some arrangements are easier to recognize more quickly than others. E.g.

Recognition of small arrangements of objects helps students in the process of counting on, composing and decomposing numbers, and that a number can be represented in many ways.

At first, students will count the dots or the pictures. Eventually, students must be able to recognize the arrangements without counting. To avoid the misconception that an arrangement can only represent a specific quantity if it is arranged in a certain way, it is VERY important to vary the orientation of the objects, dots, or pictures. When asking students to identify the number of fingers, use different combinations of fingers so that students do not believe that there is only one way to represent the number. Any two fingers represent the quantity of two; however, many students think that only the middle and index fingers represent two because these two fingers are the only ones that have been used when they have heard or said “two”. For these students, two is a shape rather than a quantity. It is important to take advantage of teachable moments during the day to talk about numbers from 0 to 5.

Young students should begin by learning the patterns of dots up to 5, as are displayed on dice (for this time of the year you may place a piece of masking tape over ‘6’). For most numbers, there are several common patterns. Patterns can also be made up of two or more easier patterns for smaller numbers. Particularly useful equipment include dice, board games, dominoes, cards, etc. Students should also associate the dot patterns to numbers, numerals, finger patterns, bead strings, dot plates, etc. Prepare dot arrangements using stickers on recipe cards or on paper plates to create a variety of arrangements for numbers 0 to 5.

A five-frame is a rectangle of five squares with each square large enough to hold a counter. Five-frames focus on the relationship to five as an anchor for numbers. This five frame represents 5:

😊  🌟  🌟  🌟  🌟  🌟
General Outcome: Develop Number Sense

Suggested Assessment Strategies

Performance

- Using a five-frame and counters have the child show the number two. Then ask the child to show you five. Observe how the child showed you five. If the child continues counting from the existing two counters, conservation of number is evident. (KN2.2)

- Display a 5-frame on the overhead projector and cover it after three seconds. Ask students to sketch or use stickers to show on an empty 5-frame what they saw. Repeat with different examples. Ask students to tell how many there are and how many more to make five. (KN2.2)

Resources/Notes

Math Makes Sense K
Lesson 7: Five Frames
KN2, KN3, KN4
TG pp. 38 - 41

Unit Centres
TG p. 10
Exploration: Filling Five

The Teaching Tip on Unit 2, page 39, of the text states: “...children should fill squares in a variety of ways without feeling they need to go from left to right.” However, it is strongly suggested to always start filling the five-frame from the left to the right to avoid possible confusion when later working with ten-frames.
Strand: Number

Outcomes

Students will be expected to

KN2 Continued

Achievement Indicator:

| KN2.2 Continued |

Elaborations—Strategies for Learning and Teaching

Introduce the following rules for showing numbers on a five frame:

- only one counter is permitted in each box of the five-frame
- always start filling the five-frame from the left to the right (the same way you read or write). A visual, such as a Smiley face above the first square on the left, will assist the student in beginning to fill the frame correctly.

At some point students need to be introduced to 0. After working with the five frame for numbers 1 to 5, 0 can be introduced as an empty 5-frame.
General Outcome: Develop Number Sense

Suggested Assessment Strategies

**Performance**

- Provide a 0 - 5 die, 5-frame and counters. Students roll the die and represent the number rolled on the 5-frame. Ask students:
  - How many are on your 5-frame?
  - How many empty spaces are on your 5-frame?
  - How many would you need to fill your five frames?

  *(KN2.2)*

- Provide students with a 5-frame and five double sided counters. Have students make a given number to 5 using two different colours with their counters. Ask students:
  - How many are on your 5-frame?
  - How many would you need to fill your 5-frame?

  *(KN2.2)*

**Resources/Notes**

*Math Makes Sense K*
- Lesson 7 (Continued): Five Frames
- KN2, KN3, KN4
- TG pp. 38 - 41

**Unit Centres:**
- TG p. 10
  - Exploration: Filling Five
Strand: Number

Outcomes

Students will be expected to

KN2 Continued

Elaborations—Strategies for Learning and Teaching

While waiting for the bell to ring, call out a number from 0 to 5. Ask the students to use fingers (stipulate how many hands) to represent the number. Doing the activity with eyes closed or with hands behind their backs, allows students to mentally visualize the number rather than count.

Dot Plate Flash - Use prepared dot arrangements for numbers 0 to 5. Hold up a dot plate for one to three seconds and then hide it. Say, “How many? How did you see it?” (Students might say, “I saw 6. I saw 3 on one side and 3 on the other.”) See how quickly students can recognize the number of dots without counting.

Daily/Calendar Routines - For the first five days of each month, students can identify familiar arrangements that correspond to that day of the week and display the arrangements for the day. For example, on October 5th, students might represent 5 as:

Show students a prepared dot plate. Ask them to show you the given dot arrangement on a 5-frame. Observe to see if they have the correct number represented and that the 5-frame is filled in from the left cell first moving to the right. Later, when students work with numbers to 10, they can do this activity for 1 - 10 for the first ten days of the month.

Place three counters on a 5-frame and show this arrangement to the student. Ask, “How many counters (objects) do you see on this 5-frame? How many more will make five?” Repeat using other numbers. Record those that the student recognizes without counting and those that he/she must count to recognize.

Achievement Indicators:

KN2.1 Look briefly at a given familiar arrangement of 1 to 5 objects or dots, and identify the number represented without counting.

KN2.2 For numbers up to 5, identify the number represented by a given dot arrangement on a five frame and describe the number’s relationship to five.
General Outcome: Develop Number Sense

Suggested Assessment Strategies

Performance

- Prepare a set of five frames or dot cards displaying objects/dots up to 5. Shuffle the cards and deal ten to each player. Each player faces their cards face down on the table. Players take turns flipping cards from their respective piles. Students compare sets to determine who has the set with fewer. That student earns a counter. Play continues until all cards have been played. The student with the most counters is the winner. (KN2.1)

- Ask students to prepare different arrangements of objects for a given number. Use a variety of material such as buttons, toothpicks, or paper clips to make arrangements. (KN2.2)

- Use prepared dot arrangements for numbers 0 to 5. Hold up a dot plate for one to three seconds. Have students reconstruct the arrangement using counters on their own blank plate and state the corresponding number. Ask them to make a set that has one more and one less. Students can use their finger to write the number on their desks or in the air. (KN2.1)

- Have students work in pairs. Provide a set of dot plates to each pair and ask pairs to sort them according to number. Ask: “Which cards or plates were easiest to sort? Why?” For example:

```
“5” cards:

```

```
“3” cards:
```

Resources/Notes

* Math Makes Sense K
* Lesson 8: Visualizing Numbers
* KN2, KN3, KN4
* TG pp. 42 - 45
Strand: Number

Outcomes

Students will be expected to

KN1 Say the number sequence by 1s:
- starting anywhere from 1 to 10 and from 10 to 1
- forward from 1 to 30.

[C, CN, V]

Elaborations—Strategies for Learning and Teaching

Provide opportunities for students to develop an understanding of number sequence as they count objects while involved in play. Pose questions that encourage counting, when opportunities occur naturally.

For example:
- How many people wore mittens today?
- How many cups do we need at this table?
- In this story, how many different animals did you see?
- How many letters are in your first name? Full name?

Student might also:
- count backwards while taking items out of the water table
- count down to special days
- count while performing finger plays or exercises
- count on while determining the total on a pair of dice
- count while skipping, hopping, bouncing a ball, or taking part in other physical activities
- count themselves for morning routines

Daily Routines - The calendar is an effective visual aid for counting.

Daily calendar routines provide opportunities for students to hear and speak mathematical vocabulary in a natural setting. A calendar exposes students to counting to and from larger numbers each day as the month progresses. Good questioning techniques during calendar activities provide occasions for students to learn the number that comes ‘before’, the number that comes ‘after’, and the number(s) that come in between.

Use linking cubes to construct towers. Students add one cube each day, for 10 days. On the tenth day, the students count down (backwards) as the cubes are removed, one at a time. The process is started again the following day. Later in the year, have students count to 30 to follow the calendar; however, it is important to remember that assessment involves only numbers from 0 to 10 at this time. By the end of the year, students will be expected to count to 30.

As students are learning to recite number sequences backwards from 10 to 1, after saying 1, ask: “Then what would you say?” This is an opportunity to expose students to the number 0.

Achievement Indicators:

| KN1.1 Name the number that comes after a given number, one to nine. |
| KN1.2 Name the number that comes before a given number, two to ten. |
| KN1.3 Recite number names from a given number to a stated number (forward – one to ten, backward – ten to one) using visual aids. |
| KN1.4 Recite number names from 1 - 30. |
General Outcome: Develop Number Sense

Suggested Assessment Strategies

Performance

- Begin counting, and have students continue counting to the number 10 (e.g., 1, 2, 3 . . . ). Repeat this activity in reverse order and have the students continue counting backwards to 0 (e.g., 10, 9, 8, 7, 6, 5 . . . etc) Also, consider counting to 10, omitting some numbers in the sequence, and have students say the missing numbers (e.g., 1, 2, 3, …, 5, 6, …, …, 9, 10). (KN1.3)

- Seat 10 students on a row of chairs. Have the whole class count as the seated students stand up, one at a time. You may repeat this activity by having all students stand and the class count backwards as the students sit down, one at a time. (KN1.3)

- Have the students form a human number line. At beginning of the year, use numbers to 5. Later in the year, extend the number line to 10. Give each student a number card and ask them to arrange themselves in order starting with 1. Then remove a number card or two and ask them to arrange themselves again. Encourage them to leave spaces for missing numbers. (KN1.1, 1.2)

- Class Riddles: Have the students make up simple riddles to ask the class. This can be done any time throughout the day (waiting to dismiss, right after recess, etc.) when you have a few minutes. E.g.,
  - I am 6. What comes after me?
  - I am 4. What comes before me?
  - I am 2. What is one more? (KN1.1, 1.2)

- The following questions will assist in determining the students’ level of competency in saying the number sequence.
  - “Please say the numbers for me starting at 1.” (If the student is unable to say the number sequence, provide a hint to get him/her started, e.g., “one, two . . .,” to see if the student is able to continue. A visual may also be used). (KN1.1, 1.2, 1.3)
  - “Start at 10 and say the numbers backwards.” (This is only to be done if the student can count forwards to 10. A hint or a visual may be necessary).
  - “Which number comes before 5? Before 9?”
  - “Start at 4 and say the numbers to 8.” (This is only to be asked if the student demonstrates correct number sequence from 0 to 10).
  - “Start at 7 and say the number sequence to 1.” (To be asked if the student is comfortable saying the number sequence backwards from 10 to 0)

Resources/Notes

Math Makes Sense K
Lesson 9: Let’s Count
KN1
TG pp. 46 - 49

Audio CD 1:
Selection 19, 18

Little Books:
How Many in All?
Exploring Patterns

Suggested Percentage of Time: 15%

This is the first explicit focus on sorting, but as with other outcomes, it is ongoing throughout the year. It is important for students to have a good conceptual understanding of sorting as it builds the foundation for later patterning skills.
Unit Overview

Focus and Context

This unit provides students with experiences in sorting, comparing and describing familiar 3-D objects. The focus of the teaching and learning is on sorting and comparing 3-D objects using one attribute, rather than on naming shapes and objects. Before students engage in patterning activities they need to come to the understanding, through hands on exploration, that objects can be sorted and classified according to their various attributes.

Process Standards

|-------------------|------------------|----------------------------------------|----------------------|-------------|---------------|------------------|

Curriculum Outcomes

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<th>OUTCOME</th>
<th>PROCESS STANDARDS</th>
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<td>KSS2 Sort objects using a single attribute and explain the sorting rule.</td>
<td>C, CN, PS, R. V</td>
</tr>
</tbody>
</table>
**Strand: Shape and Space (Measurement)**

**Outcomes**

*Students will be expected to*

**KSS2** Sort 3-D objects using a single attribute and explain the sorting rule.

[C, CN, PS, R, V]

**Elaborations—Strategies for Learning and Teaching**

The concept of patterning is closely related to sorting. Sorting is the physical process of grouping objects according to shared characteristics. Students need frequent practice sorting everyday 3-D objects, such as building blocks, cups, shoes, clothing, buttons, farm animals, toys, etc.

Before students sort objects they, through exploration, come to a realization that all objects have many attributes, some are the same and some are different.

Choose a group of students who share something in common, such as all wearing sneakers, all wearing striped clothing, all having green eyes or all wearing glasses. Once the selected students are standing in a group, the remaining classmates will identify the ways in which the group members are the same which will result in the naming of the sorting rule you used. When the students have identified the rule, talk about other rules that might also apply. Ask students how they determined their sorting rule.

It is important to provide students with opportunities to verbalize their sorting rule as this helps to build and solidify reasoning skills. It also enhances student's observations of multiple properties.

Give students the opportunity to play the role of the teacher, having them take turns choosing the rule, selecting the students and calling on someone to identify the sorting rule.

Give students a set of 3-D objects such as buttons, small animals or linkits with a common attribute. Ask students: How are these objects the same and/or different?

When sorting by a single attribute, students may apply a sorting rule by simply grouping items that are alike together. These cubes are sorted by one attribute - color:

Students may also sort objects according by one attribute, in a different way:

The cubes in the second examples are sorted by one attribute - color. The cubes in the first example are sorted by color, according to the characteristics of red, blue and yellow. The cubes in the second example are sorted according to the characteristics ‘red’ and ‘not red’, leaving the blue and yellow cubes outside the sorted circle.

**Achievement Indicators:**

- **SS2.1** Identify a common attribute in a given set of 3-D objects.
- **SS2.2** Sort a set of objects including familiar 3-D objects, using a single attribute such as size or shape, and explain the sorting rule.
General Outcome: Use Direct or Indirect Measurement to Solve Problems

Suggested Assessment Strategies

Performance

- Grab a Handful - Students are provided with a collection of various, small 3-D objects. They are instructed to ‘grab-a-handful” (or fill a small scoop) depending on the size of the items and/or the instructional level of the students) from the collection. Students then sort their collection into groups by attribute and explain their reasoning.  
  (KSS2.1, 2.2)

- Sorting Colors Game - Students randomly fill their container (margarine tub) with colored tiles or cubes. Pour out contents and sort them by color. 
  (KSS2.2)

- Provide students with many experiences to sort objects such as paper clips, blocks, toys of various sizes, math manipulatives, beads, buttons, crayons, markers, snap cubes, counters, etc. 
  (KSS2.1, 2.2)

- Set up three to four sorting centres around the classroom. Divide students into small groups. Allow 5-6 minutes at each centre for them to sort the objects at their table. Ask:
  - What is your sorting rule?
  - Is there another way to sort these objects?
  - How about another way? 
  (KSS 2.2) 

- Read “Shoes From Grandpa” by Mem Fox. Following the reading, ask students to remove their shoes or bring in their outdoor shoes to sort. Observe how they sort the shoes. Do they sort by:
  - color?
  - with or without laces?
  - velcro?
  - light up shoes?
  - theme pictures or words?  
  (KSS2.1, 2.2)

- Provide pairs of students with a barrier, such as a book or box. Give students a set of familiar 3-D objects to sort behind their barrier. Once sorted, the barrier is removed and the other student guess the sorting rule used. Game continues with players taking turns re-sorting the objects and repeating the activity. 
  (KSS 2.2) 

Resources/Notes

- Math Makes Sense K Launch
  - Teacher Guide (TG) p. 11
  - Optional

- Lesson 1: Sorting Objects
  - KSS2
  - TG pp. 12 - 15
### Outcomes

*Students will be expected to*

**KSS2 Continued**

**Achievement Indicators:**

- **KSS2.3** Determine the difference between two pre-sorted sets by explaining a sorting rule used to sort them.

### Elaborations—Strategies for Learning and Teaching

Students need practice in recognizing and stating a sorting rule for a pre-sorted set of objects.

Mystery Game - select a set of objects or people. Organize them into two sets (e.g., sorting by hair color: blonde - not blonde or sorting by height: tall and short). Ask other students to identify and explain the sorting rule.

Give students two pre-sorted sets of 3-D objects (such as a ball, a globe, and an orange; a present, tissue box and a block). Ask them to explain the sorting rule for each set.
General Outcome: Use Direct or Indirect Measurement to Solve Problems

Suggested Assessment Strategies

**Performance**

- Place collections of familiar 3-D objects on each group of student tables. As a group, students decide on a sorting rule for their collection and sort the items accordingly. After each group has sorted their collection, all students rotate around the classroom, visiting each table, trying to decide the sorting rule that was applied. (KSS2.1, 2.3)

- During dismissal time or while lining up for music/gym, group the students based on a particular attribute, such as boy/girl, clothing color, or glasses/no glasses. Have the students try to name the mystery sorting rule. (KSS2.3)

- Invite students to set up a toy store using items from the play centre. Have one student assume the role of the shop keeper, sorting the toys into two sets based upon a single attribute. Other students in the class visit the store and try to determine the shop keepers sorting rule. (KSS2.3)

- Present the students with a set of familiar objects that have been sorted into two sets based on a single attribute (e.g., texture, color, shape). Ask: “How are things in one set different from the things in the other set? What do you think the sorting rule is? Discuss all possible sorting rules.” (KSS2.3)

- Using sorting mats or trays, have students sort familiar objects into two sets. They will exchange their sorted set with a partner. Have them exchange their sets with a partner and the partner attempt to name the sorting rule used as well as explain the differences between the two sets. Challenge the students to re-sort the objects in a different way and repeat the activity. (KSS2.3)

**Resources/Notes**

- *Math Makes Sense K*
- **Lesson 2: Comparing Sets**
- KSS2
- TG pp. 16 - 19

- **Audio CD 1:**
  - Selection 1

- **Little Books:**
  - Which Belong Together?

- **Unit Centres**
  - TG p. 8
  - Imaginative Play: Tidying
Exploring Geometry and Measurement

Suggested Percentage of Time: 15%

This is the first explicit focus on sorting and describing 3-D objects which are symbolic representations of 3-D geometric solids. The focus of this unit is also on using measurement, in terms of length/height, to solve problems.
Unit Overview

Focus and Context
This unit provides students with experiences in sorting and describing 3-D objects that are symbolic representations of 3-D geometric solids (i.e. blocks of different shapes, sponges, paper towels, cans, boxes, film canisters). The focus of teaching and learning is on sorting and comparing 3-D objects using one attribute (i.e. can all roll, can all slide, all look like a box) rather than on naming shapes and objects. Teachers may expose students to correct mathematic terms such as cube, cylinder, cone and sphere using an informal approach. In Grade One, students will continue sorting, comparing and describing 3-D objects and will be formally introduced to 2-D shapes.

This unit launches the teaching and learning of measurement. Students will use direct comparison to compare two objects based on the single attribute of length/height. Students will also make statements of comparison in communicating their understanding of measurement, in terms of length/height. In Grade One, students will compare two or more objects using the single attribute of length.

Math Connects
Geometry enables us to describe, analyze, and understand our physical world and therefore, requires a focus throughout the Math curriculum. It also complements and supports the study of other aspects of mathematics such as number and measurement. Geometry offers powerful tools for representing and solving problems in all areas of mathematics.

Measurement is a fundamental mathematical process that pervades all branches of mathematics, as well as many other disciplines and everyday activities. Early measurement experiences enable students to make connections to their own experiences and their environment by using concrete materials to solve real world problems. Measurement can be easily integrated into other subject areas in the Kindergarten curriculum, such as social studies, language arts, and health.
### Process Standards Key

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### Curriculum Outcomes

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<td>KSS1 Use direct comparison to compare two objects based on a single attribute, such as length including height, mass, capacity.</td>
<td>[C, CN, PS, R, V]</td>
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<tr>
<td>Shape and Space (Measurement)</td>
<td>KSS2 Sort objects, including 3-D objects, using a single attribute and explain the sorting rule.</td>
<td>[C, CN, PS, R, V]</td>
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Strand: Shape and Space (3-D Objects and 2-D Shapes)

Outcomes

Students will be expected to

KSS3 Build and describe 3-D objects.
[CN, PS, V]

Elaborations—Strategies for Learning and Teaching

The study of 3 dimensional objects is essential as we strive to describe, analyze and understand the world we live in. Tasks selected in geometry should provide students with the opportunity to explore. Students need to see and feel, to build and take apart, to sort and to identify sorting rule(s), and to share their observations with their classmates.

The block center is an important place for students to regularly explore and experiment with 3-D objects. 3-D objects have dimensions (length, width, and depth). Use the term ‘objects’, not ‘3-D objects’ when talking to students. As they make their constructions, they begin to learn, often through trial and error, about the attributes of the various objects. It is through these investigations that students are able to learn the characteristics and properties of objects.

Asking questions while the student is building with objects can provide valuable information regarding the student’s concept acquisition. Questions might include:

- How is your creation the same as the given object?
- How is it different?
- What words can you use to describe your creation? (round, flat, shape like a box)

Early school experiences should include describing how 3-D objects are alike and how they differ.

Attributes of 3-D objects that students might explore include:

- flat slides
- sharp corners
- will roll/stack/slide
- looks like a ball

At this stage, students are not expected to name 3-D geometric solids as ‘sphere’, ‘cone’, ‘cylinder’, and ‘cube’, but you may expose students to this mathematical language during discussions.

During daily routines play games of “I Spy” using language related to 3-D objects. For example, “I spy with my little eye an object that looks like a can.”

Achievement Indicator:

KSS3.2 Describe a given 3-D object, using words such as big, little, round, like a box and like a can.
### General Outcome: Describe the Characteristics of 3-D Objects and 2-D Shapes, and Analyze the Relationships Among Them

#### Suggested Assessment Strategies

**Performance**

- **Barrier Game** – Use a hard cover book to create a barrier on the desk between two students. One student selects a 3-D object and provides his/her partner with “hints” so that the partner can guess the object that is being hidden. (KSS3.2)

- **Display a collection of familiar 3-D objects (e.g., balls, toys, art materials, etc.) on a tray/table and describe each one. For example, one student may say, “This object looks like a can,” or “This one can roll.” Allow students to look at the objects for at least 30 seconds. Students then close their eyes and you remove one object from the table/tray. Students are asked to describe the missing object without naming it. Show the missing object to the students to compare it with their descriptions. (KSS3.2)**

- **Feel and Guess Game** - Display a set of 3-D geometric solids (cone, cube, cylinder and sphere). In a bag, hide an object that matches one of the solids in the displayed set. Say, “I put an object in the bag that is the same as one of the objects in this set.” Have a student reach into the bag, feel the object. Ask him or her to tell classmates about the shape and size of the object so that students can find the 3-D geometric solid that it matches?” Repeat several times. This activity can be extended by asking students to spy a similar object in the classroom. (KSS3.2)

#### Resources/Notes

- **Math Makes Sense K**
  - **Launch**
    - Teacher Guide (TG) p.13
  - **Audio CD 1:**
    - Selection 1
  - **Lesson 1: Describing 3-D Objects**
    - KSS3
    - TG pp. 14 - 17
**Strand: Shape and Space (Measurement)**

**Outcomes**

_Students will be expected to_

KSS2 Sort 3-D objects using a single attribute and explain the sorting rule.

[C, CN, PS, R, V]

**Elaborations—Strategies for Learning and Teaching**

Students come to school having had experience with many 3-D objects. Structuring meaningful contexts for students where they have opportunities to explore, touch, manipulate, play, sort and build with 3-D objects is important to developing spatial sense. Early school experiences should include sorting 3-D objects and describing how they are alike and how they differ (smooth sides, sharp corners, will roll, looks like a ball, etc.). Sorting or classifying shapes, using models, is a good way to introduce geometric ideas. At this stage students recognize and describe 3-D objects based on global, visual characteristics or attributes. They consider the overall appearance (not specific properties) when describing, sorting and comparing figures. When describing attributes of 3-D objects, you can use mathematical language such as ‘cube’, ‘cylinder’, ‘cone’ and ‘sphere’; however, students are NOT expected to acquire this language in Kindergarten.

Consider the following strategies when planning lessons:

- Ask students to bring 3-D objects from home to share with the class. Have them tell one or two things that they find interesting about what they have brought from home.
- Use 3-D objects that have similar attributes as cubes, cones, cylinders and spheres. For example, blocks of different shapes, sponges, paper towel rolls, cans, boxes of different sizes, film canisters, spools, marbles and crayons.

**Achievement Indicators:**

- **KSS2.1 Identify a common attribute in a given set of 3-D objects.**
- **KSS2.2 Sort a set of 3-D objects, using a single attribute such as size or shape, and explain the sorting rule.**

Give students a set of 3-D objects with a common attribute. Ask students to identify the attribute using sorting criteria such as number of faces, thickness of the shape and whether it rolls and/or stacks, as well as non-geometric criteria such as color, function and texture.

Give students a mixed set of 3-D objects. Ask them to sort the objects and to explain their sorting rule. Encourage them to re-sort them in other ways.
General Outcome: Use Direct or Indirect Measurement to Solve Problems

### Suggested Assessment Strategies

**Performance**

- Give students a pre-sorted set of 3-D objects. For example, a tissue box, eraser, book and sponge. Ask them to identify how the objects are the same (e.g., can slide, have flat sides, have points). (KSS2.1)

- Give students a mixed set of 3-D objects. Ask them to sort the objects and to explain their sorting rule. Encourage them to re-sort them in other ways. (KSS2.2)

- Table groups are given a set of 3-D objects. As a group they will sort the objects based upon a common attribute and explain their sorting rule. This activity can be repeated using other sorting rules. (KSS2.2)

- Place four 3-D objects on a table and ask which shape does not belong (e.g., ice cream cone, tennis ball, party hat, and pylon). Have student explain why it does not belong. (KSS2.2, 2.3)

### Resources/Notes

- *Math Makes Sense K*
  - Lesson 2: Sorting 3-D Objects
  - KSS2
  - TG pp. 18 - 21
## Strand: Shape and Space (Measurement)

### Outcomes

*Students will be expected to*

KSS2 Continued

### Achievement Indicators:

**KSS2.3** Determine the difference between two pre-sorted sets by explaining a sorting rule used to sort them.

### Elaborations—Strategies for Learning and Teaching

Students need practice in recognizing and stating a sorting rule for a pre-sorted set of 3-D objects. Students often enjoy this task because it is like playing a mystery game.

Display two pre-sorted sets using 3-D objects. Say:

- tell how the objects in this set are the same (all these can roll like a ball)
- tell how the objects in this set are different from the objects that are NOT in the set (they cannot roll)
- what else can you tell me about the shape of these objects? (they are round, they can't slide, they don't look like a box)
General Outcome: Use Direct or Indirect Measurement to Solve Problems

<table>
<thead>
<tr>
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<td><strong>Performance</strong></td>
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| • Sort 3-D geometric solids into a set according to a single attribute. Students try to name the sorting rule. Ask:  
  How are these objects the same and how are they different?  
  What is my sorting rule? (how they move - roll/not roll, how many sides, how they look - like a ball, can, pointy, curved or straight)  
  Is there another way that we could sort them? [KSS2.2, 2.3]  
  Math Makes Sense K  
  Lesson 2 (Continued): Sorting 3-D Objects  
  KSS2, KSS3  
  TG pp. 18 - 21 | |
| • Provide pairs of students with a barrier, such as a book or box. Students are given a set of familiar 3-D objects to sort behind their barrier. Once sorted, the barrier is removed and students take turns guessing each others sorting rule. Students re-sort the objects and repeat the activity. [KSS2.2, 2.3] | |
Outcomes

Students will be expected to

KSS1 Use direct comparison to compare two objects based on a single attribute, such as length including height, mass, capacity [C, CN, PS, R, V]

Measurement involves identifying and comparing similar attributes. Through measurement activities, students should realize that the same object can have many measurable attributes. Students should use terminology involving measurement, including: longest, shortest, heaviest, lightest, most, least, etc. It is important that students explore measurement in context throughout each day using direct comparison. This involves students lining up items side by side to compare. In the development of measurement skills, students must engage in a wide variety of activities that promote measurement experiences. Students must have first hand practices to gain true understanding of this skill. Measuring activities will enable students to better incorporate computational skills and make the connection between basic geometric concepts and number concepts.

Many students’ first experiences with measurement involve height. They may have a growth chart at home. Direct comparisons of two or more objects are important for the development of the understanding of measurement. Students need a variety of experiences to compare height. Be aware that not all students understand the concept of a base line (comparing by starting both objects at the same place) when measuring. At this stage, students should compare height by lining up items starting at a common base line such as the edge of the table and observing which one sticks out (or up) farther than the other. When comparing objects, students will use words such as ‘shorter’, ‘higher’ and ‘taller’ or ‘almost the same’.

To test for conservation of length, place 2 objects side-by-side, starting at the edge of a table and ask if they are the same length.

Most students will say “yes”. Next, move one object away from the edge and repeat the question.

A child who has conservation of length will say that the objects are still the same length.
General Outcome: Use Direct or Indirect Measurement to Solve Problems

Suggested Assessment Strategies

Performance

• Read and discuss the story _The Three Bears_. Using the bears’ belongings, discuss length.
  Chairs - Using three different size chairs get the students to compare height and size.
  Beds - Using pictures of three different size beds get the students to compare the height of each.  
  (KSS1.1)

Student-Teacher Dialogue

• Display two objects (one that is longer than the other) and ask:
  • Which object do you think is the longer (shorter)?
  • Can you show or tell me why?
  Display two objects (of almost the same height) and ask:
  • Which object do you think is the highest (tallest, shortest)?
  • Can you show or tell me why?
  Display other objects and ask:
  • Are these two ______ almost the same height?
  • Can you show (tell) me why?  
  (KSS1.1)

• Ask students to find things in the classroom that are taller, shorter than, or as tall as themselves or other objects, e.g., pencil, or block tower. Ask students to identify the tallest or shortest in a group of objects, e.g., a bunch of carrots, a group of crayons or straws.  
  (KSS1.1)

Resources/Notes

_math Makes Sense K_
Lesson 5: Which Is Taller?
KSS1
TG pp. 30 - 33

Audio CD 2:
Selection 1
Strand: Shape and Space (Measurement)

Outcomes

Students will be expected to

KSS1 Continued

Achievement Indicators:

KSS1.1 Compare the length of two given objects; and explain how they compare using the words shorter, longer, taller or almost the same

Elaborations—Strategies for Learning and Teaching

Students’ early experiences of measurement of length involve comparing objects and familiar things in their environment using direct comparison. Student’s understanding of length is developed by meaningful exposure of measuring activities using materials such as:

- Classroom manipulatives (snap cubes, link its, paper clips, plastic straws, crayons, etc.)
- Parts of the body (length of an arm, length of a foot)
- Classroom furniture (length of a table, length of a book)
General Outcome: Use Direct or Indirect Measurement to Solve Problems

Suggested Assessment Strategies

Performance

• Draw Straws - Provide each group of 3 students with 15 counters and 5 straws cut different lengths. Player 1 holds the straws with 2 hands, hiding the bottom of the straws. Players 2 and 3 take a straw and compare the length of their straws using direct comparison. The player whose straw is the longest takes 1 counter. Player 2 holds the straws while Players 1 and 3 take a straw. Continue taking turns holding the straws and drawing the straws. The student who gets 5 counters first is the winner. (KSS1.1)

• By snapping cubes together, students construct a train based on the number of letters in his/her name (one snap cube per letter). Students then compare the length of his/her name with a partner’s name using terms such as shorter than, longer than, the same as. (KSS1.1)

• Read ‘David’s Father’ by Robert Munch. Students compare themselves with other students using terms taller, shorter, and almost the same as. (KSS1.1)

Student-Teacher Dialogue

• Make 2 snap cube towers of equal length. Place them side by side on a table. Ask if they are the same length. Most students will say ‘yes’. Next raise one tower off the table. Repeat the question. A student who has conservation of length will say that the towers are still the same length. (KSS1.1)

Resources/Notes

Math Makes Sense K
Lesson 6: Comparing Lengths
KSS1
TG pp. 34 - 37

Audio CD 2:
Selection 2

Unit Centres:
TG p. 10
Imaginative Play: Join the Band
Exploration: Compare It
Numbers to 10

Suggested Percentage of Time: 15%

September October November December January February March April May June

Numbers to 10 (6 to 10)  
Lessons 1 - 10

Exploring Patterns (2 elements)  
Exploring Geometry (building 3D objects)  
and Measurement (mass)
Unit Overview

Focus and Context

In term 2, as students become confident working with numbers from 1 to 5, they may begin working with the numbers 6 to 10. Groups of more than five objects are not as easily recognized by students at a glance. Focus will be given in guiding students to make connections between their knowledge of the numbers one to five in relation to the larger numbers. Students will continue to build on their experiences working with part-part-whole activities to help them recognize that a given number can be represented by two smaller numbers. They will create sets to represent numbers to 10 and make comparisons to tell which set is larger or smaller.

Process Standards

Key

| [ME] Mental Mathematics and Estimation | | | |

Curriculum

Outcomes

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<td>Number</td>
<td>KN3 Relate a numeral, 1 to 10, to its respective quantity.</td>
<td>[CN, R, V]</td>
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<tr>
<td>Number</td>
<td>KN4 Represent and describe numbers 2 to 10, in two parts, concretely and pictorially.</td>
<td>[C, CN, ME, R, V]</td>
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</table>
**Strand: Number**

**Outcomes**

*Students will be expected to*

KN3 Relate a numeral, 1 to 10, to its respective quantity.  
[CN, R, V]

**Achievement Indicators:**

**KN3.1 Construct a set of objects corresponding to a given number.**

**Elaborations—Strategies for Learning and Teaching**

This unit of work focuses on the same outcomes addressed earlier in the teaching and learning of numbers 1 to 5. Some of the elaboration may be repeated, because the focus now is on applying many of the same strategies to numbers 6 to 10.

As in the previous unit, students should continue to be given experiences counting concrete objects before counting images printed on paper. Have a variety of materials available, such as links, counters, Pattern Blocks, Unifix cubes, beans, popsicle sticks, etc. Containers of small toys, cubes, cars, and pasta, as well as plates, meat trays, or hula hoops can be used to make sets of a given quantity.

Students will pass through many stages when learning to visually count a set of objects at their own pace. Often students will:

- move objects as they count them
- touch the object to keep track
- group the objects
- scan the set
- count pictures or drawings of objects
- recognize a known quantity
- use the "counting on" strategy to count one or more objects at a time.

Counting situations should occur naturally in the course of daily tasks. As contrasted with rote counting in which students say number names in sequence, meaningful counting involves an understanding that:

- One number is said for each item in the group and is counted once and only once. Students who are still not secure with the idea may say words faster or slower than they point, having noticed only that they must stop pointing and stop saying words at the same time. In this process they may skip or even recount an object. Students should be encouraged to move objects as they count. It takes a while for students to recognize that we say one word for each object we count. (one-to-one correspondence)

- Counting begins with the number 1 and there is a set number sequence. (stable order)
- The number in the set is the last number said. (cardinality)
- The starting point and order of counting does not affect the quantity. (conservation)
- The arrangement or types of objects does not affect the count. (conservation)
General Outcome: Develop Number Sense

Suggested Assessment Strategies

Performance

- Students work in pairs using a die and 12 counters. Taking turns, partners roll the die. Each time a 6 is rolled the student who rolls the 6 takes a counter. The first student who gets 6 counters is the winner. (KN3.1, 3.2)

Journal

- Show a group of 6 items, such as 6 popsicle sticks. In their math journals, have students write or draw as many ways as they can to show the number 6. (E.g., the numeral 6, the word six, 6 counters in a row, 6 dots in 2 rows of 3). Then ask:
  - Which of the ways you showed is the quickest way for someone else to know that it shows 6?
  - Why do you think it is the quickest? (E.g., the numeral 6 because you don’t have to count to figure out how many there are.) (KN3.1, 3.2, 3.3)

- Provide students with old magazines, catalogues or flyers. Ask students to cut out 6 red objects and glue them into their journals. Students record the numeral 6. (KN3.1, 3.5)

Resources/Notes

- Math Makes Sense K
- Launch
  Teacher Guide (TG) p. 15
- Lesson 1: Counting and Creating Sets of 6
  KN3, KN4
  TG pp. 16 - 17
- Audio CD 2:
  Selection 4
- Little Books:
  The Number Six
- Activity Bank:
  TG p. 21
  Number Lineup
  Dots and Fingers
### Outcomes

**Students will be expected to**

KN3 Continued

### Achievement Indicators:

| KN3.3 Record numerals to represent the number of objects in a given set (1-10). |

| KN3.4 Hold up the appropriate number of fingers for a given numeral. |

| KN3.5 Match numerals with pictorial representations. |

| KN3.6 Count the number of objects in a set and recognize that when the objects are re-arranged the original count is maintained. |

### Elaborations—Strategies for Learning and Teaching

It is important that students continue to develop an efficient means of recording numerals, therefore numeral writing should be taught. As students are ready to record information by recording the appropriate numeral(s), specific instruction and practice will be necessary.

Integrating digits in an emergent writing opportunity supports students in the development of writing skills. Students can “write” the digits using a variety of materials such as plasticine, sand, water, and paint. At this level, writing digits should not include the use of lined paper. Allow the students to experiment freely on unlined paper using markers, crayons, and pencils. Observe students as they write their numerals, both when copying from a model and when forming them from memory. Students should be encouraged to start at the top when printing numerals. One suggestion for practice is to use their index fingers to form the numerals on their desks, in the air, or in the sandbox.

Give students snap cubes to place on the tips of their fingers, on one or two hands. Show a number card and ask students to hold up the corresponding number of fingers. (E.g., 8 - 3 fingers on the right hand and 5 fingers on the left hand, or 4 fingers on each hand, etc.)

Many representations of numbers can be used in activities such as sorting and matching activities, memory games, construction of sets, and activities that require the counting of counters or coins in a set.

Conservation of number is the understanding that the number of objects remains the same when they are rearranged spatially. When students do not demonstrate conservation of number, they may believe that the number of objects can increase or decrease when they are moved around.

As conservation of number is a developmental skill, provide experiences to promote the development of conservation of number. Also observe to see if students have reached this developmental level. It is important for students to develop confidence in their counting. For example, if they count out some objects and decide that there are 7 of them, they need to recognize immediately that if the objects are rearranged, they do not need to recount, because the count is still 7.
General Outcome: Develop Number Sense

Suggested Assessment Strategies

Performance

- Prepare number puzzles for numeral 6 and cut apart into 6 pieces. Students put the puzzle together to from the numeral 6 and glue the puzzle on a piece of construction paper. Using items such as lima beans, buttons, students create a set of 6 and glue it on their number puzzle. (KN3.3)

- Have students sit in a circle. Ask students to give a “high five” to the student sitting next to him or her. As students:
  - How can you give a “high six”? Observe the ways students represent six using their fingers. (KN3.4)

- Provide students with individual whiteboards and dry erase markers. On an overhead projector, show students 6 snap cubes and have them count the cubes. Students print the numeral on their whiteboard. Ensure that the students watch as you change the arrangement of the cubes. Ask: How many snap cubes are there now? Students write the numeral on their whiteboard. Observe if students know the correct answer or must recount the cubes. (KN3.6)

Resources/Notes

Math Makes Sense K
Lesson 1 (Continued):
Counting and Creating Sets of 6
KN3, KN4
TG pp. 16 - 17

Unit Centres:
TG p. 12 - 13
- Arts and Crafts: Number Picture
- Exploration: Nature Counters
- Imaginative Play: Puppet Theatre
- Literacy: Number Book
- Sand and Water: Sand Numbers
Strand: Number

Outcomes

Students will be expected to

KN4 Represent and describe numbers 2 to 10, in two parts, concretely and pictorially.

[C, CN, ME, R, V]

Elaborations—Strategies for Learning and Teaching

The ability to think about a number in terms of its parts is an important milestone in the development of number (e.g., 6 as 4 and 2, or 3 and 3, or 5 and 1). Students will have previously explored part-part-whole relationships of numbers to 5. It is important not to rush students to work with larger numbers until they are able to deal confidently with smaller numbers. Students will build on their prior knowledge to work with the numbers 6 to 10.

To assess students’ understanding of number combinations, it is important to use hands-on activities so students can manipulate the materials to show two different parts (e.g., snap cubes, linkits, etc.). Counting a set of objects will not cause a student to focus on the fact that it could be made of two parts. Focusing on a quantity in terms of its parts has important implications for developing number sense. The ability to think about a number in terms of parts is a major milestone in the development of number (Van de Walle and Lovin, 2006, p. 48).

A number can be partitioned into two or more smaller sets. Understanding the relationship among the parts and the relation between the parts and the whole is essential to developing a sense of numbers and an understanding of mathematical operations. It is important to understand that the action of partitioning a set of objects does not affect the count. A student that demonstrates an understanding of these connections can also determine a larger quantity without counting each object.

To conceptualize a number as being made up of two or more parts is the most important relationship that can be developed about numbers. The number 6 can be represented by raising three fingers on one hand and three fingers on the other hand, or by raising four fingers on one hand and two on the other. By participating in such an activity, a student begins to understand that 6 can be represented in many ways, for example by 3 and 3, 4 and 2, and 5 and 1 as well as other representations. Use other representations as well as fingers to avoid the misconception that partitioning can only be represented using fingers.

While using objects to represent part-part-whole relationships, is a good beginning, students may also record how they represent numbers in two parts, using pictures.

Achievement Indicators:

KN4.1 Show a given number as two parts, using fingers, counters or other objects, and name the number of objects in each part.

N4.2 Show a given number as two parts, using pictures, and name the number of objects in each part.
General Outcome: Develop Number Sense

Suggested Assessment Strategies

**Journal**

- Working in pairs, each student is given a die. At the same time each student rolls a die. If the dots add up to 6 they record the combination in their journal (drawing dots and numeral combination). (KN4.1, 4.2)

**Performance**

- Students make a 6 train using snap cubes of all the same colour. Sitting in a circle, students put their train behind their back. Counting one, two, three, snap it, students break apart their train. Each student shows the two parts of their train, describing the number (e.g., “My 6 is 4 and 2.”). (KN4.1)

- Using ‘Part-Part-Whole mats’ and counters, have students make a set of 6. Students place counters on the mat. Ask students to partition the counters into two parts. Ask students to describe their number: E.g., “My 6 is 3 and 3.”

Math Makes Sense K
Lesson 2: Exploring Combinations of 6
KN3, KN4
TG pp. 18 - 21

Activity Bank:
TG p. 21
Muffin Mystery
Stick Dice

Resources/Notes
Strand: Number

Outcomes

Students will be expected to

KN3 Relate a numeral, 1 to 10, to its respective quantity.
[CN, R, V]

Elaborations—Strategies for Learning and Teaching

The elaborations for outcome N3 and indicators for this lesson were discussed in relation to number 6 on the previous pages. Although this lesson focuses on counting and creating sets 7, the elaboration and assessment tasks for counting sets 6 on the previous page may simply be modified to apply to sets of 7.

Achievement Indicators:

| KN3.1 Continued |
| KN3.2 Continued |
| KN3.3 Continued |
| KN3.4 Continued |
| KN3.5 Continued |
| KN3.6 Continued |

See pages 82
See pages 82
See pages 84
See pages 84
See pages 84
See pages 84

KN4 Represent and describe numbers 2 to 10, in two parts, concretely and pictorially.
[C, CN, ME, R, V]

The elaborations for outcome N4 and indicators for this lesson were discussed in relation to number 6 on the previous pages. Although this lesson focuses on combinations of 7, the elaboration and assessment tasks for 6 on the previous page may be modified to apply to 7.

Achievement Indicators:

| KN4.1 Continued |
| N4.2 Continued |
General Outcome: Develop Number Sense

Suggested Assessment Strategies

Performance

- Provide each student with a sheet of star stickers. Student selects 7 stickers and forms them into a design in their journal. Count the stickers and record the numeral. Repeat activity, making a different design. (KN3.1, 3.3, 3.5)

- Read Today is Monday, by Eric Carle. Make a class big book based on the number 7. Provide each student with a sheet of paper with the title ‘My 7 Favourite Animals’ where they draw and colour their seven favourite animals. (KN3.1, 3.2)

- Snap It! - Students make a 7 train using snap cubes of all the same colour. Sitting in a circle, students put their train behind their back. Counting one, two, three, snap it, students break apart their train. Each student shows the two parts of their train, describing the number (e.g., “My 7 is 4 and 2.”). (KN4.1)

- Using part-part-whole mats and counters, have students make a set of 7. Students place counters on the mat. Ask students to partition the counters into two parts. Ask students to describe their number: E.g., “My 7 is 4 and 3.” (KN4.1)

- Provide students with two different shaped pattern blocks. Students choose seven blocks and make a design showing combinations of seven. Display on a mat and have students record the combinations. (KN4.1)

- Provide each student with seven, two colour counters. Students shake the counters and drop them on the table. Have the students count the number of each colour and describe their ‘seven’. For example, “My seven is four and three.” (KN4.1)

Resources/Notes

Math Makes Sense K
- Lesson 3: Counting and Creating
  Sets of 7
  KN3, KN4
  TG pp. 22 - 23

Audio CD 2:
- Selection 5

Little Books:
- The Number Seven

Activity Bank:
- TG p. 27
  - Ring and Count
  - What Comes After?

Lesson 4: Exploring Combinations of 7
- KN3, KN4
  TG pp. 24 - 27

Activity Bank:
- TG p. 27
  - Turning 7
  - 7 Trains
## Strand: Number

### Outcomes

*Students will be expected to*

**KN3** Relate a numeral, 1 to 10, to its respective quantity.

[CN, R, V]

### Achievement Indicators:

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<td>KN3.3 Continued</td>
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<td>KN3.5 Continued</td>
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<td>KN3.6 Continued</td>
<td>See pages 84</td>
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</table>

**KN4** Represent and describe numbers 2 to 10, in two parts, concretely and pictorially.

[C, CN, ME, R, V]

### Achievement Indicators:

<table>
<thead>
<tr>
<th>KN4.1 Continued</th>
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<tr>
<td>N4.2 Continued</td>
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</tbody>
</table>

### Elaborations—Strategies for Learning and Teaching

The elaborations for outcome N3 and indicators for this lesson were discussed in relation to number 6 on previous pages. Although this lesson focuses on counting and creating sets 8, the elaboration and assessment tasks for counting sets 6 on the previous page may simply be modified to apply to sets of 8.

The elaborations for outcome N4 and indicators for this lesson were discussed in relation to number 6 on the previous pages. Although this lesson focuses on combinations of 8, the elaboration and assessment tasks for 6 on the previous page may be modified to apply to 7.
General Outcome: Develop Number Sense

Suggested Assessment Strategies

**Performance**

- Give each student a paper plate and strips of tissue paper (approximately 3 cm x 30 cm). Student selects 8 strips ad glues them to the plate to make an octopus. Student can add eyes and mouth.  
  (KN3.1, 3.2)

- Have students sit in a circle. Ask students to give a “high five” to the student sitting next to him or her. Ask students:
  - How could you give a “high eight”?
  - Can you think of anther way to show a “high eight”?
  Throughout the day, repeat the activity calling “high eight” and have students give each other “high eights”.  
  (KN3.4)

- Prepare a set of dot and numeral cards (6, 7, 8) for each pair of students. Lay the cards face down. Player one turns over 2 cards and keeps the pair if they match. If there is no match, turn the cards back over. Player two takes a turn. Continue playing until all pairs have been found. The student records their pairs on a prepared sheet.  
  (KN3.3, 3.5)

- Students make an 8 train using snap cubes, all the same colour. Sitting in a circle, students put their train behind their back. Everyone counts, “One, two, three, snap it.” Students break apart their train. Each student shows the two parts of their train, describing their number. E.g., “My number 8 is 5 and 3.”  
  (KN4.1)

- Using the ‘Part-Part-Whole’ mats and counters, have students make a set of 8. Students place counters on the mat. Ask students to partition the counters into two parts. Ask students to describe their number. E.g., “My 8 is 6 and 2”.  
  (KN4.1)

**Journal**

- Using 2 colours of linkits, student creates chains of 8 linkits using 2 different colours. In journal, students draw and colour the chain and record the numeral combination. Repeat this activity with as many combinations as possible.  
  (KN4.1, 4.2)

**Resources/Notes**

* Math Makes Sense K
  Lesson 5: Counting and Creating Sets of 8
  KN3, KN4
  TG pp. 28 - 29

* Audio CD 2:
  Selection 6

* Little Books:
  The Number Eight

* Activity Bank:
  TG p. 33
  8 Up!

* Lesson 6: Exploring Combinations of 8
  KN3, KN4
  TG pp. 30 - 33

* Activity Bank:
  TG p. 33
  Grab Bag
  Tower Building
**Strand: Number**

**Outcomes**

*Students will be expected to*

KN3 Relate a numeral, 1 to 10, to its respective quantity.

[CN, R, V]

**Elaborations—Strategies for Learning and Teaching**

The elaborations for outcome N3 and indicators for this lesson were discussed in relation to number 6 on previous pages. Although this lesson focuses on counting and creating sets 8, the elaboration and assessment tasks for counting sets 6 on the previous page may simply be modified to apply to sets of 8. Songs and finger plays are powerful tools through which students can learn about sets of numbers. The song “Doctor Knickerbocker” is an example of a lesson for introducing number 9.

**Achievement Indicators:**

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<th>Indicators</th>
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<td>KN3.2 Continued</td>
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<td>KN3.3 Continued</td>
<td>84</td>
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<td>KN3.6 Continued</td>
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</tbody>
</table>
General Outcome: Develop Number Sense

Suggested Assessment Strategies

Performance

- Build a Tower - Working in pairs, each student needs snap cubes, Build a Tower game board, and a one number cube (4 - 9). Partner one rolls the number cube and builds a tower made of that number of cubes. He/She then places the tower on the game board in the column that corresponds with the number. Partner two rolls the die and play continues. Students continue to take turns rolling the number cube and building towers until an entire column is filled. (E.g., Like a straight line in bingo).

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(Size of the game board may vary by adding extra rows.)

(KN3.1, 3.2, 3.5)

- Provide students with marshmallows and toothpicks. Have each student take nine marshmallows and use toothpicks to form designs. Have students compare the design at their table/with their class.

(KN3.2, 3.6)

- Provide students with 9 snap cubes. Ask students to build a creation using some or all of their cubes. Students count and record the number of cubes used to build their creation. Students compare their creations with a partner by counting and recording the snap cubes used in their partners creation.

(KN3.1, 3.2, 3.3)

- Have students sit in a circle. Ask students to give a “high five” to the student sitting next to him or her. Ask students:
  - How could you give a “high nine”?
  - Can you think of another way to show a “high nine”? Throughout the day, repeat the activity calling “high nine” and have students give each other “high nines”.

(KN3.4)

Resources/Notes

Math Makes Sense K
Lesson 7: Counting and Creating Sets of 9
KN3, KN4
TG pp. 34-35

Audio CD 2:
Selection 7

Little Books:
The Number Nine

Activity Bank:
TG p. 39
Mixed-Up Orders
Nifty 9
Strand: Number

Outcomes

Students will be expected to

KN4 Represent and describe numbers 2 to 10, in two parts, concretely and pictorially.
[C, CN, ME, R, V]

Elaborations—Strategies for Learning and Teaching

The elaborations for outcome N4 and indicators for this lesson were discussed in relation to number 6 on the previous pages. Although this lesson focuses on counting and creating sets of 9, the elaboration and assessment tasks for 6 on the previous pages may be modified to apply to 9.

Achievement Indicators:

- KN4.1 Continued
- N4.2 Continued

See pages 86
General Outcome: Develop Number Sense

Suggested Assessment Strategies

**Performance**

- Working in partners, each student will need 9 snap cubes (each will have his/her own colour) and shared cards 1 - 9. The first student picks a card and forms a train with the number drawn. The second student adds to the train to make the number 9. This combination can be recorded in students’ journals. Repeat until all cards have been used. Students alternate picking cards.

- Sitting in a circle, sing the song ‘Dr. Knickerbocker’. As you sing the last line of verse one, hold up one, two three fingers and stop. Students continue the count to 9 as they put up their fingers. Discuss the combination by asking the students:
  - How many fingers you have?
  - How many fingers each student has?
  Continue with remaining verses, each time stopping counting and holding up fingers at a different number.

- Using part-part-whole mats and counters, have students make a set of 9. Students place counters on the mat. Ask students to partition the counters into two parts. Ask students to describe their number. E.g., “My 9 is 3 and 6.”

  ![Part-Part-Whole Mat](image)

- Students make a 9 train using snap cubes, all the same colour. Sitting in a circle, students put their train behind their back. Everyone counts, “One, two, three, snap it.” Students break apart their train. Each student shows the two parts of their train, describing their number. E.g., “My number 9 is 7 and 2.”

**Resources/Notes**

- *Math Makes Sense K*
- Lesson 8: Exploring Combinations of 9
  - KN3, KN4
  - TG pp. 36 - 39

- Activity Bank:
  - TG p. 39
  - 9 Dots Please
  - Spilling 9
Strand: Number

Outcomes

*Students will be expected to*

KN3 Relate a numeral, 1 to 10, to its respective quantity.

[CN, R, V]

<table>
<thead>
<tr>
<th>Achievement Indicators:</th>
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<tbody>
<tr>
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<td>The elaborations for outcome N3 and indicators for this lesson were discussed in relation to number 6 on previous pages. Although this lesson focuses on counting and creating sets of 10, the elaboration and assessment tasks for counting sets 6 on the previous page may be modified to apply to sets of 10. Songs and finger plays are powerful tools through which students can learn about sets of numbers.</td>
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<td>KN3.6 Continued</td>
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</tbody>
</table>
General Outcome: Develop Number Sense

Suggested Assessment Strategies

* **Performance**

- Read the story, “Ten Black Dots” by Donald Crews. Provide students with a prepared sheet, as shown, and bingo dabbers (stamps or stickers). Have students create sets and record the numeral to complete the activity. (KN3.1, 3.2, 3.3)

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<th>Count to 10</th>
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- Have students select 10 items such as buttons, pasta, beads, or stickers. Give each student a paper plate and ask them to use the items to make a face. Students can record on a piece of paper the number of items used to make their face. Students compare their faces by displaying on a bulletin board. (KN3.1, 3.3, 3.6)

- Have students sit in a circle. Ask students to give a “high five” to the student sitting next to him or her. Ask students:
  - How could you give a “high ten”?
  - Can you think of another way to show a “high ten”?
Throughout the day, repeat the activity calling “high ten” and have students give each other “high tens”. (KN3.4)

- Have students sit in a circle. Show students ten clothes pins on a plastic clothes hanger. Ask students to count the clothespins. Spread the clothespins out on the hanger and ask the students, “How many clothespins now?” If the student recounts the clothespins he/she is not demonstrating conservation of number. If a student gives you the correct answer, ask, “How do you know?” He/she may say, “I watched you move them” or “You did not add any so it is still 10.” Repeat the activity, bunching the clothespins together. (KN3.6)

**Resources/Notes**

* **Math Makes Sense K**
  - Lesson 9: Counting and Creating Sets of 10
  - KN3, KN4
  - TG: pp. 40 - 41

* **Little Books:**
  - The Number Ten

* **Activity Bank:**
  - Finger Fling!
  - Fish Pond

* **Unit Centres:**
  - TG p. 12
### Strand: Number

#### Outcomes

*Students will be expected to*

KN4 Represent and describe numbers 2 to 10, in two parts, concretely and pictorially.

[C, CN, ME, R, V]

#### Elaborations—Strategies for Learning and Teaching

The elaborations for outcome N4 and indicators for this lesson were discussed in relation to number 6 on the previous pages. Although this lesson focuses on counting and creating set of 9, the elaboration and assessment tasks for 6 on the previous pages may be modified to apply to 9.

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<th>N4.2 Continued</th>
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General Outcome: Develop Number Sense

Suggested Assessment Strategies

Performance

- Have students sit in a circle. Show students 10 clothespins on a plastic hanger. Have a student partition the clothespins in two groups to show a combination for 10. Challenge them to find as many combinations as they can find for number 10. (KN4.1)

- Using part-part-whole mats and counters, have students make a set of 10. Students place counters on the mat. Ask students to partition the counters into two parts. Ask students to describe their number. E.g., “My 10 is 8 and 2.” (KN4.1)

- Students make a 10 train using snap cubes, all the same colour. Sitting in a circle, students put their train behind their back. Everyone counts, “One, two, three, snap it.” Students break apart their train. Each student shows the two parts of their train, describing their number. E.g., “My number 10 is 6 and 4.” (KN4.1)

- Provide students with domino templates and bingo dabbers. Students make dominos to represent 10 and present the dominos, naming the dots in each part. (KN4.2)

Resources/Notes

Math Makes Sense K
Lesson 10: Exploring Combinations of 10
KN3, KN4
TG pp. 42 - 45

Audio CD 2:
Selection 8

Activity Bank:
TG p. 45
Is There Enough Room?
Ways to Make 10
Exploring Patterns

Suggested Percentage of Time: 15%

- **September**
  - Numbers to 10 (6 to 10)
  - Exploring Patterns (2 elements)
    - Lessons 3, 4 and 5
- **October**
  - Exploring Geometry (building 3-D objects)
  - Measurement (mass)
- **November**
- **December**
- **January**
- **February**
- **March**
- **April**
- **May**
- **June**
Unit Overview

Focus and Context

In Kindergarten, students are formally introduced to repeating patterns of two to three elements. Students verbalize and communicate rules to help them understand the predictability of a pattern. As students have more experiences with this, they will begin to understand that patterns exist all around us and can be used to solve a variety of everyday problems. In Grade One students will continue working with repeating patterns, extending their knowledge to include four elements. By the end of term two, Kindergarten students will be expected to identify, reproduce, extend and create two element patterns. Three element patterns will be the focus of teaching and learning during third term.

Process Standards

Key

<table>
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<td>ME</td>
<td>Mental Mathematics and Estimation</td>
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<td>PS</td>
<td>Problem Solving</td>
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<td>T</td>
<td>Technology</td>
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Curriculum Outcomes

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<th>PROCESS STANDARDS</th>
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<tr>
<td>Patterns and Relations (Pattern)</td>
<td>KPR1 Demonstrate an understanding of repeating patterns (two or three elements) by: • identifying • reproducing • extending • creating patterns using manipulatives, sounds and actions.</td>
<td>[C, CN, PS, V]</td>
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</tbody>
</table>
Outcomes

Students will be expected to

KPR1 Demonstrate an understanding of repeating patterns (two or three elements) by:
• identifying
• reproducing
• extending
• creating patterns using manipulatives, sounds and actions.

[C, CN, PS, V]

Elaborations—Strategies for Learning and Teaching

Patterning experiences should be an ongoing part of Mathematics throughout the year. At this point in the year, students have had experiences with sorting and classifying a variety of manipulatives in term 1 and this should continue. Students should be given the opportunity to describe patterns orally; as it helps them interpret the patterns they experience visually and solidify their understanding of the concept. It also allows other students to learn from each other.

Students need many opportunities to work in small groups or pairs to create and extend patterns using a variety of manipulatives to enhance their learning and understanding of patterns.

Providing students with opportunities to sort and classify will enhance their understanding of patterns in their environment.

Provide students with a collection of multilink cubes in two different colors and ask them to sort the cubes into two groups and to create a two element pattern using the sorted multilink cubes.

A pattern is an extension of a repeating sequence beyond what the student can actually see. Students need many experiences predicting the extended sequence of a given pattern.

The core of a repeating pattern is the shortest string of elements that repeats. For example, the AB pattern red, blue, red, blue, red, blue... has a core of two different elements, red and blue that repeats over and over and is therefore a 2 element pattern. It is important to repeat the core of the pattern at least three times before expecting students to describe, reproduce, or extend a pattern. Suggested manipulatives for creating patterns include:
• connecting cubes
• rubber stamps and adding machine paper rolls
• stickers
• color tiles
• link it
• pattern blocks
• collections (each collection should consist of 60 – 100 small items of one kind, such as bread tags, buttons, shells)
• two-color counters

Young students first need to experience repeating patterns in a variety of different ways. They need both teacher-directed and independent activities. Teacher-directed activities should encourage students to analyze a variety of patterns. Independent activities provide students with the opportunity to explore, reproduce, extend, and create patterns appropriate to their level of understanding.
General Outcome: Use Patterns to Describe the World and to Solve Problems

Suggested Assessment Strategies

Performance

- Display two towers using snap cubes. One is a two element repeating pattern and the other is not a pattern. Students will distinguish which tower is a repeating pattern and which is not a repeating pattern. Students will identify the repeating pattern of the tower. (KPR 1.1)

- Patterning Ourselves – Choose one student to go to the far side of the room. Instruct the student to turn away from the group and cover his/her ears. Have the remainder of the group form a circle or a line. Begin a people pattern by directing the children to do a particular action. Point to each student in order, as you say:
  - “hands up, hands down, hands up. . .’
  - Ask the student to come back to the group and decide if they recognize a pattern. Be sure to include non-repeating sequences such as:
    - ‘stand up, sit down, stand up, hands up, kneel down...’  (KPR1.1)

- Use math manipulatives to create a pattern and non-pattern. Students decide what sequences are indeed patterns. For example, create the pattern such as, red block, blue block, red block, blue block, etc. and a non-pattern such as, red, green, orange, purple, red, yellow. Can the Students distinguish between the pattern and the non-pattern? Can they tell the repeating core (the shortest part of the pattern that repeats)? (KPR1.1)

- Present the students with the two different action patterns below and ask them to indicate whether they are the same or different and why.
  - sit down, stand up, turn around, sit down, stand up, turn around
  - snap fingers, clap hands, pat knees, snap fingers, clap hands, pat knees

Students who have a good understanding of patterns will realize that these are the same. They may say, “They both have three different actions over and over.” (KPR1.1)

Resources/Notes

- Math Makes Sense K
- Lesson 3: It’s a Pattern (2 elements)
- KPR1
- TG pp. 20 - 23
- Important: Although lessons 3, 4 and 5 in the text cover 2 and 3 element patterns, at this time of year the focus can be on 2 element patterns. The lesson will be readdressed in term 3 with a focus on 3 element patterns.

- Audio CD 1:
  - Selections 2 and 3

- Little Books:
  - Which Belong Together?
Strand: Patterns and Relations (Patterns)

Outcomes

Students will be expected to

KPR1 Continued

Achievement Indicator:

Examples of patterns young students should describe, reproduce, extend, and create include:

- Rhythmic/Sound patterns: e.g., clap, snap, clap, snap, clap, snap, …
- Action pattern: e.g., sit, stand, sit, stand, sit, stand, …
- Color patterns: e.g. red, yellow, red, yellow, red, yellow, …
- Shape patterns: e.g., circle, square, circle, square, circle, square, …
- Patterns of attributes: e.g., using buttons (four holes, two holes, four holes, two holes, …)
- Patterns of size: e.g., long, short, long, short, long, short, …
- Number patterns: e.g., 1, 2, 1, 2, 1, 2, …

Students' first experiences with patterns will involve them in copying, with manipulatives, a modeled pattern given by the teacher. Students may be provided with task cards showing varying pattern and using available materials to copy the pattern. Model how to interpret patterns from task cards before students work independently.

It is necessary for all students to have an opportunity to copy a pattern. Ask the helper of the day to copy a given pattern to share with the whole group. If time permits you may ask another volunteer to do the same.

Rhythmic patterns are one of the easiest and most effective ways to begin exploring the concept of patterns. Using rhythmic patterns should be ongoing throughout the mathematics program, interspersing simple patterns with more complicated ones.

Act out a rhythmic pattern and ask students to join in after a few repetitions. E.g., slap (legs), clap, slap, clap, slap, clap…

Continue the pattern for at least 30 to 60 seconds. The more repetitions of a pattern will help students who experience difficulty “feel” the pattern, even if they can't act it out perfectly. It is common to slow down the rhythm of a pattern for students having difficulty with patterns; however, this does not allow students to “feel” the pattern. The rate of a child's heartbeat (90 times per minute) would be a good tempo for a pattern.
**General Outcome:** Use Patterns to Describe the World and to Solve Problems

### Suggested Assessment Strategies

**Performance**

- Act out a rhythmic pattern such as:
  - Stomp, snap, stomp, snap, stomp, snap...
  - Head nod, clap, head nod, clap, head nod, clap...
  - Ask students to identify and copy the pattern. \(\text{(KPR 1.2)}\)

- Provide students with task cards showing varying patterns. Use link-its, snap cubes, elastic bands, paper clips, bread tags, etc. Ask students to copy a pattern from a selected task card. Ask what part repeats. \(\text{(KPR1.2)}\)

### Resources/Notes

- *Math Makes Sense K*
  - Lesson 3: It's a Pattern (2 elements)
  - KPR1
  - TG pp. 20 - 23

- Unit Centres:
  - TG p. 9
  - Literacy: Book Talk
## Strand: Patterns and Relations (Patterns)

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<tr>
<th>Outcomes</th>
<th>Elaborations—Strategies for Learning and Teaching</th>
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<tr>
<td>Achievement Indicator:</td>
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<tr>
<td>KPR1.3 Extend repeating patterns to two more repetitions.</td>
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</tbody>
</table>

Regardless of whether students are working with simple or complex patterns, encourage them to extend their pattern as far as they can with their chosen manipulative. This repetition will help them solidify their understanding that patterns go on and on.

Using manipulatives, present the core of a 2 element pattern at least three times. For example, red block, green block, red block, green block, red block, green block. Ask for a student to volunteer to extend the pattern.

Using bears or other manipulatives create a 2 element pattern using at least four repetitions and conceal the last two or three manipulatives. Students predict what the concealed manipulatives are.

Students’ early understanding of repeating and extending patterns can also be nurtured through exposure to rich, quality literature. For example, each page of “The Shape of Things” by Dayle Ann Dodds, is made up of colorful pattern borders that lead to discussions and explorations on repeating patterns.
General Outcome: Use Patterns to Describe the World and to Solve Problems

Suggested Assessment Strategies

Performance

- Color Towers – students will use snap cubes to copy a given tower with a two element repeating pattern (red, green, red, green, red, green...). Students will identify and extend the given two element pattern. (KPR 1.1, 1.2, 1.3)

- Have students sit in a circle. Provide each student a red and yellow cube. Ask them to look at a colored pattern created by the teacher (e.g., red, yellow, red, yellow, red, yellow). Ask the student to your left to continue the pattern by placing the correct colored cube in front of them. The next student continues the pattern by doing the same, and so on. Pause occasionally to describe the repeated core of the pattern. Repeat using other combinations of patterns. (KPR1.3)

- Create and display a 2 element pattern. How can you tell if this is a pattern? (I look to see if the cubes, buttons, or shells repeat in the same way.) How would you describe this pattern? (The part that repeats is shell, cube, shell, cube, shell, cube) What comes next? (The pattern shows shell, cube, shell, cube, over and over, so a shell comes next.) (KPR1.3)

- In circle time or when lining up begin a repeating pattern using the children (e.g., sit, stand, sit, stand, sit, stand.., boy, girl, boy, girl, boy, girl,.., etc) Ask students to describe and extend the pattern. Have students take turns creating and extending other repeating patterns. (KPR 1.1,1.3, 1.4)

- Many of the nursery rhymes provide excellent opportunities for students to see action, size, shape etc. in patterns. Have students recite Humpty Dumpty. Give students red construction paper to make a wall for Humpty Dumpty. Ask them to make short bricks and long bricks to make a pattern. (KPR1.4)

- In an Art centre, students could create bulletin board borders or gift wrap of repeating patterns using potato/apple prints. (KPR1.4)

Resources/Notes

Math Makes Sense K

Lesson 4: Extending Patterns (2 elements)

KPR1
TG pp. 24 - 27

Important: Although lessons 3, 4 and 5 in the text cover 2 and 3 element patterns, at this time of year the focus can be on 2 element patterns. The lesson will be readdressed in term 3 with a focus on 3 element patterns.

Audio CD 1:
Selections 5, 6, 7, 8 and 9

Little Books:
Which Two are the Same?
Strand: Patterns and Relations (Patterns)

Outcomes

Students will be expected to

KPR1 Continued

Achievement Indicators:

KPR1.4 Create a repeating pattern, using manipulatives, musical instruments or actions, and describe the pattern.

KPR1.5 Identify and describe a repeating pattern in the classroom, school and outdoors; e.g., in a familiar song, in a nursery rhyme.

Elaborations—Strategies for Learning and Teaching

A significant step in students’s mathematical understanding is to realize that two patterns constructed with different materials is actually the same pattern. For example, a two element pattern can be represented with triangles and squares as well as with a clap and a snap.

Using a musical triangle, miniature cymbals, and a drum, or other musical instruments, students will explore patterns using different rhythms. For example, one drum beat, one cymbal crash, one drum beat, one cymbal crash, one drum beat, one cymbal crash.

Explore a variety of patterns such as AB, AAB, ABB, ABC, etc. It is essential to use a wide variety of manipulatives, musical and tactile rhythms and beats when teaching the concept of patterns.

Students enjoy making patterns using their own bodies as they click their tongues, snap their fingers, pat their lap or tap their toes, etc. to copy and create given patterns.

Provide students with opportunities to see the patterns that are in their environment (i.e. in the classroom, outdoors, on their clothes). To introduce patterns in the environment, the teacher can begin playing a game of I SPY. For example, teacher says, “I spy a pattern on Mary’s dress. Does anyone else see this pattern?” Once students have had a chance to look for the pattern, the teacher or a student can describe the pattern, “Blue flower, yellow flower, blue flower, yellow flower, blue flower, yellow flower”.

Patterns are often visible on clothing. The teacher and the students may also find patterns on food packaging, wall paper and fences.

Some patterns that may be less obvious include:

- Landscapes (tree, flower, tree, flower, tree, flower…)
- Dishes (heart, stripe, heart, stripe, heart, stripe…)
- Buildings (window, wall, window, wall, window, wall…)
- Books (words, pictures, words, pictures, words, pictures…)

Take advantage of opportunities that arise in the classroom to identify patterns. For example, line students up to go out for gym according to different patterns. For example:

- boy, girl, boy, girl, boy, girl, …
- short sleeve, long sleeve, short sleeve, long sleeve, …
- legs crossed, arms crossed, legs crossed, arms crossed, …
General Outcome: Use Patterns to Describe the World and to Solve Problems

Suggested Assessment Strategies

**Performance**

- Place students in pairs to create a two element pattern. One partner constructs a rhythmic pattern (e.g., snap, tap, snap, tap, snap, tap or clap, stomp, clap, stomp, clap, stomp, etc.) The other partner will identify and extend their partner’s pattern and then reverse roles. *(KPR 1.4)*

- Guess the Pattern - Ask a student to cover their eyes or turn around from their peer group. The group arranges themselves into a pattern, ex. Sit, stand, sit, stand, sit, stand, etc. Invite the student back to the group to identify and describe the pattern. Observe:
  - Can the student accurately identify the pattern rule? *(KPR 1.5)*
  - Can the student copy the pattern created by his/her classmates?
  - Can the student extend the pattern by telling you what comes next?
  - Can they add to the pattern? *(KPR 1.5)*

- When playing outdoor activities and games have students organize the equipment they are using into patterns. Ask others to identify and describe the pattern made. For example:
  - big ball, small ball, football, big ball, small ball, football, … *(KPR1.5)*
  - bat, glove, bat, glove, bat, glove, …

- Display a collection of objects from the environment, some with obvious visible patterns and some without. Discuss each object by naming it and observing its features. Ask:
  - Did anyone see and object with a pattern? How do you know? *(KPR 1.5)*
  - Did anyone see an object that did not have a pattern? How do you know?
  - Where do you see patterns in the classroom? *(KPR 1.5)*

- At their tables, provide a variety of concrete materials such as blocks, buttons, stickers, keys, and colored tiles. After creating patterns, have students display their work and explain their patterns to the class. Once all patterns are displayed, ask students to look for similarities in the patterns they created. *(KPR1.4)*

- Follow the Leader - Model a pattern for the students to copy (e.g., sit, stand, sit, stand, sit, stand). After modeling three more different types of patterns ask a volunteer to provide the group with a pattern to copy. *(KPR1.2, 1.4)*

### Resources/Notes

**Math Makes Sense K**

**Lesson 5: We Can Make Patterns** *(2 elements)*

**KPR1**

TG pp. 28 - 31

*Important: Although lessons 3, 4 and 5 in the text cover 2 and 3 element patterns, at this time of year the focus can be on 2 element patterns. The lesson will be readdressed in term 3 with a focus on 3 element patterns.*

**Unit Centres**

TG pp. 8 - 9

- Art and Crafts: Bracelets
- Construction: Towers and Trains
- Exploration: Nature
- Sand and Water: Patterns in the Sand

**Audio CD 1:**

Selection 10
Exploring Geometry and Measurement

Suggested Percentage of Time: 15%

- September: Numbers to 10 (6 to 10)
- October: Exploring Patterns (2 elements)
- November: Exploring Geometry (building 3D objects) and Measurement (mass)
- December: Lessons 3, 4 and 8
Unit Overview

Focus and Context
In this unit, students will use building materials such as, blocks of different shapes, sponges, paper towels, cans, boxes, film canisters, legos, snap cubes, as well as 3-D geometric models to build 3-D structures, create 3-D structures using modelling clay and describe the structures they build and create. When building with 3-D geometric solids, teachers may expose students to correct mathematical terms such as cube, cylinder, cone and sphere, but emphasis should be on providing language such as: easy to stack, it's shaped like a box, the round bocks rolled away, the flat blocks were easy to stack, when describing a structure they have built. In Grade One, students will sort, compare, describe, construct and represent 2-D shape and 3-D objects.

In this unit, students will use direct comparison to compare two objects based on the single attribute of mass. Students will also make statements of comparison in communicating their understanding of measurement, in terms of mass. In Grade One, students will compare two or more objects using the single attribute of mass.

Process Standards Key

<table>
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Curriculum Outcomes

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<th>STRAND</th>
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| Shape and Space (Measurement) | KSS1 Use direct comparison to compare two objects based on a single attribute, such as:  
                            | • length including height  
                            | • mass  
                            | • capacity            | [C, CN, PS, R, V]       |
| Shape and Space (3-D Objects and 2-D Shapes) | KSS3 Build and describe 3-D objects. | [CN, PS, V]       |
Strand: Shape and Space (3-D Objects and 2-D Shapes)

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<tr>
<th>Outcomes</th>
<th>Elaborations—Strategies for Learning and Teaching</th>
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<tr>
<td>Students will be expected to</td>
<td>The block center is an important place for students to regularly explore and experiment with 3-D objects. 3-D objects have dimensions (length, width, and depth). However, use the term objects, not 3-D objects when talking to students. As they make their constructions, they begin to learn, often through trial and error, about the attributes of the various objects. It is through these investigations that students are able to learn the characteristics and properties of objects.</td>
</tr>
<tr>
<td>KSS3 Build and describe 3-D objects. [CN, PS, V]</td>
<td>Provide students with various building materials such as Lego, snap cubes, or blocks. Ask them to recreate a given object. Have them describe and explain their representation. Teachers should model mathematical vocabulary – as tall as..., flat, curved, sides, and points.</td>
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<tr>
<td>Achievement Indicators:</td>
<td>Asking questions while the student creates can provide valuable information regarding the student’s concept acquisition.</td>
</tr>
<tr>
<td>KSS3.1 Create a representation of a given 3-D object, using materials such as modeling clay and building blocks, and compare the representation to the original 3-D object.</td>
<td>• How is your creation the same as the given object?</td>
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<td>• How is it different?</td>
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<td>• What words can you use to describe your creation? (round, flat, shape like a box)</td>
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<tr>
<td>KSS3.2 Describe a given 3-D object, using words such as big, little, round, like a box and like a can.</td>
<td>Provide students with modeling clay. Ask them to recreate a given object. Have them describe and explain their representation. Teachers should model mathematical vocabulary - as tall as..., flat, curved, sides, and points.</td>
</tr>
</tbody>
</table>
General Outcome: Describe the Characteristics of 3-D Objects and 2-D Shapes, and Analyze the Relationships Among Them

Suggested Assessment Strategies

**Performance**

- **3-D Object Walk** - Go on a walk through the school looking for 3-D objects in the environment – clock, garbage can, locker, globe, door, eraser, crayon. Have students describe the 3-D objects that they found.

Have students select a 3-D object that they found in the environment and create a representation of the selected object using materials such as Legos, building blocks, scrap materials, etc. (KSS3.1, 3.2)

- **Provide students with modeling clay** and have them create a copy of an object that is provided by the teacher. Guide students with strategies for working with modeling clay. Model or discuss ways of stretching, rolling or squeezing clay into shapes. Encourage students to talk about strategies for copying the object. (KSS3.1, 3.2)

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<td>KSS3</td>
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<td>TG: pp. 22 - 25</td>
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**Unit Centres:**

TG pp. 10-11
- Construction: Be A Builder
- Literacy: Alphabet City

Lesson 4: Making 3-D Objects

KSS3

TG: pp. 26 - 29
Strand: Shape and Space (Measurement)

Outcomes

Students will be expected to
KSS1 Use direct comparison to compare two objects based on a single attribute, such as:
- length including height
- mass
- capacity
[C, CN, PS, R, V]

Achievement Indicator:

KSS1.2 Compare the mass of two given objects; and explain how they compare, using the words lighter, heavier or almost the same.

Elaborations—Strategies for Learning and Teaching

Students should recognize that mass tells about the ‘heaviness’ of an object. They should explore direct methods to compare and order masses. Direct measurement involves placing two objects on a balance simultaneously and comparing the mass of one with that of the other. Students can compare the mass of two objects by holding one in each hand, extending their arms and feeling the downward pull of each object, determining which is heavier, lighter or about the same.

These experiences can then be performed using a pan balance scale. Students need to develop the understanding that when they place the objects in the two pans of the balance, the pan that goes down can be understood to hold the heavier object. Also, sometimes students confuse size with mass. They should have experiences of comparing something ‘big and light’ (e.g., tissue box) with something ‘small and heavy’ (e.g., golf ball) to ensure the attribute that is being measured is the one the students are focusing on.
General Outcome: Use Direct or Indirect Measurement to Solve Problems

Suggested Assessment Strategies

**Performance**

- Using a pan balance, students compare the mass of two objects found in the classroom. Have students select two objects and predict which is heavier or are about the same by holding one in each hand. Place the objects on the balance and have students discuss their findings. Encourage the students to use heavier, lighter or almost the same as when making comparisons. Provide students with an object and get them to find another object that is heavier, lighter or almost the same as. Use the pan balance to confirm their findings. Ask:
  
  “Why is one side of the balance scale lower than the other?”

  “Why is one side of the balance scale higher than the other?”

  “Why are the two sides the same?” (KSS1.2)

**Observation**

- Observe students as they consider the mass of objects. Note whether or not they:
  
  - accurately use terms such as heavier, lighter, or almost the same
  - consider the size of an object
  - consider the material out of which the object is made (KSS1.2)

- Students collect items from around the classroom to compare mass. More than one student should do the same comparison. Observe if there is agreement. Students may then use a pan balance to confirm their predictions. (KSS1.2)

**Resources/Notes**

*Math Makes Sense K*

Lesson 8: Exploring Mass

KSS1

TG pp. 42 - 45

Unit Centres:

TG p. 10 - 11

Arts and Crafts: Sock Fish

Sand and Water: Which is Heavier?
Numbers to 10

Suggested Percentage of Time: 70%

- Numbers to 10 (ten frame/counting)
  Lessons 11 and 12
- Exploring Patterns (3 elements)
- Exploring Geometry and Measurement (capacity)
Unit Overview

Focus and Context

The ten frame will be introduced as an extension of the five frame. Through repeated experiences, students will discover relationships between numbers, and begin to see five and ten as benchmark numbers. Students will continue to build on their previous knowledge about part-part-whole number relationships and apply this knowledge while working with ten frames. It is important that these experiences are not rushed, as students must be given the time needed to make connections between numbers. These connections are the foundation for developing number operations in the later grades.

Process Standards

Key

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Curriculum Outcomes

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<th>PROCESS STANDARDS</th>
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<tr>
<td>Number</td>
<td>KN1 Say the number sequence by 1s: • starting anywhere from 1 to 10 and from 10 to 1 • forward from 1 - 30.</td>
<td>[C, CN, V]</td>
</tr>
<tr>
<td></td>
<td>KN3 Relate a numeral, 1 to 10, to its respective quantity.</td>
<td>[CN, R, V]</td>
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<tr>
<td></td>
<td>KN4 Represent and describe numbers 2 to 10, in two parts, concretely and pictorially.</td>
<td>[C, CN, ME, R, V]</td>
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</tbody>
</table>
Strand: Number

Outcomes

Students will be expected to

KN3 Relate a numeral, 1 to 10, to its respective quantity.

[CN, R, V]

Achievement Indicators:

KN3.1 Construct a set of objects corresponding to a given numeral.

KN3.2 Identify the number of objects in a set.

Elaborations—Strategies for Learning and Teaching

A ten-frame is a 2 x 5 array in which dots or counters are placed to illustrate numbers. How students use the ten-frame provides insight into students number concept development. Students would have already been introduced to a five-frame earlier in the year. The ten-frame is simply an extension of the five-frame. E.g.,

Ten-frames focus on the relationship to five and ten as anchors for numbers. Introduce the following rules for showing numbers on a ten-frame:

• only one counter is permitted in each box of the ten-frame (should use counters of the same colour).

• always fill the top row first starting from left to right (the same way you read or write). A visual, such as a ‘smiley face’ above the first square on the left, will assist the student in beginning to fill the frame correctly.

• when the top row is filled, counters can be placed in the bottom row, also from left to right.

Relating numbers to benchmark numbers, specifically 5 and 10, is a useful in thinking about various combinations of numbers. For example, 6 is the number that is 1 more than 5, or 9 is the number that is 1 less than 10.

• There are different views on the placement of counters on the ten-frame; however, it is important to consider why ten-frames are used. The main purpose of a ten-frame is to visualize numbers in relation to 5 and 10, or relate numbers to 5 and 10 as benchmarks. Hence, in Kindergarten, filling left to right with no empty spaces is strongly recommended so that students internally visualize that when you have three counters, you need two more to make five; it is two away from five; or three and two make five.

KN4 Represent and describe numbers 2 to 10, in two parts, concretely and pictorially.

[C, CN, ME, R, V]

Achievement Indicators:

KN4.1 Show a given number as two parts, using fingers, counters or other objects, and name the number of objects in each part.

KN4.2 Show a given number as two parts, using pictures, and name the number of objects in each part.
General Outcome: Develop Number Sense

Suggested Assessment Strategies

Performance

• Provide each student with counters and a ten frame. Hold up a dot plate or number card. Have students fill out ten frame according to the number shown. (KN3.1, 3.2)

• Provide each student with counters and a ten frame. Flash a ten frame on the overhead. Have students fill out their ten frame as shown. Repeat for different numbers. (KN3.1, 3.2)

• Place matching sets of ten frame cards face down in an array. Students take turns turning over any two cards to find matches. They identify the amount on each card and if they are the same, they take both cards. If the cards are not a match, they turn the cards face down again. Play continues until all matches have been found. (KN3.2)

• Read the book, “10 for Dinner” by J.E. Bogart (1989) to the students. The pages provide a setting for students to think about number combinations for 10. Have the student use a ten frame and double sided counters to create their own story showing their 2 part combinations for 10. E.g., 6 red balloons and 4 yellow balloons. (KN4.1)

• Provide pairs of students with a ten frame, 2 colour counters, and a set of number cards 1 - 10. Player 1 picks a card and covers the ten frame with the corresponding number of red counters. Player 2 completes the ten frame with yellow counters. Provide each student with a sheet of ten frame templates. Students use red and yellow crayons and colour their sheets and record numbers to represent their ten frame number combinations. Repeat this activity with Player 2 choosing a card first. (KN4.1, 4.2)

Resources/Notes

Math Makes Sense K
Lesson 11: Ten Frame
KN3, KN4
TG pp. 46 - 49

Audio CD 2:
Selection 9, 10
## Strand: Number

### Outcomes

*Students will be expected to*

**KN1 Say the number sequence by 1s:**
- starting anywhere from 1 to 10 and from 10 to 1
- forward from 1 to 30.

[C, CN, V]

### Elaborations—Strategies for Learning and Teaching

Students have been provided opportunities for saying the number sequence from 0 to 10 and from 10 to 0 in meaningful contexts throughout the year. The daily routines with the calendar will have provided practice in saying the number sequence to 30.

Students will need repetitive tasks to develop confidence and competency in reciting these number sequences.

Provide opportunities during the school day to recite the number sequences up to 30. E.g., As students line up for dismissal, have them recite the numbers starting with the first student saying a number and the others will continue saying the number sequence forward or backward to a given number.

Sharing children’s literature, such as predictable counting books, rhymes and finger plays, provides opportunities for students to hear number sequence and use the mathematical language. Examples of some predictable counting books are:

- My Little Sister Ate One Hare, by Bill Grossman
- One Big Building, by Michael Dahl
- Ten, Nice, Eight, by Molly Bang
- Ten Sly Piranhas by Victoria Chess

Examples of rhymes:

- One To Buckle My Shoe
- Five Little Ducks
- Over in the Meadow

These activities assist in developing students’ abilities to learn the names of the numbers as well as their order.

Play a variation of ‘Pass The Bean Bag’ - Begin with number 1 and continue passing the bean bag around the circle or around the class until the students have recited the number sequence to 30.
General Outcome: Develop Number Sense

Suggested Assessment Strategies

Presentation

- Show and Tell - Throughout the week, students take turns presenting a ‘Show and Tell’ involving sets of objects. A number from 1 to 10 is secretly assigned to, or chosen by, each student as a theme for their Show and Tell presentation. Students are assigned a specific day to bring and present their set of objects that represents their “secret” number. The set of items should be concealed in a bag, tin, box, etc. The other students may ask questions to help them guess how many items there are in the set. Prior to doing this, brainstorm ideas with the students to prepare a list of possible questions that may be asked. Sample questions include:
  - Are there more than 4?
  - Is it between 2 and 7?
  - Is it less than what Sam had yesterday?
The student presenting may only respond with ‘yes’ or ‘no’. The students may then modify their questions in response to the answers given. When enough hints have been provided, the student presenting may ask, “How many do I have?” Once students have guessed the number, or the contents are revealed, the objects can be counted, forwards and backwards, by the whole group. (You may model this activity prior to student presentation). (KN1.1, 1.2, 1.3)

- Up and Down - Students will join with you in counting to 10 as they slowly stand up and kneel back down. Ask students to make their bodies as small as possible. As you say the number 1, have the students slowly stretch their bodies. Continue saying the number sequence to 10 together as the students’ bodies gradually stretch taller and larger. When you reach the number 10, students’ bodies will be fully extended with their hands in the air. A variation of this activity is to start with the student’s body fully extended and say the number sequence backward. (KN1.1, 1.2, 1.3)

- Pass The Bean Bag - As you pass a bean bag to a student, say a number between 0 - 30. The student must continue to say the number sequence to 30. A variation of this is to say the number sequence from 10, backward to 0. (KN1.1, 1.2, 1.3)

- Up and Back Counting - Have students line up and put chairs in front of them. As the class says the number sequence 1 to ? (depending on the number of students in the class), the students sit down one at a time. Have the class say the number sequence backward 10 to 1 and have the students stand up one at a time. (KN1.1, 1.2, 1.3)

Resources/Notes

Math Makes Sense K
Lesson 12: Counting Forward and Backward
KN1
TG: pp. 50 - 53

Audio CD 2:
Selection 11, 12, 13, 14, 15
Exploring Patterns

Suggested Percentage of Time: 15%

- Numbers to 10 (ten frame/counting)
- Exploring Patterns (3 elements): Lessons 3, 4 and 5
- Exploring Geometry and Measurement (capacity)
**Unit Overview**

**Focus and Context**
This unit explores patterns containing three elements, such as red, red, green, red, red, green, red, red, green or button, paper clip, eraser, button, paper clip, eraser. Students need to be provided with a variety of patterns from simple to complex to meet the range of their varying abilities. Because students progress at different rates, it is unlikely that they will all master a pattern before the teacher moves on to others. However, all students will improve over time if provided with many authentic experiences.

**Process Standards**

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<td>Patterns and Relations (Pattern)</td>
<td>KPR1 Demonstrate an understanding of repeating patterns (two or three elements) by: • identifying • reproducing • extending • creating patterns using manipulatives, sounds and actions.</td>
<td>[C, CN, PS, V]</td>
</tr>
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</table>
Strand: Patterns and Relations (Patterns)

Outcomes

Students will be expected to

KPR1 Demonstrate an understanding of repeating patterns (two or three elements) by:

• identifying
• reproducing
• extending
• creating

patterns using manipulatives, sounds and actions.

[C, CN, PS, V]

Elaborations—Strategies for Learning and Teaching

By the end of Term 2 students were expected to identify, reproduce, extend and create two element patterns. Three element patterns will be the focus of teaching and learning during Term 3.

Achievement Indicators:

KPR1.1 Distinguish between repeating patterns and non-repeating sequences in a given set by identifying the part that repeats.

Use math manipulatives to create three element patterns and a non-pattern. Students decide what sequences are indeed patterns. For example, create a three element pattern such as, red, blue, yellow, red, blue, yellow, etc. and a non-pattern such as, red, green, orange, purple, red, yellow. Can the students distinguish between the pattern and the non-pattern? Can they tell the repeating core (the shortest part of the pattern that repeats)?

Provide students with a pattern of linking cubes (e.g., red, green, green, red, green, green, red, green, green). This task involves describing a three element pattern using objects with one attribute (color). Ask students to describe the pattern, using color words.

KPR1.2 Copy a given repeating pattern, e.g., actions, sound, colour, size, shape, orientation, and describe the pattern.

Student’s first experiences with patterns will involve them in copying, with manipulatives, a modeled pattern given by the teacher.
General Outcome: Use Patterns to Describe the World and to Solve Problems

Suggested Assessment Strategies

**Performance**

- Follow the Leader - Model a pattern for the students to copy (e.g., sit, stand, kneel, sit, stand, kneel, sit, stand, kneel . . . ). After modeling three more different types of patterns ask a volunteer to provide the group with a pattern to copy. 
  (KPR1.2, 1.4)

- Make a musical pattern with a core - loud drum beat, loud drum beat, soft drum beat. Ask students to copy the pattern. 
  (KPR1.2)

- Present the students with the two different action patterns below and ask them to indicate whether they are the same or different and why.
  - sit down, stand up, turn around, sit down, stand up, turn around
  - snap fingers, clap hands, pat knees, snap fingers, clap hands, pat knees
  Students who have a good understanding of patterns will realize that these are the same. They may say, “They both have three different actions over and over.” 
  (KPR1.1)

- Ask students to repeat a rhythmic pattern presented to them (e.g., clap, clap, stamp, clap, clap, stamp) 
  (KPR1.2)

**Resources/Notes**

- *Math Makes Sense K*
  - Lesson 3: It’s a Pattern (3 elements)
  - TG pp. 20 - 23

- *Audio CD 1*
  - Selection 2, 3 and 4

- *Little Books:*
  - Which Belong Together?

- *Unit Centres:*
  - TG p. 9
  - Literacy: Book Talk
### Strand: Patterns and Relations (Patterns)

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Elaborations — Strategies for Learning and Teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will be expected to KPR1 Continued</td>
<td>Using manipulatives, the teacher presents at least three repetitions of a given pattern. For example, red block, green block, red block, green block, red block, green block. Ask for a student to volunteer to extend the pattern.</td>
</tr>
<tr>
<td><strong>Achievement Indicator:</strong> PR1.3 Extend repeating patterns to two more repetitions.</td>
<td>Using bears or other manipulatives create a three element pattern using at least four repetitions and conceal the last two to three manipulatives. Have students predict what the concealed manipulatives are.</td>
</tr>
<tr>
<td></td>
<td>If a student is having difficulty learning to identify or extend patterns, check the student’s ability to work with AB patterns first. Use concrete materials whenever possible but with only one different attribute (e.g., crayons with only one difference in color). Avoid using objects with a difference in color, size, and shape.</td>
</tr>
</tbody>
</table>
General Outcome: Use Patterns to Describe the World and to Solve Problems

Suggested Assessment Strategies

Performance

- Give students twelve pattern blocks. Show them a pattern like the one below and ask them to describe the pattern, copy the pattern and extend it.

![Pattern Blocks](image)

(KPR1.1, 1.2, 1.3)

- Create and display a three element pattern. Ask:
  
  How can you tell if this is a pattern? (I look to see if the cubes, buttons, or shells repeat in the same way.)
  
  How would you describe this pattern? (The part that repeats is shell, cube, button, shell, cube, button)
  
  What comes next? (The pattern shows shell, cube, button, over and over, so a shell comes next.) (KPR1.1, 1.3)

- Patterning Ourselves: In a circle the teacher places some of the students in a three element pattern (e.g., hands up, hands down, hands down, hands up, hands down, hands down, hands up, hands down, etc.) The remaining students extend the pattern by arranging themselves in the correct position. (KPR. 1.3)

Resources/Notes

Math Makes Sense K

Lesson 4: Extending Patterns (3 elements)

KPR1

TG pp. 24 - 27

Audio CD 1:

Selections 5, 6, 7, 8 and 9

Little Books:

Which Two are the Same?
### Strand: Patterns and Relations (Patterns)

#### Outcomes

*Students will be expected to*

KPR1 Continued

**Achievement Indicators:**

<table>
<thead>
<tr>
<th>PR1.4</th>
<th>Create a repeating pattern, using manipulatives, musical instruments or actions, and describe the pattern.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR1.5</td>
<td>Identify and describe a repeating pattern in the classroom, school and outdoors; e.g., in a familiar song, in a nursery rhyme.</td>
</tr>
</tbody>
</table>

#### Elaborations—Strategies for Learning and Teaching

Using a musical triangle, miniature cymbals, and a drum, or other musical instruments, students will explore patterns using different rhythms. For example, one drum beat, one cymbal, one triangle, one drum beat, one cymbal, one triangle.

Take advantage of opportunities that arise in the classroom to identify patterns. For example, line students up to go out for gym according to different patterns. For example:

- boy, girl, boy, girl, …
- short sleeve, long sleeve, short sleeve, long sleeve, …
- legs crossed, legs crossed, arms crossed, arms crossed, …
General Outcome: Use Patterns to Describe the World and to Solve Problems

Suggested Assessment Strategies

Performance

- Guess the Pattern - Ask a student to cover their eyes or turn around from their peer group. The group arranges themselves into a pattern, ex. Sit, stand, kneel, sit, stand, kneel, sit, stand, kneel, etc. Invite the student back to the group to identify and describe the pattern. Observe:
  - Can the student accurately identify the pattern rule?
  - Can the student copy the pattern created by his/her classmates?
  - Can the student extend the pattern by telling you what comes next?
  - Can they add to the pattern? (KPR1.5)

- When playing outdoor activities and games have students organize the equipment they are using into patterns. Ask others to identify and describe the pattern made. For example:
  - skipping rope, skipping rope, ball . . . (KPR1.4, 1.5)

- At their tables, provide a variety of concrete materials such as blocks, buttons, stickers, keys, and colored tiles. After creating three element patterns, have students display their work and explain their patterns to the class. Once all patterns are displayed, ask students to look for similarities in the patterns they created. (KPR1.4)

Resources/Notes

Math Makes Sense K
Lesson 5: We Can Make Patterns
(3 elements)
KPR1
TG pp. 28 - 31

Audio CD 1:
Selection 10

Unit Centres:
TG pp. 8 - 9
Art and Crafts: Bracelets
Construction: Towers and Trains
Exploration: Nature
Sand and Water: Patterns in the Sand
Exploring Geometry and Measurement

Suggested Percentage of Time: 15%
Unit Overview

Focus and Context
In this unit, students will use direct comparison to compare two objects based on the single attribute of capacity. Students will also make statements of comparison in communicating their understanding of measurement, in terms of capacity. In Grade One, students will compare two or more objects using the single attribute of capacity.

Process Standards Key

<table>
<thead>
<tr>
<th>STRAND</th>
<th>OUTCOME</th>
<th>PROCESS STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape and Space (Measurement)</td>
<td>KSS1 Use direct comparison to compare two objects based on a single attribute, such as: • length including height • mass • capacity</td>
<td>[C, CN, PS, R, V]</td>
</tr>
</tbody>
</table>
Strand: Shape and Space (Measurement)

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Elaborations — Strategies for Learning and Teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will be expected to</td>
<td>Students learn that capacity tells how much something holds. They should investigate strategies to directly compare the capacities of two or more containers. Direct measurement involves filling one container and then pouring the contents into another one to find out which holds more. While developing measurement skills for capacity, students should use terms such as ‘holds more’, ‘holds less’, ‘holds the same’, ‘full’ and ‘empty’.</td>
</tr>
<tr>
<td>KSS1 Use direct comparison to compare two objects based on a single attribute, such as:</td>
<td>Students can compare the capacity of two containers by filling one container with a pourable material such as water, sand, rice and beans and then pouring the contents into the other container. Students can observe that the capacity of a container can be determined by height, width and the configuration of the container.</td>
</tr>
<tr>
<td>• length including height</td>
<td></td>
</tr>
<tr>
<td>• mass</td>
<td></td>
</tr>
<tr>
<td>• capacity</td>
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</tr>
</tbody>
</table>

Achievement Indicators:

KSS1.3 Compare the capacity of two given objects; and explain how they compare, using the words less, more, (bigger, smaller) or almost the same.
General Outcome: Use Direct or Indirect Measurement to Solve Problems

Suggested Assessment Strategies

Performance

- Provide containers of various sizes and shapes. Have students select two containers and compare the capacity of each. Ask questions such as:
  Did the taller container hold more/less?
  Did the wider container hold more/less? (KSS1.3)

- Display two identical transparent containers that are filled with coloured water (or rice, pasta, sand). Ensure that one of the containers does not contain as much water as the other. Ask:
  “Which container (glass, jar) contains more water (less water)?”
  “Can you show (tell) me why?” (KSS1.3)

- Display three identical transparent containers filled with coloured water (put in a few drops of food coloring to make colourful water). Ensure that at least two of the containers have the same quantity of water. Ask:
  “Which containers (glasses, jars) contain the same amount of water?”
  “Can you show (tell) me why?”

  Take two of the containers and ask:
  “Which container (glass, jar) contains more water (less water)?”
  “Can you show (tell) me why?”
  Provide empty containers. Fill a container with water. Ask the students to fill their container with less water (more water or almost the same amount of water). Ask questions and observe the students to verify understanding of the language and the concepts. (KSS1.3)

Resources/Notes

*Math Makes Sense K*
Lesson 7: Exploring Capacity
KSS1
TG pp. 38 - 41
Appendix A
Outcomes by Strand
(with page references)
<table>
<thead>
<tr>
<th>Strand: Number</th>
<th>General Outcome: Develop number sense</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specific Outcomes</strong></td>
<td><strong>Achievement Indicators</strong></td>
</tr>
<tr>
<td><em>It is expected that students will:</em></td>
<td><em>The following set of indicators help determine whether students have met the corresponding specific outcome.</em></td>
</tr>
</tbody>
</table>

**KN1** Say the number sequence by 1s: - starting anywhere from 1 to 10 and from 10 to 1 - forward from 1 to 30.  
[C, CN, V]  
*pp. 54, 126*  

| KN1.1 Name the number that comes after a given number, one to nine.  
KN1.2 Name the number that comes before a given number, two to ten.  
KN1.3 Recite number names from a given number to a stated number (forward – one to ten, backward – ten to one), using visual aids.  
KN1.4 Recite number names forward from zero to thirty. |

**KN2** Subitize (recognize at a glance) and name familiar arrangements of 1 to 6 objects, dots or pictures.  
[C, CN, ME, V]  
*p. 48*  

| KN2.1 Look briefly at a given familiar arrangement of 1 to 5 objects or dots, and identify the number represented without counting.  
KN2.2 Identify the number represented by a given dot arrangement on a five frame and describe the number’s relationship to five |

**KN3** Relate a numeral, 1 to 10, to its respective quantity.  
[CN, R, V]  
*pp. 34, 44, 82, 88, 90, 92, 96, 124*  

| KN3.1 Construct a set of objects corresponding to a given numeral.  
KN3.2 Identify the number of objects in a set.  
KN3.3 Record numerals to represent the number of objects in a given set (1 – 10)  
KN3.4 Hold up the appropriate number of fingers for a given numeral.  
KN3.5 Match numerals with pictorial representations.  
KN3.6 Count the number of objects in a set and recognize that when the objects are re-arranged the original count is maintained (conservation of number). |
<table>
<thead>
<tr>
<th>Strand: Number (Continued)</th>
<th>General Outcome: Develop number sense</th>
</tr>
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<tbody>
<tr>
<td><strong>Specific Outcomes</strong></td>
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</table>

**KN4** Represent and describe numbers 2 to 10, in two parts, concretely and pictorially.

- C, CN, ME, R, V
- pp. 40, 46, 86, 88, 90, 94, 98, 124

- KN4.1 Show a given number as two parts, using fingers, counters or other objects, and name the number of objects in each part.
- KN4.2 Show a given number as two parts, using pictures, and name the number of objects in each part.

**KN5** Compare quantities 1 to 10:
- using one-to-one correspondence
- by ordering numbers representing different quantities

- C, CN, V
- p. 30

- KN5.1 Construct a set to show more than, fewer than or as many as a given set.
- KN5.2 Compare two given sets through direct comparison and describe the sets, using words such as: ‘more’, ‘fewer’, ‘as many as’ or ‘the same number’.
**Strand:** Patterns and Relations (Patterns)

**Specific Outcomes**

*It is expected that students will:*

KPR1 Demonstrate an understanding of repeating patterns (two or three elements) by:
- identifying
- reproducing
- extending
- creating
  patterns using manipulatives, sounds and actions.

[C, CN, PS, V]

**General Outcome:** Use patterns to describe the world and to solve problems.

**Achievement Indicators**

*The following set of indicators help determine whether students have met the corresponding specific outcome.*

KPR1.1 Distinguish between repeating patterns and non-repeating sequences in a given set by identifying the part that repeats.
KPR1.2 Copy a given repeating pattern, e.g., actions, sound, colour, size, shape, orientation, and describe the pattern.
KPR1.3 Extend repeating patterns to two more repetitions.
KPR1.4 Create a repeating pattern, using manipulatives, musical instruments or actions, and describe the pattern.
KPR1.4 Identify and describe a repeating pattern in the classroom, school and outdoors; e.g., in a familiar song, in a nursery rhyme.
<table>
<thead>
<tr>
<th>Strand: Shape and Space (Measurement)</th>
<th>General Outcome: Use direct or indirect measurement to solve problems.</th>
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<tr>
<td><strong>Specific Outcomes</strong></td>
<td><strong>Achievement Indicators</strong></td>
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<td><em>It is expected that students will:</em></td>
<td><em>The following set of indicators help determine whether students have met the corresponding specific outcome.</em></td>
</tr>
</tbody>
</table>
| KSS1 Use direct comparison to compare two objects based on a single attribute, such as: | KSS1.1 Compare the length or height of two given objects; and explain how they compare using the words ‘shorter’, ‘longer’, ‘taller’ or ‘almost the same’.
| | KSS1.2 Compare the mass of two given objects; and explain how they compare, using the words ‘lighter’, ‘heavier’ or ‘almost the same’.
| | KSS1.3 Compare the capacity of two given objects; and explain how they compare, using the words ‘less’, ‘more’, ‘bigger’, ‘smaller’ or ‘almost the same’.
<p>| • length including height           |                                                                     |
| • mass                              |                                                                     |
| • capacity                          |                                                                     |
| [C, CN, PS, R, V]                   |                                                                     |
| <em>pp. 74, 118, 142</em>                  |                                                                     |</p>
<table>
<thead>
<tr>
<th>Strand: Shape and Space (3-D Objects and 2-D Shapes)</th>
<th>General Outcome: Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.</th>
</tr>
</thead>
</table>
| **Specific Outcomes**                               | **Achievement Indicators**  
It is expected that students will:  
The following set of indicators help determine whether students have met the corresponding specific outcome. |
| KSS2 Sort 3-D objects using a single attribute and explain the sorting rule.  
[C, CN, PS, R, V]  
*pp. 60, 70* | KSS2.1 Identify a common attribute in a given set of 3-D objects.  
KSS2.2 Sort a set of familiar 3-D objects using a single attribute such as size or shape, and explain the sorting rule.  
KSS2.3 Determine the difference between two pre-sorted sets by explaining a sorting rule used to sort them. |
| KSS3 Build and describe 3-D objects.  
[CN, PS, V]  
*pp. 68, 116* | KSS3.1 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.  
SS3.2 Describe a given 3-D object, using words such as big, little, round, like a box and like a can. Include use of formal names such as spheres, cubes and cylinders. |
Appendix B
References
REFERENCES


Computation, Calculators, and Common Sense. May 2005, NCTM.


Richardson, K. Counting comparing and pattern. Pearson Education, Inc. 1999


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