The Glance Across the Grades: Kindergarten to Grade 9 Mathematics resource is a compilation of the outcomes into suggested categories or learning targets. These learning targets sort the outcomes and allow teachers to preview the outcomes across grade levels. It should be noted that this is only one way to sort the outcomes across the grades; however, this breakdown will enable teachers to differentiate teaching within each strand of the curriculum. This resource can assist teachers in:

- deepening understandings of the mathematics strands and outcomes
- facilitating purposeful teaching
- identifying the continuum of student learning across the learning targets
- monitoring individual student learning and being able to specifically discuss his or her progress and identify learning gaps
- differentiating instruction
- building essential connections to learning within and between the learning targets

The big ideas, located under each learning target, are statements of an idea that is central to the learning of mathematics and makes instruction purposeful. The big ideas are compilations from the work of Marian Small, John Van de Walle, and Randall J. Charles.

### NUMBER
- Counting
- Representation of Whole Numbers
- Representation of Rational Numbers
- Operations with Whole Numbers
  - Addition/Subtraction
  - Multiplication/Division
- Operations with Rational Numbers

### PATTERNS AND RELATIONS
- Patterns
  - Patterning and Algebraic Thinking
- Variables and Equations
  - Algebraic Representations with Expressions
  - Algebraic Representations with Equations

### SHAPE AND SPACE
- Measurement
  - Length
  - Area
  - Volume (Capacity)
  - Mass (Weight)
  - Time
  - Angles
- 3-D Objects and 2-D Shapes
  - Identifying, Sorting, Comparing, and Constructing
- Transformations
  - Position and Motion

### STATISTICS AND PROBABILITY
- Data Analysis
  - Collection, Organization, and Analysis of Data
- Chance and Uncertainty
  - Probability

### Substrands
- Learning Targets

### STRANDS
- Communication (C)
- Connections (CN)
- Mental Mathematics and Estimation (ME)
- Problem Solving (PS)
- Reasoning (R)
- Technology (T)
- Visualization (V)
Big Ideas

Number Strand

- Counting
  - Counting tells how many or how much.
  - Numbers are related to each other through a variety of number relationships.
  - Quantities can be estimated by using referents.
- Representation of Whole Numbers
- Representation of Rational Numbers
  - Quantities can be represented concretely, pictorially, and symbolically.
  - There are different but equivalent representations of numbers.
  - Benchmark numbers are useful for comparing, relating, and estimating numbers.
  - Our number system is based on patterns (place value).
  - The position of a digit in a number determines the quantity it represents.
  - Classifying numbers provides information about their characteristics.
- Operations with Whole Numbers (Addition/Subtraction)
- Operations with Whole Numbers (Multiplication/Division)
- Operations with Rational Numbers
  - The four operations are intrinsically related.
  - Flexible methods of calculation in all operations involve decomposing and composing numbers in a wide variety of ways.
  - Flexible methods of calculation require a strong understanding of the operations and properties of the numbers involved.
  - There are a variety of appropriate ways to estimate sums, differences, products, and quotients, depending on the context and the numbers involved.
- Personal strategies and algorithms provide flexible and efficient methods of calculating that vary depending on the context and the numbers involved.

Patterns and Relations Strand

- Patterns
  - Patterns can be represented in a variety of ways.
  - Relationships can be described and generalized for mathematical situations that have numbers or objects that repeat in predictable ways.
  - Data can be arranged to highlight patterns and relationships.
- Variables and Equations
  - Algebraic Representations with Expressions
  - Algebraic Representations with Equations
    - Algebra, with the use of symbols or variables, expressions, and equations, is a tool for generalizing arithmetic and representing mathematical situations and patterns in our world.
    - The equal sign describes the balance that exists between the quantities on either side of the equal sign.
    - Equality and inequality are used to express relationships between two quantities.
    - Relationships between quantities can be described using rules involving variables.

Shape and Space Strand

- Measurement
  - Length / Area / Volume (Capacity) / Mass (Weight) / Time / Angles
    - It is necessary to understand the attributes of the object before anything can be measured.
    - Measurement involves a selected attribute of an object (length, area, mass, volume, capacity) and a comparison of the object being measured against non-standard and standard units of the same attribute.
    - The longer the unit of measure, the fewer units it takes to measure the object.
    - The use of standard measurement units simplifies communication about the size of objects.
- 3-D Objects and 2-D Shapes
  - Identifying, Sorting, Comparing, and Constructing
    - Two- and three-dimensional objects can be described, classified, and analyzed by their attributes.
- Transformations
  - Position and Motion
    - Shapes can be relocated and reoriented using mathematical procedures.
    - Shapes can be described in terms of their location in a plane or in a space.

Statistics and Probability Strand

- Data Analysis
  - Collection, Organization, and Analysis of Data
    - Data is gathered and organized in order to answer questions.
    - The question that needs to be answered determines the data that will be collected.
    - The type of data determines the best way to organize and represent it.
    - Visual displays quickly reveal information about data.
    - Information from data representations is used to make references, to interpret, to draw conclusions, and to make predictions.
- Chance and Uncertainty
  - Probability
    - Probability involves the use of mathematics to describe the level of certainty that an event will occur.
    - Probabilities, both theoretical and experimental, can be determined in different ways.
**General Learning Outcome:** Develop number sense.

**Specific Learning Outcomes**

### Big Ideas

- Counting tells how many or how much.
- Numbers are related to each other through a variety of number relationships.
- Quantities can be estimated by using referents.

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<tr>
<td>Say the number sequence by 1s, starting anywhere from 1 to 30 and from 10 to 1. [C, CN, V]</td>
<td>Counting tells how many or how much.</td>
<td>Counting tells how many or how much.</td>
<td>Demonstrate an understanding of counting to 10 by indicating that the last number said identifies “how many”</td>
<td>Show that any set has only one count [C, CN, R, V]</td>
<td>Say the number sequence by 1s forward and backward between any two given numbers (0 to 100)</td>
<td>Demonstrate an understanding of counting by using the counting-on strategy</td>
<td>Identify the number, up to 20, that is one more, two more, one less, and two less than a given number. [C, CN, ME, R, V]</td>
<td>Estimate quantities to 20 by using referents. [C, CN, ME, R, V]</td>
<td>Counting tells how many or how much.</td>
<td>Demonstrate an understanding of counting to 10 by indicating that the last number said identifies “how many”</td>
<td>Estimate quantities less than 1000 using referents. [CN, RS, V]</td>
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<td>Demonstrate an understanding of counting to 10 by indicating that the last number said identifies “how many”</td>
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**Counting**

- *(K, Grade 1, Grade 2, Grade 3, Grade 4, Grade 5, Grade 6, Grade 7, Grade 8, Grade 9)*

### Kindergarten

- K.N.1. Say the number sequence by 1s.
- K.N.2. Counting tells how many or how much.
- K.N.3. Demonstrate an understanding of counting to 10.
- K.N.4. Demonstrate an understanding of counting to 10.
- K.N.5. Demonstrate an understanding of counting to 10.

### Grade 1

- 1.N.1. Say the number sequence by 1s, forward and backward between any two given numbers (0 to 100).
- 1.N.2. Demonstrate an understanding of counting to 10.
- 1.N.3. Demonstrate an understanding of counting to 10.
- 1.N.4. Demonstrate an understanding of counting to 10.
- 1.N.5. Demonstrate an understanding of counting to 10.
- 1.N.6. Demonstrate an understanding of counting to 10.
- 1.N.7. Demonstrate an understanding of counting to 10.
- 1.N.8. Demonstrate an understanding of counting to 10.

### Grade 2

- 2.N.1. Say the number sequence by 1s, forward and backward between any two given numbers (0 to 100).
- 2.N.2. Demonstrate an understanding of counting to 10.
- 2.N.3. Demonstrate an understanding of counting to 10.
- 2.N.4. Demonstrate an understanding of counting to 10.
- 2.N.5. Demonstrate an understanding of counting to 10.
- 2.N.7. Demonstrate an understanding of counting to 10.

### Grade 3

- 3.N.1. Say the number sequence by 1s, forward and backward between any two given numbers (0 to 100).
- 3.N.2. Demonstrate an understanding of counting to 10.
- 3.N.3. Demonstrate an understanding of counting to 10.
- 3.N.5. Demonstrate an understanding of counting to 10.

### Grade 4

- 4.N.1. Say the number sequence by 1s, forward and backward between any two given numbers (0 to 100).
- 4.N.2. Demonstrate an understanding of counting to 10.
- 4.N.3. Demonstrate an understanding of counting to 10.
- 4.N.5. Demonstrate an understanding of counting to 10.
- 4.N.7. Demonstrate an understanding of counting to 10.

### Grade 5

- 5.N.1. Say the number sequence by 1s, forward and backward between any two given numbers (0 to 100).
- 5.N.2. Demonstrate an understanding of counting to 10.
- 5.N.3. Demonstrate an understanding of counting to 10.
- 5.N.4. Demonstrate an understanding of counting to 10.
- 5.N.5. Demonstrate an understanding of counting to 10.
- 5.N.6. Demonstrate an understanding of counting to 10.
- 5.N.7. Demonstrate an understanding of counting to 10.
- 5.N.8. Demonstrate an understanding of counting to 10.

### Grade 6

- 6.N.1. Say the number sequence by 1s, forward and backward between any two given numbers (0 to 100).
- 6.N.2. Demonstrate an understanding of counting to 10.
- 6.N.3. Demonstrate an understanding of counting to 10.
- 6.N.4. Demonstrate an understanding of counting to 10.
- 6.N.5. Demonstrate an understanding of counting to 10.
- 6.N.7. Demonstrate an understanding of counting to 10.
- 6.N.8. Demonstrate an understanding of counting to 10.

### Grade 7

- 7.N.1. Say the number sequence by 1s, forward and backward between any two given numbers (0 to 100).
- 7.N.2. Demonstrate an understanding of counting to 10.
- 7.N.3. Demonstrate an understanding of counting to 10.
- 7.N.5. Demonstrate an understanding of counting to 10.
- 7.N.7. Demonstrate an understanding of counting to 10.

### Grade 8

- 8.N.1. Say the number sequence by 1s, forward and backward between any two given numbers (0 to 100).
- 8.N.2. Demonstrate an understanding of counting to 10.
- 8.N.5. Demonstrate an understanding of counting to 10.

### Grade 9

- 9.N.1. Say the number sequence by 1s, forward and backward between any two given numbers (0 to 100).
Glance Across the Grades: NUMBER

General Learning Outcome: Develop number sense.

Specific Learning Outcomes

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<tr>
<th>Big Ideas</th>
<th>KINDERGARTEN</th>
<th>GRADE 1</th>
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<tr>
<td>• Quantities can be represented concretely, pictorially, and symbolically.</td>
<td>K.N.2. Subitize and name familiar arrangements of 1 to 6 dots (or objects). [C, CN, ME, V]</td>
<td>1.N.2. Subitize and name familiar arrangements of 1 to 10 dots (or objects). [C, CN, ME, V]</td>
<td>2.N.2. Demonstrate if a number (up to 100) is even or odd. [C, CN, PS, R]</td>
<td>3.N.2. Represent and describe whole numbers to 1000, concretely, pictorially, and symbolically. [C, CN, T, V]</td>
<td>4.N.1. Represent and describe whole numbers to 10 000, concretely, pictorially, and symbolically. [C, CN, T, V]</td>
<td>5.N.1. Represent and describe whole numbers to 100 000. [C, CN, T, V]</td>
<td>6.N.1. Demonstrate an understanding of place value for numbers: greater than one million, less than one-thousandth. [C, CN, R, T]</td>
<td>7.N.1. Demonstrate an understanding of perfect squares and square roots, concretely, pictorially, and symbolically (limited to whole numbers). [C, CN, R, V]</td>
<td>8.N.1. Demonstrate an understanding of powers with integral bases (excluding base 0) and whole-number exponents by representing repeated multiplication using powers: using patterns to show that a power with an exponent of zero is equal to 1. [C, CN, PS, R]</td>
<td>9.N.1. Demonstrate an understanding of perfect squares and square roots, concretely, pictorially, and symbolically (limited to whole numbers). [C, CN, R, V]</td>
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<td>• There are different but equivalent representations of numbers.</td>
<td>K.N.3. Relate a numeral, 1 to 10, to its respective quantity. [CN, R, V]</td>
<td>1.N.3. Relate a numeral, 1 to 10, to its respective quantity. [CN, R, V]</td>
<td>2.N.3. Describe order or relative position using ordinal numbers. [C, CN, R]</td>
<td>3.N.3. Compare and order numbers to 1000. [C, CN, R]</td>
<td>4.N.2. Compare and order numbers to 10 000. [C, CN]</td>
<td>5.N.2. Compare and order numbers up to 10 000. [C, CN]</td>
<td>6.N.2. Compare and order numbers up to 100 000. [C, CN, T, V]</td>
<td>7.N.2. Compare and order numbers to 1 000 000. [C, CN, T, V]</td>
<td>8.N.2. Demonstrate an understanding of perfect squares and square roots, concretely, pictorially, and symbolically (limited to whole numbers). [C, CN, R, V]</td>
<td>9.N.2. Demonstrate an understanding of powers with integral bases (excluding base 0) and whole-number exponents by representing repeated multiplication using powers: using patterns to show that a power with an exponent of zero is equal to 1. [C, CN, PS, R]</td>
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<td>• Benchmark numbers are useful for comparing, relating, and estimating numbers.</td>
<td>K.N.4. Represent and describe numbers 2 to 10 in two parts, concretely and pictorially. [C, CN, ME, R, V]</td>
<td>1.N.4. Represent and describe numbers 2 to 10, concretely, pictorially, and symbolically. [C, CN, V]</td>
<td>2.N.4. Represent and describe numbers to 100, concretely, pictorially, and symbolically. [C, CN, V]</td>
<td>3.N.4. Represent and describe numbers to 1000, concretely, pictorially, and symbolically. [C, CN, T, V]</td>
<td>4.N.3. Represent and describe whole numbers to 10 000, concretely, pictorially, and symbolically. [C, CN, T, V]</td>
<td>5.N.3. Illustrate, concretely and pictorially, the meaning of place value for numbers to 1000. [C, CN, R, V]</td>
<td>6.N.3. Illustrate, concretely and pictorially, the meaning of place value for numbers to 100 000. [C, CN, T, V]</td>
<td>7.N.3. Demonstrate an understanding of integers, concretely, pictorially, and symbolically. [C, CN, R, V]</td>
<td>8.N.3. Demonstrate an understanding of perfect squares and square roots, concretely, pictorially, and symbolically (limited to whole numbers). [C, CN, R, V]</td>
<td>9.N.3. Demonstrate an understanding of powers with integral bases (excluding base 0) and whole-number exponents by representing repeated multiplication using powers: using patterns to show that a power with an exponent of zero is equal to 1. [C, CN, PS, R]</td>
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| • Our number system is based on patterns (place value). | K.N.5. Compare quantities, 1 to 10. [C, CN, ME, R, V] | 1.N.5. Compare and order sets containing up to 20 elements to solve problems by using: 
- referents 
| • The position of a digit in a number determines the quantity it represents. | K.N.6. Compare quantities, 1 to 10. [C, CN, ME, R, V] | 1.N.6. Compare quantities, 1 to 10. [C, CN, ME, R, V] | 2.N.6. Demonstrate if a number (up to 100) is even or odd. [C, CN, PS, R] | 3.N.6. Demonstrate if a number (up to 1000) is even or odd. [C, CN, PS, R] | 4.N.5. Compare and order numbers to 100. [C, CN] | 5.N.5. Compare and order numbers to 100. [C, CN] | 6.N.5. Compare and order numbers to 1000. [C, CN, T, V] | 7.N.5. Demonstrate an understanding of integers, concretely, pictorially, and symbolically. [C, CN, R, V] | 8.N.5. Demonstrate an understanding of perfect squares and square roots, concretely, pictorially, and symbolically (limited to whole numbers). [C, CN, R, V] | 9.N.5. Demonstrate an understanding of powers with integral bases (excluding base 0) and whole-number exponents by representing repeated multiplication using powers: using patterns to show that a power with an exponent of zero is equal to 1. [C, CN, PS, R] |
| • Classifying numbers provides information about their characteristics. | K.N.7. Demonstrate, concretely and pictorially, how a number, up to 30, can be represented by a variety of equal groups with and without singles. [C, R, V] | 1.N.7. Demonstrate, concretely and pictorially, how a number, up to 30, can be represented by a variety of equal groups with and without singles. [C, R, V] | 2.N.7. Demonstrate, concretely and pictorially, how a number, up to 100, can be represented by a variety of equal groups with and without singles. [C, R, V] | 3.N.7. Demonstrate, concretely and pictorially, how a number, up to 1000, can be represented by a variety of equal groups with and without singles. [C, R, V] | 4.N.6. Demonstrate, concretely and pictorially, how a number, up to 10 000, can be represented by a variety of equal groups with and without singles. [C, R, V] | 5.N.6. Demonstrate, concretely and pictorially, how a number, up to 1 000 000, can be represented by a variety of equal groups with and without singles. [C, R, V] | 6.N.6. Demonstrate, concretely and pictorially, how a number, up to 10 000 000, can be represented by a variety of equal groups with and without singles. [C, R, V] | 7.N.6. Demonstrate, concretely and pictorially, how a number, up to 100 000 000, can be represented by a variety of equal groups with and without singles. [C, R, V] | 8.N.6. Demonstrate, concretely and pictorially, how a number, up to 1 000 000 000, can be represented by a variety of equal groups with and without singles. [C, R, V] | 9.N.6. Demonstrate, concretely and pictorially, how a number, up to 1 000 000 000 000, can be represented by a variety of equal groups with and without singles. [C, R, V] |

Representation of Whole Numbers

- [C] Communication
- [CN] Connections
- [ME] Mental Mathematics
- [R] Reasoning
- [T] Technology
- [V] Visualization

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### General Learning Outcome: Develop number sense.

#### Specific Learning Outcomes

**Big Ideas**

- Quantities can be represented concretely, pictorially, and symbolically.
- There are different but equivalent representations of numbers.
- Benchmark numbers are useful for comparing, relating, and estimating numbers.
- Our number system is based on patterns (place value).
- The position of a digit in a number determines the quantity it represents.
- Classifying numbers provides information about their characteristics.

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**3.N.13.** Demonstrate an understanding of fractions by:
- explaining that a fraction represents a portion of a whole divided into equal parts
- describing situations in which fractions are used
- comparing fractions of the same whole with like denominators

**4.N.8.** Demonstrate an understanding of fractions less than or equal to one by using concrete and pictorial representations to:
- name and record fractions for the parts of a whole or a set
- compare and order fractions
- model and explain that for different wholes, two identical fractions may not represent the same quantity
- provide examples of where fractions are used

**5.N.7.** Demonstrate an understanding of fractions by using concrete and pictorial representations to:
- create sets of equivalent fractions
- compare fractions with like and unlike denominators

**6.N.1.** Demonstrate an understanding of place value for numbers:
- greater than one million
- less than one-thousandth

**6.N.4.** Relate improper fractions to mixed numbers.

**6.N.5.** Demonstrate an understanding of ratio, concretely, pictorially, and symbolically.

**5.N.9.** Relate decimals to fractions (tenths, hundredths, thousandths) concretely, pictorially, and symbolically.

**6.N.6.** Demonstrate an understanding of percent (limited to whole numbers), concretely, pictorially, and symbolically.

**7.N.4.** Demonstrate an understanding of the relationship between repeating decimals and fractions, and terminating decimals and fractions.

**7.N.7.** Compare and order fractions, decimals (to thousandths), and integers by using:
- benchmarks
- place value
- equivalent fractions and/or decimals

**8.N.4.** Demonstrate an understanding of ratio and rate.

**9.N.3.** Demonstrate an understanding of rational numbers by:
- comparing and ordering rational numbers
- solving problems that involve arithmetic operations on rational numbers.
# Glance Across the Grades: NUMBER

## General Learning Outcome: Develop number sense.

### Specific Learning Outcomes

#### Big Ideas

- The four operations are intrinsically related.
- Flexible methods of calculation in all operations involve decomposing and composing numbers in a wide variety of ways.
- Flexible methods of calculation require a strong understanding of the operations and properties of the operations.
- There are a variety of appropriate ways to estimate sums, differences, products, and quotients, depending on the context and the numbers involved.
- Personal strategies and algorithms provide flexible and efficient methods of calculating that vary depending on the context and the numbers involved.

#### Operations with Whole Numbers

### Addition / Subtraction

#### Kindergarten

- **1.N.9.** Demonstrate an understanding of addition of numbers with answers to 20 and their corresponding subtraction facts, concretely, pictorially, and symbolically, by:
  - using familiar and mathematical language to describe additive and subtractive actions from their experience
  - creating and solving problems in context that involve addition and subtraction
  - modelling addition and subtraction using a variety of concrete and visual representations, and recording the process symbolically.

- **1.N.10.** Describe and use mental mathematics strategies, including:
  - counting on, counting back
  - using one more, one less
  - making 10
  - starting from known doubles
  - using addition to subtract to determine the basic addition and related subtraction facts to 10.

#### Grade 1

- **2.N.8.** Demonstrate and explain the effect of adding zero to or subtracting zero from any number. (C, R)
- **2.N.9.** Demonstrate an understanding of addition (limited to 1- and 2-digit numerals) with answers to 100 and the corresponding subtraction by:
  - using personal strategies for adding and subtracting with and without the support of manipulatives
  - creating and solving problems that involve addition and subtraction
  - explaining that the order in which numbers are added does not affect the sum
  - explaining that the order in which numbers are subtracted may affect the difference.

- **2.N.10.** Apply mental mathematics strategies, including:
  - using doubles
  - making 10
  - using one more, one less
  - using two more, two less
  - building on a known double
  - using addition for subtraction to develop recall of basic addition facts to 10 and related subtraction facts.

#### Grade 2

- **3.N.6.** Describe and apply mental mathematics strategies for adding two 2-digit numerals, such as:
  - adding from left to right
  - taking one addend to the nearest multiple of ten and then compensating
  - using doubles.

- **3.N.7.** Describe and apply mental mathematics strategies for subtracting two 2-digit numerals, such as:
  - taking the subtrahend to the nearest multiple of ten and then compensating
  - thinking of addition
  - using doubles.

- **3.N.8.** Apply estimation strategies to predict sums and differences of two 2-digit numerals in a problem-solving context, using personal strategies for adding and subtracting with and without the support of manipulatives.

- **3.N.9.** Demonstrate an understanding of addition and subtraction of numbers, with answers to 1000 (limited to 1-, 2-, and 3-digit numerals) by:
  - using personal strategies for adding and subtracting with and without the support of manipulatives
  - creating and solving problems in contexts that involve addition and subtraction of numbers, concretely, pictorially, and symbolically.

- **3.N.10.** Apply mental mathematics strategies, including:
  - using doubles
  - making 10
  - using one more, one less
  - using two more, two less
  - building on a known double
  - using addition for subtraction to develop recall of basic addition facts to 10 and related subtraction facts.

#### Grade 3

- **4.N.3.** Demonstrate an understanding of addition of numbers with answers to 10 000 and their corresponding subtraction facts, including:
  - front-end rounding
  - compensation
  - compatible numbers (limited to 3- and 4-digit numerals), concretely, pictorially, and symbolically.

- **4.N.6.** Demonstrate an understanding of addition of numbers with answers to 10 000 and their corresponding subtraction facts, including:
  - front-end rounding
  - compensation
  - compatible numbers (limited to 3- and 4-digit numerals), concretely, pictorially, and symbolically.

- **5.N.2.** Apply estimation strategies, including:
  - using technology.

- **6.N.2.** Solve problems involving large numbers including:
  - using manipulatives

- **6.N.3.** Perform operations with whole numbers including:
  - using personal strategies

- **7.N.6.** Demonstrate an understanding of addition and subtraction of integers, concretely, pictorially, and symbolically.

- **9.N.4.** Explain and apply the order of operations, including:
  - using exponents, and without technology.
## Specific Learning Outcomes

### General Learning Outcome:
Develop number sense.

### Specific Learning Outcomes

<table>
<thead>
<tr>
<th>Big Ideas</th>
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3.N.11. Demonstrate an understanding of multiplication to 5 × 5 by
- representing and explaining multiplication using equal grouping and arrays
- creating and solving problems in context that involve multiplication
- modelling multiplication using concrete and visual representations, and recording the process symbolically
- relating multiplication to repeated addition
- relating multiplication to division
[C, CN, PS, R]

3.N.12. Demonstrate an understanding of division by
- representing and explaining division using equal sharing and equal grouping
- creating and solving problems in context that involve equal sharing and equal grouping
- modelling equal sharing and equal grouping using concrete and visual representations, and recording the process symbolically
- relating division to repeated subtraction
- relating division to multiplication (limited to division related to multiplication facts to 5 × 5).
[C, CN, PS, R]

4.N.4. Explain the properties of 0 and 1 for multiplication, and the property of 1 for division.
[C, CN, R]

4.N.5. Describe and apply mental mathematics strategies, such as
- skip-counting from a known fact
- using doubling, halving
- using doubling and adding one more group
- using patterns in the 9s facts
- using repeated doubling to develop an understanding of basic multiplication facts to 81 × 81 and related division facts.
[C, CN, ME, PS, R]

5.N.2. Apply estimation strategies, including
- front-end rounding
- compensation
- compatible numbers in problem-solving contexts.
[C, CN, ME, PS, R, V]

5.N.3. Apply mental math strategies to determine multiplication and related division facts to 81 (9 × 9).
[C, CN, ME, R, V]

5.N.4. Apply mental mathematics strategies for multiplication, such as
- annexing then adding zeros
- halving and doubling
- using the distributive property
[C, CN, ME, PS, R]

4.N.6. Demonstrate an understanding of multiplication (2- or 3-digit numbers by 1-digit numerals) to solve problems by
- using personal strategies for multiplication with and without concrete materials
- using arrays to represent multiplication
- connecting concrete representations to symbolic representations
- estimating products
[C, CN, ME, PS, R, V]

4.N.7. Demonstrate an understanding of division (1-digit divisor and up to 2-digit dividend) to solve problems by
- using personal strategies for dividing with and without concrete materials
- estimating quotients
- relating division to multiplication
[C, CN, ME, PS, R, V]

5.N.4. Demonstrate an understanding of multiplication (2- or 3-digit multiplicands), concretely, pictorially, and symbolically, by
- determining multiples of factors and of numbers less than 100
- identifying prime and composite numbers
- solving problems involving factors or multiples
[PS, R, V]

5.N.5. Demonstrate an understanding of multiplication (1- and 2-digit multipliers and up to 4-digit multiplicands), concretely, pictorially, and symbolically, by
- using personal strategies
- using the standard algorithm
- estimating products to solve problems.
[C, CN, ME, PS, V]

5.N.6. Demonstrate an understanding of division (1- and 2-digit divisors and up to 4-digit dividends), concretely, pictorially, and symbolically, and interpret remainders by
- using personal strategies
- using the standard algorithm
- estimating quotients to solve problems.
[C, CN, ME, PS]

5.N.9. Explain and apply the order of operations, excluding exponents (limited to whole numbers).
[C, CN, PS, T]

6.N.2. Solve problems involving large numbers, using technology.
[ME, PS, T]

7.N.1. Determine and explain why a number is divisible by 2, 3, 4, 5, 6, 8, or 10, and why a number cannot be divided by 5.
[C, R]

8.N.1. Demonstrate an understanding of perfect squares and square roots, concretely, pictorially, and symbolically (limited to whole numbers).
[C, CN, R, V]

9.N.1. Demonstrate an understanding of powers with integral bases (including base 0) and whole-number exponents by
- representing repeated multiplication using powers
- using patterns to show that a power with an exponent of zero is equal to 1
- solving problems involving powers
[C, CN, PS, R]

9.N.2. Demonstrate an understanding of operations on powers with integral bases (excluding base 0) and whole-number exponents.
[C, CN, PS, R, T]

9.N.4. Explain and apply the order of operations, including exponents, with and without technology.
[PS, T]
### General Learning Outcome:
Develop number sense.

### Specific Learning Outcomes

#### Big Ideas

- The four operations are intrinsically related.
- Flexible methods of calculation in all operations involve decomposing and composing numbers in a wide variety of ways.
- Flexible methods of calculation require a strong understanding of the operations and properties of the operations.
- There are a variety of appropriate ways to estimate sums, differences, products, and quotients, depending on the context and the numbers involved.
- Personal strategies and algorithms provide flexible and efficient methods of calculating that vary depending on the context and the numbers involved.

#### Glance Across the Grades: NUMBER

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<td>5.N.8. Demonstrate an understanding of multiplication and division of decimals (involving 1-digit whole-number multipliers, 1-digit natural number divisors, and multipliers and divisors that are multiples of 10), concretely, pictorially, and symbolically, by • using personal strategies • using the standard algorithms • using estimation • solving problems [C, CN, ME, PS, R, V]</td>
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<td>9.N.3. Demonstrate an understanding of rational numbers by • comparing and ordering rational numbers • solving problems that involve arithmetic operations on rational numbers [C, CN, PS, R, T, V]</td>
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Specific Learning Outcomes

**Big Ideas**

- Patterns can be represented in a variety of ways.
- Relationships can be described and generalized made for mathematical situations that have numbers or objects that repeat in predictable ways.
- Data can be arranged to highlight patterns and relationships.

**Kindergarten**

1. PR.1 Demonstrate an understanding of repeating patterns (two or three elements) by:
   - identifying
   - reproducing
   - extending
   - creating patterns using manipulatives, sounds, and actions.
   
2. PR.2 Translate repeating patterns from one representation to another.

**Grade 1**

1. PR.1 Demonstrate an understanding of repeating patterns (two to four elements) by:
   - identifying
   - reproducing
   - extending
   - creating patterns using manipulatives, diagrams, sounds, and actions.
   
2. PR.2 Demonstrate an understanding of increasing patterns by:
   - describing
   - reproducing
   - extending
   - creating patterns using manipulatives, diagrams, sounds, and actions.

**Grade 2**

1. PR.1 Demonstrate an understanding of increasing patterns found in tables and charts, including a multiplication chart.

2. PR.2 Reproduce a pattern shown in a table or chart using concrete materials.

3. PR.3 Represent and describe patterns and relationships using charts and tables to solve problems.

4. PR.4 Identify and explain mathematical relationships using charts and diagrams to solve problems.

**Grade 3**

1. PR.1 Identify and describe patterns found in tables and charts, including a multiplication chart.

2. PR.2 Reproduce a pattern shown in a table or chart using concrete materials.

3. PR.3 Represent and describe patterns and relationships using graphs and tables.

4. PR.4 Identify and explain mathematical relationships using charts and diagrams to solve problems.

**Grade 4**

1. PR.1 Determine the pattern rule to make predictions about subsequent elements.

2. PR.2 Represent and describe patterns and relationships using graphs and tables.

3. PR.3 Represent and describe patterns and relationships using graphs and tables.

4. PR.4 Describe patterns and relationships using graphs and tables.

**Grade 5**

1. PR.1 Demonstrate an understanding of oral and written patterns and their corresponding relations.

2. PR.2 Construct a table of values from a relation, graph the table of values, and analyze the graph to draw conclusions and solve problems.

3. PR.3 Graph and analyze two-variable linear relations.

4. PR.4 Graph linear relations, analyze the graph, and interpolate or extrapolate to solve problems.

**Grade 6**

1. PR.1 Determine the pattern rule to make predictions about subsequent elements.

2. PR.2 Represent and describe patterns and relationships using graphs and tables.

3. PR.3 Represent and describe patterns and relationships using graphs and tables.

4. PR.4 Describe patterns and relationships using graphs and tables.

**Grade 7**

1. PR.1 Demonstrate an understanding of the relationships within tables of values to solve problems.

2. PR.2 Represent and describe patterns and relationships using graphs and tables.

3. PR.3 Represent and describe patterns and relationships using graphs and tables.

4. PR.4 Describe patterns and relationships using graphs and tables.

**Grade 8**

1. PR.1 Demonstrate an understanding of the relationships within tables of values to solve problems.

2. PR.2 Represent and describe patterns and relationships using graphs and tables.

3. PR.3 Represent and describe patterns and relationships using graphs and tables.

4. PR.4 Describe patterns and relationships using graphs and tables.

**Grade 9**

1. PR.1 Generalize a pattern arising from a problem-solving context using linear equations, and verify by substitution.

2. PR.2 Graph linear relations, analyze the graph, and interpolate or extrapolate to solve problems.
General Learning Outcome: Use patterns to describe the world and solve problems.

### Specific Learning Outcomes

#### Big Ideas
- Algebra, with the use of symbols or variables, expressions, and equations, is a tool for generalizing arithmetic and representing mathematical situations and patterns in our world.
- The equal sign describes the balance that exists between the quantities on either side of the equal sign.
- Equality and inequality are used to express relationships between two quantities.
- Relationships between quantities can be described using rules involving variables.

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### Specific Learning Outcomes

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

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- **Glance Across the Grades:**
  - **PATTERNS AND RELATIONS (Variables and Equations)**

#### General Learning Outcome:

Use patterns to describe the world and solve problems.

#### Specific Learning Outcomes

**KINDERGARTEN**

- 1.PR.3. Describe equality as a balance and inequality as an imbalance, concretely and pictorially (0 to 20).
- 1.PR.4. Record equalities using the equal symbol (0 to 20).

**GRADE 1**

- 2.PR.3. Demonstrate and explain the meaning of equality and inequality by using manipulatives and diagrams (0 to 100).
- 2.PR.4. Record equalities and inequalities symbolically using the equal symbol or the not-equal symbol.

**GRADE 2**

- 3.PR.4. Record equalities and inequalities symbolically using the equal symbol or the not-equal symbol.

**GRADE 3**

- 4.PR.3. Express a problem as an equation in which a symbol is used to represent an unknown number.
- 4.PR.4. Solve one-step equations involving a symbol to represent an unknown number.

**GRADE 4**

- 5.PR.2. Solve equations with whole-number coefficients and whole-number solutions.
- 5.PR.3. Represent linear equations of the form: $ax + b = c$, concretely, pictorially, and symbolically, where $a$, $b$, and $c$ are integers.

**GRADE 5**

- 6.PR.2. Model and solve problems using linear equations of the form: $ax + b = c$, concretely, pictorially, and symbolically, where $a$, $b$, and $c$ are integers.
- 6.PR.3. Represent generalizations arising from number relationships using equations with letter coefficients, and whole-number solutions.

**GRADE 6**

- 7.PR.3. Demonstrate an understanding of preservation of equality by:
  - modeling preservation of equality, concretely, pictorially, and symbolically.
  - applying preservation of equality to solve equations.

**GRADE 7**


**GRADE 8**

- 9.PR.3. Explain and illustrate strategies to solve single-variable linear inequalities with rational number coefficients within a problem-solving context.

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**Manitoba 2016 — 11**
Glance Across the Grades: SHAPE AND SPACE (Measurement)

General Learning Outcome: Use direct or indirect measurement to solve problems.

Specific Learning Outcomes

**Big Ideas**

- It is necessary to understand the attributes of the object before anything can be measured.
- Measurement involves a selected attribute of an object (length, area, mass, volume, capacity) and a comparison of the object being measured against non-standard and standard units of the same attribute.
- The longer the unit of measure, the fewer units it takes to measure the object.
- The use of standard measurement units simplifies communication about the size of objects.

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<tr>
<td>2.SS.1 Demonstrate an understanding of measuring length (cm, m) by: selecting and justifying referents for the units cm and m; measuring and recording length, width, and height. [C, CN, ME, PS, R, V]</td>
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<td>3.SS.1 Demonstrate an understanding of measuring length (cm, m) by: selecting and justifying referents for the units cm and m; measuring and recording length, width, and height. [C, CN, ME, PS, R, V]</td>
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<td>4.SS.1 Demonstrate an understanding of measuring length (mm) by: selecting and justifying referents for the unit mm; measuring and recording length, width, and height. [C, CN, ME, PS, R, V]</td>
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<td>2.SS.2 Relate the size of a unit of measure to the number of units (limited to non-standard units) used to measure length and mass (weight). [C, CN, ME, R, V]</td>
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<td>3.SS.3 Relate the size of a unit of measure to the number of units (limited to non-standard units) used to measure length and mass (weight). [C, CN, ME, R, V]</td>
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<td>4.SS.3 Relate the size of a unit of measure to the number of units (limited to non-standard units) used to measure length and mass (weight). [C, CN, ME, R, V]</td>
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<td>5.SS.3 Demonstrate that different objects may have the same attributes. [C, R, V]</td>
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**SHAPE AND SPACE (Measurement)**

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General Learning Outcome: **Use direct or indirect measurement to solve problems.**

Specific Learning Outcomes

### Big Ideas

- **K**
  - It is necessary to understand the attributes of the object before anything can be measured.
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### Glance Across the Grades: SHAPE AND SPACE (Measurement)

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<tr>
<th>Big Ideas</th>
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[Communication (C)] [Connections (CN)] [Mental Mathematics and Estimation (ME)] [Problem Solving (PS)] [Reasoning (R)] [Technology (T)] [Visualization (V)]
## General Learning Outcome:
Use direct or indirect measurement to solve problems.

## Specific Learning Outcomes

### Big Ideas

- It is necessary to understand the attributes of the object before anything can be measured.
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### Grade 9

5.SS.3. Demonstrate an understanding of volume by
- describing the relationship between mL and L
- selecting and justifying referents for the units mL or L
- estimating capacity by using referents for mL or L
- measuring and recording capacity (mL or L)
[C, CN, ME, PS, R, V]

6.SS.4. Develop and apply formulas for determining the volume of right prisms and right cylinders. [C, CN, PS, R, V]

### Grade 8

5.SS.3. Demonstrate an understanding of volume by
- selecting and justifying referents for the units cm³ or m³
- estimating volume by using referents for cm³ or m³
- measuring and recording volume (cm³ or m³)
- constructing rectangular prisms for a given volume
[C, CN, ME, PS, R, V]

5.SS.4. Demonstrate an understanding of capacity by
- describing the relationship between mL and L
- selecting and justifying referents for the units mL or L
- estimating capacity by using referents for mL or L
- measuring and recording capacity (mL or L)
[C, CN, ME, PS, R, V]

### Grade 6

6.SS.3. Demonstrate an understanding of volume by
- selecting and justifying referents for the units cm³ or m³
- estimating volume by using referents for cm³ or m³
- measuring and recording volume (cm³ or m³)
- constructing rectangular prisms for a given volume
[C, CN, ME, PS, R, V]

5.SS.4. Demonstrate an understanding of capacity by
- selecting and justifying referents for the units mL or L
- estimating capacity by using referents for mL or L
- measuring and recording capacity (mL or L)
[C, CN, ME, PS, R, V]

### Grade 5

5.SS.3. Demonstrate an understanding of volume by
- selecting and justifying referents for the units cm³ or m³
- estimating volume by using referents for cm³ or m³
- measuring and recording volume (cm³ or m³)
- constructing rectangular prisms for a given volume
[C, CN, ME, PS, R, V]

5.SS.4. Demonstrate an understanding of capacity by
- selecting and justifying referents for the units mL or L
- estimating capacity by using referents for mL or L
- measuring and recording capacity (mL or L)
[C, CN, ME, PS, R, V]

### Grade 4

2.SS.5. Demonstrate that changing the orientation of an object does not alter the measurements of its attributes.
[C, R, V]

K.SS.1. Use direct comparison to compare two objects based on a single attribute, such as length, height, mass, weight, and volume (capacity).
[C, CN, PS, R, V]

### Grade 3

K.SS.1. Use direct comparison to compare two objects based on a single attribute, such as length (height), mass (weight), and volume (capacity).
[C, CN, PS, R, V]

### Grade 2

1.SS.1. Demonstrate an understanding of measurement as a process of comparing by
- identifying attributes that can be compared
- ordering objects
- making statements of comparison
- filling, covering, or matching
[C, CN, PS, R, V]

### Grade 1

K.SS.1. Use direct comparison to compare two objects based on a single attribute, such as length (height), mass (weight), and volume (capacity).
[C, CN, PS, R, V]

### KINDERGARTEN

K.SS.1. Use direct comparison to compare two objects based on a single attribute, such as length (height), mass (weight), and volume (capacity).
[C, CN, PS, R, V]
### Glance Across the Grades: SHAPE AND SPACE (Measurement)

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<td>2.SS.2. Relate the size of a unit of measure to the number of units (limited to non-standard units) used to measure length and mass (weight). [C, CN, ME, R, V]</td>
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<td>3</td>
<td>2.SS.3. Compare and order objects by length, height, distance around, and mass (weight) using non-standard units, and make statements of comparison. [C, CN, ME, R, V]</td>
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<td>4</td>
<td>2.SS.4. Demonstrate that changing the orientation of an object does not alter the measurements of its attributes. [C, R, V]</td>
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<td>5</td>
<td>3.SS.1. Demonstrate an understanding of measuring mass (g, kg) by selecting and justifying referents for the units g and kg.</td>
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<td>6</td>
<td>3.SS.2. Model and describe the relationship between the units g and kg.</td>
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<td>3.SS.3. Estimate mass using referents.</td>
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<td>3.SS.4. Measure and record mass. [C, CN, ME, PS, R, V]</td>
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[Manitoba 2016 — 15]
General Learning Outcome: **Use direct or indirect measurement to solve problems.**

### Specific Learning Outcomes

#### Big Ideas

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

**Glance Across the Grades: SHAPE AND SPACE (Measurement)**
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**Specific Learning Outcomes**

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#### Angles

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</table>
| 6.SS.1. | Demonstrate an understanding of angles by:  
- identifying examples of angles in the environment  
- classifying angles according to their measure  
- estimating the measure of angles using 45°, 90°, and 180° as reference angles  
- determining angle measures in degrees  
- drawing and labeling angles when the measure is specified | | | | | | | | | | |
| 6.SS.2. | Demonstrate that the sum of interior angles is:  
- 180° in a triangle  
- 360° in a quadrilateral | | | | | | | | | | |
| 7.SS.1. | Demonstrate an understanding of circles by:  
- describing the relationships among radius, diameter, and circumference of circles  
- relating circumference to pi (π)  
- determining the sum of the central angles  
- constructing circles with a given radius or diameter  
- solving problems involving the radii, diameters, and circumferences of circles | | | | | | | | | | |
| 9.SS.1. | Solve problems and justify the solution strategy using circle properties, including:  
- the perpendicular from the centre of a circle to a chord bisects the chord  
- the measure of the central angle is equal to twice the measure of the inscribed angle subtended by the same arc  
- the inscribed angles subtended by the same arc are congruent  
- a tangent to a circle is perpendicular to the radius at the point of tangency | | | | | | | | | | |
| 9.SS.3. | Demonstrate an understanding of similarity of polygons. | | | | | | | | | | |
General Learning Outcome: Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.

Specific Learning Outcomes

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Glance Across the Grades: **SHAPE AND SPACE (Transformations)**

**General Learning Outcome:** Describe and analyze position and motion of objects and shapes.

**Specific Learning Outcomes**

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<tr>
<th>Grade</th>
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<tr>
<td>1.K1</td>
<td>Shapes can be relocated and reoriented using mathematical procedures.</td>
<td>4.SS.6. Demonstrate an understanding of line symmetry by ➤ identifying symmetrical 2-D shapes ➤ creating symmetrical 2-D shapes ➤ drawing one or more lines of symmetry in a 2-D shape [C, CN, V]</td>
</tr>
<tr>
<td>1.1</td>
<td>Shapes can be described in terms of their location in a plane or in a space.</td>
<td>4.SS.7. Perform a single transformation (translation, rotation, or reflection) of a 2-D shape, and draw and describe the image. [C, CN, T, V]</td>
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<tr>
<td>1.2</td>
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<td>5.SS.6. Perform a combination of transformations (translations, rotations, or reflections) on a single 2-D shape, and draw and describe the image. [C, CN, T, V]</td>
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<td>5.SS.7. Identify a single transformation (translation, rotation, or reflection) of 2-D shapes [C, T, V]</td>
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<td>6.SS.6. Perform a combination of transformations of 2-D shapes to create a design, and identify and describe the transformations. [C, CN, T, V]</td>
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<td>6.SS.7. Perform a combination of successive transformations of 2-D shapes to create a design, and identify and describe the transformations. [C, CN, T, V]</td>
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<td>1.6</td>
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<td>6.SS.8. Identify and plot points in the first quadrant of a Cartesian plane using whole-number ordered pairs. [C, CN, V]</td>
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<td>1.7</td>
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<td>6.SS.9. Perform and describe single transformations of a 2-D shape in the first quadrant of a Cartesian plane (limited to whole-number vertices). [C, CN, PS, T, V]</td>
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<td>7.SS.4. Identify and plot points in the four quadrants of a Cartesian plane using ordered pairs. [C, CN, V]</td>
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<td>7.SS.5. Perform and describe transformations of a 2-D shape in all four quadrants of a Cartesian plane (limited to integral vertices). [C, CN, PS, T, V]</td>
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<td>8.SS.6. Demonstrate an understanding of tessellation by ➤ explaining the properties of shapes that make tessellating possible ➤ creating tessellations ➤ identifying tessellations in the environment [C, CN, PS, V]</td>
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<td>1.11</td>
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<td>9.SS.4. Draw and interpret scale diagrams of 2-D shapes. [C, R, T, V]</td>
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<td>9.SS.5. Demonstrate an understanding of line and rotation symmetry. [C, CN, PS, V]</td>
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**Position and Motion**

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Manitoba 2016 — 19
## General Learning Outcome:
Collect, display, and analyze data to solve problems.

## Specific Learning Outcomes

### Big Ideas

- Data is gathered and organized in order to answer questions.
- The question that needs to be answered determines the data that will be collected.
- The type of data determines the best way to organize and represent it.
- Visual displays quickly reveal information about data.
- Information from data representations is used to make references, to interpret, to draw conclusions, and to make predictions.

<table>
<thead>
<tr>
<th>Big Ideas</th>
<th>KINDERGARTEN</th>
<th>GRADE 1</th>
<th>GRADE 2</th>
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### Glance Across the Grades: STATISTICS AND PROBABILITY (Data Analysis)

**Manitoba 2016 — 20**
## General Learning Outcome

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

## Specific Learning Outcomes

### Big Ideas

- Probability involves the use of mathematics to describe the level of certainty that an event will occur.
- Probabilities, both theoretical and experimental, can be determined in different ways.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Kindergarten</th>
<th>Grade 1</th>
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<th>Grade 3</th>
<th>Grade 4</th>
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</table>
| **5.SP.3.** Describe the likelihood of a single outcome occurring, using words such as:  
  - impossible  
  - possible  
  - certain  
  [C, CN, PS, R] |
| **5.SP.4.** Compare the likelihood of two possible outcomes occurring, using words such as:  
  - less likely  
  - equally likely  
  - more likely  
  [C, CN, PS, R] |
| **6.SP.4.** Demonstrate an understanding of probability by:  
  - identifying all possible outcomes of a probability experiment  
  - differentiating between experimental and theoretical probability  
  - determining the theoretical probability of outcomes in a probability experiment  
  - determining the experimental probability of outcomes in a probability experiment  
  - comparing experimental results with the theoretical probability for an experiment  
  [C, ME, PS, T] |
| **7.SP.4.** Express probabilities as ratios, fractions, and percents.  
  [C, CN, R, T, V] |
| **7.SP.5.** Identify the sample space (where the combined sample space has 36 or fewer elements) for a probability experiment involving two independent events.  
  [C, ME, PS] |
| **7.SP.6.** Conduct a probability experiment to compare the theoretical probability (determined using a tree diagram, table, or another graphic organizer) and experimental probability of two independent events.  
  [C, PS, R, T] |
| **8.SP.2.** Solve problems involving the probability of independent events.  
  [C, CN, PS, T] |
| **9.SP.4.** Demonstrate an understanding of the role of probability in society.  
  [C, CN, R, T] |
Bibliography


