

LAL Numeracy: Progression of Mathematics Learning

Pages 19–28 provide an overview of the learning outcomes for all four LAL numeracy courses organized by strand and big ideas. Consolidation of the learning outcomes is not prioritizing some outcomes as more important than others; it is grouping outcomes to help move student learning forward through conceptual understanding of mathematics.

NUMBER STRAND							
Processes and language development — Interwoven through each lesson and topic:							
	Communication	Connections	Visualization	Reasoning	Mental math and estimation	Problem solving	Technology
	Oral and academic language supports						
	1A	1B	2A	2B			
Learning Target: Counting							
Big Ideas	<ul style="list-style-type: none"> ■ <i>Counting tells how many or how much.</i> ■ <i>Numbers are related to each other through a variety of number relationships.</i> ■ <i>Quantities can be estimated by using referents.</i> 						
Consolidation of Learning Outcomes	<ul style="list-style-type: none"> ■ Counting <ul style="list-style-type: none"> ■ Counting sequence ■ One-to-one correspondence ■ Cardinality ■ Conservation ■ Estimating 						

NUMBER STRAND (CONTINUED)

	1A	1B	2A	2B
Learning Target: Representation of Whole and Rational Numbers				
Big Ideas <ul style="list-style-type: none"> ■ 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. 				
Consolidation of Learning Outcomes				
<ul style="list-style-type: none"> ■ Number relationships <ul style="list-style-type: none"> ■ Spatial relationships ■ Using a number line ■ Benchmark of numbers ■ Parts—whole <ul style="list-style-type: none"> ■ Composing and decomposing numbers ■ Place value ■ Ratios and relationships 	<ul style="list-style-type: none"> ■ Represent whole numbers by comparing and ordering numbers to a billion. ■ Demonstrate an understanding of even and odd numbers. ■ Illustrate place value up to thousands values. 	<ul style="list-style-type: none"> ■ Represent integers concretely, pictorially, and symbolically. ■ Describe and represent decimals (tenths, hundredths, thousandths) concretely, pictorially, and symbolically. ■ Relate decimals to fractions (tenths, hundredths, thousandths). ■ Relate improper fractions to mixed numbers. ■ Create sets of equivalent fractions with like and unlike denominators. ■ Demonstrate an understanding of place value to ten-thousandths. ■ Demonstrate an understanding of ratios and percent with relation to whole numbers. 	<ul style="list-style-type: none"> ■ Demonstrate an understanding of repeating decimals and their relationships to fractions. ■ Compare and order decimals (to thousandths), fractions, and integers using benchmarks, place values, and/or equivalent fractions and/or decimals. ■ Demonstrate—concretely, pictorially, and symbolically—an understanding of adding and subtracting positive fractions and mixed numbers with like and unlike denominators. 	<ul style="list-style-type: none"> ■ Demonstrate an understanding of ratios and relationships. ■ Demonstrate—concretely, pictorially, and symbolically—an understanding of perfect squares and square roots. ■ Determine the approximate square root of numbers that are not perfect squares. ■ Demonstrate an understanding of percent greater than or equal to zero.

NUMBER STRAND (CONTINUED)

1A

1B

2A

2B

Learning Target: Operations with Whole and Rational Numbers

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.*

Consolidation of Learning Outcomes

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| <ul style="list-style-type: none"> ■ Developing the meanings of the four operations <ul style="list-style-type: none"> ■ Addition and subtraction ■ Multiplication and division <ul style="list-style-type: none"> — Factors and multiples — Squares and square roots ■ Order of operations ■ Problem solving | <ul style="list-style-type: none"> ■ Add and subtract up to 3-digit numbers with answers less than 10,000, estimating sums and differences. ■ Multiply whole numbers (up to 3 digits each) and divide whole numbers (up to 2 digits), estimating products and quotients. ■ Explain how equal groupings relate multiplication and division to repeated addition or repeated subtraction. ■ Explain and apply order of operations (excluding exponents and limited to whole numbers). ■ Represent rational numbers (e.g., numerator and denominator, part of a whole); compare fractions with like denominators. ■ Compare and order fractions less than or equal to one. | <ul style="list-style-type: none"> ■ Derive factors and multiples for numbers less than 100, identifying prime and composite numbers. ■ Add and subtract decimals to thousandths, concretely, pictorially, and symbolically. ■ Multiply and divide decimals to thousandths, concretely, pictorially, and symbolically. ■ Solve problems involving factors and multiples. | <ul style="list-style-type: none"> ■ Demonstrate—concretely, pictorially, and symbolically—an understanding of addition, subtraction, multiplication, and division of integers. ■ Demonstrate an understanding of the addition, subtraction, multiplication, and division of decimals to solve problems (for more than 1-digit divisors or 2-digit multipliers). ■ Solve problems involving percent from 1% to 100%. | <ul style="list-style-type: none"> ■ Solve problems that involve rates, ratios, and proportional reasoning. ■ Demonstrate—concretely, pictorially, or symbolically—an understanding of multiplying and dividing positive fractions and mixed numbers. ■ Solve problems using positive rational numbers. |
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PATTERNS AND RELATIONS STRAND

Processes and language development — Interwoven through each lesson and topic:

Communication Connections Visualization Reasoning Mental math and estimation Problem solving Technology
Oral and academic language supports

1A

1B

2A

2B

Learning Target: Patterning and Algebraic Thinking

Big Ideas

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

Consolidation of Learning Outcomes

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| <ul style="list-style-type: none"> ■ Recognize, compare, and analyze pattern rules. ■ Represent relations with tables of values, graphs, and equations. | <ul style="list-style-type: none"> ■ Represent repeating patterns. ■ Identify and describe patterns found in tables and charts (including a multiplication chart). ■ Determine a pattern rule to make predictions about subsequent elements. | <ul style="list-style-type: none"> ■ Use a table of values to solve problems. ■ Represent and describe patterns and relationships using graphs and tables. | <ul style="list-style-type: none"> ■ Demonstrate an understanding of oral and written patterns and their corresponding relations. ■ Construct a table of values from a relation, graph the table of values, and analyze the graph to draw conclusions and solve problems. | <ul style="list-style-type: none"> ■ Graph and analyze two-variable linear equations. |
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PATTERNS AND RELATIONS STRAND (CONTINUED)

	1A	1B	2A	2B
Learning Target: Algebraic Representation with Equations				
Big Ideas				
<ul style="list-style-type: none"> ■ <i>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.</i> ■ <i>The equals sign describes the balance that exists between the two quantities on either side of it.</i> ■ <i>Equality and inequality are used to express relationships between two quantities.</i> ■ <i>Relationships between quantities can be described using rules involving variables.</i> 				
Consolidation of Learning Outcomes				
<ul style="list-style-type: none"> ■ Understand equality and inequality. ■ Model and solve equations. ■ Explain the difference between an expression and an equation. 		<ul style="list-style-type: none"> ■ Use equality and inequality to express relationships between two quantities. ■ Describe relationships between quantities using rules involving variables. ■ Express problems as an equation where a symbol is used to represent an unknown number. ■ Solve one-step equations involving a symbol to represent an unknown number. ■ Demonstrate and explain—concretely, pictorially, and symbolically—the importance of preserving equality. 	<ul style="list-style-type: none"> ■ Explain the difference between an expression and an equation. ■ Evaluate an expression given the value of the variable(s). ■ Demonstrate an understanding of preservation of equality by <ul style="list-style-type: none"> ■ modelling preservation of equality concretely, pictorially, and symbolically ■ applying preservation of equality to solve equations ■ Model and solve problems that can be represented by <ul style="list-style-type: none"> ■ one-step equations of the form $x + a = b$ ■ linear equations of the form: <ul style="list-style-type: none"> — $ax + b = c$ — $ax = b$ — $\frac{x}{a} = b, a \neq 0$ 	<ul style="list-style-type: none"> ■ Model and solve problems using linear equations of the form: <ul style="list-style-type: none"> ■ $ax = b$ ■ $ax + b = c$ ■ $\frac{x}{a} = b, a \neq 0$ ■ $\frac{x}{a} + b = c, a \neq 0$ ■ $a(x + b) = c$ concretely, pictorially, or symbolically.

SHAPE AND SPACE STRAND

Processes and language development — Interwoven through each lesson and topic:

Communication Connections Visualization Reasoning Mental math and estimation Problem solving Technology
Oral and academic language supports

1A

1B

2A

2B

Learning Target: Measurement

Big Ideas

- *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.*

Consolidation of Learning Outcomes

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| <ul style="list-style-type: none"> ■ Compare measurable attributes directly. ■ Estimate and use physical models for length, mass, area, volume, and capacity. ■ Estimate and measure with standard units for length, mass, area, volume, and capacity. ■ Develop measurement formulas. ■ Develop concepts of time and reading clocks. ■ Estimate and measure angles. | <ul style="list-style-type: none"> ■ Measure attributes such as length, mass, and volume; calculate perimeter and area of regular and irregular shapes; describe an object by its mass; describe the passage of time; and read and record events related to time. ■ Demonstrate an understanding of volume by <ul style="list-style-type: none"> ■ justifying referents for the units cm^3 and m^3 ■ estimating volume by using referents for the units cm^3 and m^3 ■ measuring and recording volume ■ Describe and provide examples of lines that are parallel, intersecting, perpendicular, vertical, and horizontal. | <ul style="list-style-type: none"> ■ Design and construct different rectangles given either the perimeter or area or both (whole numbers). ■ Develop and apply a formula for determining <ul style="list-style-type: none"> ■ the perimeter of polygons ■ area of a rectangle ■ volume of right rectangular prisms ■ Represent capacity by <ul style="list-style-type: none"> ■ describing the relationship between mL and L ■ justifying referents for the units mL and L ■ estimating capacity by using referents mL and L ■ measuring and recording capacity mL and L ■ Identify and classify angles according to their measure. | <ul style="list-style-type: none"> ■ Demonstrate an understanding of circles by <ul style="list-style-type: none"> ■ describing the relationships among radius, diameter, and circumference of circles ■ relating circumference to pi (π) ■ determining the sum of central angles ■ constructing circles with a given radius or diameter ■ solving problems involving radii, diameter, and circumference of a circle ■ Develop and apply formulas for determining areas of <ul style="list-style-type: none"> ■ triangles ■ parallelograms ■ circles | <ul style="list-style-type: none"> ■ Develop and apply the Pythagorean theorem to solve problems. ■ Describe the surface areas of <ul style="list-style-type: none"> ■ right rectangular prisms ■ right triangular prisms ■ right cylinders to solve problems. ■ Develop and apply formulas for determining the volume of right prisms and right cylinders. |
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SHAPE AND SPACE STRAND (CONTINUED)

	1A	1B	2A	2B
Learning Target: 3-D Objects and 2-D Shapes Big Ideas <ul style="list-style-type: none"> ■ <i>Identifying, Sorting, Comparing, and Constructing</i> <ul style="list-style-type: none"> ■ <i>Two- and three-dimensional objects can be described, classified, and analyzed by their attributes.</i> 				
Consolidation of Learning Outcomes <ul style="list-style-type: none"> ■ Compare and sort 2-D and 3-D shapes based on different attributes. ■ Compose and decompose shapes. ■ Construct and classify lines and 2-D and 3-D shapes. 	<ul style="list-style-type: none"> ■ Name the characteristics of a given two-dimensional shape (e.g., triangle, quadrilateral, square, rectangle, pentagon, hexagon, and circle). ■ Describe, sort, classify, and analyze 2-D shapes (e.g., rectangles, squares, and trapezoids, parallelograms, rhombuses) and 3-D objects (e.g., rectangular and triangular prisms, and spheres). 	<ul style="list-style-type: none"> ■ Describe and compare sides and angles of regular triangles. ■ Construct and compare triangles in different orientations, including scalene, isosceles, right, equilateral, obtuse, and acute. ■ Represent that the sum of interior angles is <ul style="list-style-type: none"> ■ 180° in a triangle ■ 360° in a quadrilateral 		
Learning Target: Transformations Big Ideas: <ul style="list-style-type: none"> ■ <i>Position and Motion</i> <ul style="list-style-type: none"> ■ <i>Shapes can be relocated and reoriented using mathematical procedures.</i> ■ <i>Shapes can be described in terms of their location in a plane or in a space.</i> 				
Consolidation of Learning Outcomes <ul style="list-style-type: none"> ■ Perform transformations (e.g., translation, rotation, and reflection). ■ Use a Cartesian plane to locate and transform 2-D shapes. 		<ul style="list-style-type: none"> ■ Identify, describe, and perform a symmetry, a single transformation, and a combination of successive transformations (e.g., translation, rotation, or reflection) on a 2-D shape. 	<ul style="list-style-type: none"> ■ Identify and plot points in the first quadrant of a Cartesian coordinate plane, using whole number ordered pairs. ■ Identify and plot points in the four quadrants of a Cartesian coordinate plane using ordered pairs. ■ Perform transformations of 2-D shapes (i.e., translations, rotations, and reflections) in all four quadrants of a Cartesian coordinate plane, limited to integral vertices. 	<ul style="list-style-type: none"> ■ Demonstrate an understanding of shapes that make tessellations possible; create tessellations; identify tessellations in the environment.

STATISTICS AND PROBABILITY STRAND

Processes and language development — Interwoven through each lesson and topic:

Communication Connections Visualization Reasoning Mental math and estimation Problem solving Technology
Oral and academic language supports

1A

1B

2A

2B

Learning Target: Collection, Organization, and Analysis of Data

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.

Consolidation of Learning Outcomes

- Question, collect, organize, and analyze data.
- Represent data graphically.
- Calculate measures of central tendency.

- Represent, organize, and construct charts and bar and line graphs of data collected or provided.
- Select, justify, and use appropriate methods of collecting data, including questionnaires, experiments, databases, etc.
- Differentiate between first-hand and second-hand data.
- Graph collected data and analyze the graph to solve problems.

- Describe the likelihood of a single outcome occurring using words such as *impossible*, *possible*, and *certain*.
- Describe the likelihood of a “two” outcome occurring, using words such as *less likely*, *equally likely*, and *more likely*.
- Demonstrate an understanding of the probability of an event.
- Identify all possible outcomes of a probability in an experiment.
- Differentiate between and determine experimental and theoretical probabilities.
- Compare results of theoretical and experimental probabilities for an experiment.

- Construct, label, and interpret a circle graph to solve problems.
- Demonstrate an understanding of central tendency and range by
 - determining the central tendencies and the range
 - determining the most appropriate measure of central tendency to report findings

- Critique ways in which data is presented; describe the effect of bias.

STATISTICS AND PROBABILITY STRAND (CONTINUED)

	1A	1B	2A	2B
Learning Target: Probability				
Big Ideas				
<ul style="list-style-type: none"> ■ <i>Probability involves the use of mathematics to describe the level of certainty that an event will occur.</i> ■ <i>Probabilities, both theoretical and experimental, can be determined in different ways.</i> 				
Consolidation of Learning Outcomes				
<ul style="list-style-type: none"> ■ Use vocabulary of probability for everyday events. ■ Determine experimental and theoretical probability of independent events. 			<ul style="list-style-type: none"> ■ Express probabilities as ratios, fractions, and percentages. 	<ul style="list-style-type: none"> ■ Identify a sample space (36 or fewer elements) for a probability experiment involving two independent events. ■ Calculate theoretical probability (using a tree diagram, table, or another graphic organizer) of two independent events. ■ Conduct a probability experiment to compare the theoretical probability and an experimental probability of two independent variables. ■ Solve problems involving the probability of events. ■ Describe the role probability plays in society.

FINANCIAL LITERACY STRAND

Processes and language development — Interwoven through each lesson and topic:

Communication Connections Visualization Reasoning Mental math and estimation Problem solving Technology
Oral and academic language supports

1A

1B

2A

2B

Teachers can infuse these financial literacy topics throughout each half course or explicitly teach the concepts. Some resources that may be of help are [Financial Literacy Resource](#) by Manitoba Education and Training, *Financial ESL Literacy Toolkit* (https://globalaccess.bowvalleycollege.ca/sites/default/files/financial_ESL_literacy_toolkit_0.pdf) from Bow Valley, *Dollars & Sense: Financial Literacy Course, Curriculum Manual* (www.famlit.ca/resources/Dollars_&_Sense2012.pdf) by Centre for Family Literacy, and/or *Money and Youth: A Guide to Financial Literacy* (<https://www.kobo.com/ca/en/ebook/money-and-youth>) by Canadian Foundation for Economic Education (2012). Teachers may also use other resources that may be available.

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| <ul style="list-style-type: none"> ■ Money ■ Shopping <ul style="list-style-type: none"> ■ Groceries ■ Etc. ■ Household expenses | <ul style="list-style-type: none"> ■ Spending <ul style="list-style-type: none"> ■ Sales tax ■ Receipts ■ Income <ul style="list-style-type: none"> ■ Deductions ■ Take-home pay | <ul style="list-style-type: none"> ■ Banking <ul style="list-style-type: none"> ■ Chequing account ■ Savings account ■ RRSP ■ Budgeting | <ul style="list-style-type: none"> ■ Credit <ul style="list-style-type: none"> ■ Loans ■ Credit cards ■ Fraud |
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