Senior Years
Literacy, Academics, and Language (LAL)
Transitional Numeracy Courses

Phase 2A—Half-Course Credit

LAL Numeracy Phase 2A: **Number: Repeating Decimals**

Big Ideas: There are different but equivalent representations of numbers; our number system is based on patterns; benchmark numbers are useful for comparing and estimating numbers.

	Numeracy	Language

Outcomes
7N4, 7N7
	■ Demonstrate an understanding of repeating decimals and their relationships to fractions.
	■ Compare and order fractions, decimals, and integers by using
	  ■ benchmarks
	  ■ place value
	  ■ equivalent fractions and/or decimals
		■ Know and use with some consistency a range of simple grammatical features required for everyday classroom and foundational academic subject-area learning.
		■ Use visuals, realia, and/or their first language to add a developing range of new knowledge, concepts, and skills to complete simple structured mathematical tasks.
		■ Demonstrate the foundational and essential knowledge, skills, and attitudes related to the outcomes.
		■ Complete, with guidance and modelling, a range of academic tasks related to the outcomes.
		■ Use a variety of simple cognitive and metacognitive strategies with guidance to enhance learning.

Connections to Prior Learning	■ Compare and order terminating decimals (tenths, hundredths, thousandths) and equivalent fractions. ■ Demonstrate an understanding of place value in terms of decimal numbers.	Use cognitive and interpersonal strategies to do the following: ■ Convert decimals to fractions and fractions to decimals. ■ Explain why a decimal is repeating and how they relate to their equivalent fractions. ■ Order fractions, decimals, and integers.
	Instructional Strategies: ■ Use manipulatives to represent and explore parts of a whole. Record the parts as a decimal and its related fraction. ■ Change a set of fractions to decimals. Sort in numerical order. ■ Lead a class demonstration and discussion about representing a fraction quantity using base-10 blocks. Use a "flat" to represent a candy bar to be shared among various numbers of people. Sharing between 2 people—each person receives 5 tenths ("longs") or $\frac{1}{2}$ the candy bar. In the base-10 number system, the share is represented by 0.5 of the whole candy bar. Sharing between 3 people—each person receives 3 tenths ("longs") and they need to further divide the extra tenth among the 3 people. The extra tenth ("long") can be further divided using unit blocks. Each person will receive 3 more hundredths ("units"), further divide the extra hundredth ("unit") among the 3 people. This process needs to be repeated indefinitely. In the base-10 number system this share is represented by $0.3 + 0.03 + \ldots = 0.33333\ldots$. ■ Repeat this process sharing the candy bar represented by a "flat" with 4, 5, 6, 7, 8, 9, and 10 people. Determine which fractions result in a repeating decimal and which fractions result in a terminating decimal. See Grade 7 Support Document (pp. 72–74) (https://www.edu.gov.mb.ca/k12/cur/math/support_gr7/index.html)	**Assessment Criteria:** ■ Match a set of fractions to their decimal representations. ■ Sort a set of fractions as repeating or terminating decimals. ■ Express a fraction as a terminating or repeating decimal. ■ Express a repeating decimal as a fraction. ■ Express a terminating decimal as a fraction. ■ Order the numbers of a set that includes fractions, decimals, or integers in ascending or descending order, and verify the result using a variety of strategies. ■ Identify a number that would be between two numbers in an ordered sequence or on a horizontal or vertical number line. ■ Identify incorrectly placed numbers in an ordered sequence or on a horizontal or vertical number line. ■ Position fractions with like and unlike denominators from a set on a horizontal or vertical number line, and explain strategies used to determine order. ■ Order the numbers of a set by placing them on a horizontal or vertical number line that contains benchmarks, such as 0 and 1 or 0 and 5. ■ Position a set of fractions, including mixed numbers and improper fractions, on a horizontal or vertical number line, and explain strategies used to determine order.

Connections to Prior Learning

Instructional Strategies: *(continued)*

- Show students how to use a calculator to convert a fraction into a decimal, and record using the appropriate notation to indicate if the decimal is terminating or repeating. (Note: Students cannot rely on the calculator to verify whether a fraction is represented as a terminating or repeating decimal—e.g., $\frac{1}{7}$ = 0.14285714, which is a repeating decimal.)
- Order decimal and fractions on a number line (e.g., use a clothesline with fraction/decimal cards as a physical number line).

Learning Experiences

Language Foundation:

- Use age-appropriate examples and resources.
- Describe how to order fractions.
- Discuss how to identify a repeating decimal.
- Describe the repeating decimals, terminating decimals, and fractions.
- Discuss how to order decimal numbers by comparing decimal places.

Key Vocabulary:

- Decimal equivalent
- Decimal number
- Denominator
- Fraction
- Multiple
- Numerator
- Repeating decimal
- Terminating decimal
- Ascending
- Denominators
  - like and unlike
- Descending
- Equivalent fractions
- Horizontal
- Improper fractions
- Mixed numbers
- Proper fractions
- Unlike denominators
- Verify
- Vertical
- Tenths, hundredths, thousandths

Sentence Frames:

- _____ is greater than/less than _____.
- _____ is a terminating/repeating decimal because _____.
- _____ is between _____ and _____.

Learning Supports:

- Counters
- Number lines (vertical and horizontal)
- Base-10 blocks
- Calculators
- *National Library of Virtual Manipulatives* (http://nlvm.usu.edu/en/nav/category_g_2_t_1.html)
- Cuisinaire rods

Mental Math:

- Apply mental mathematics strategies for multiplication and division, such as
  - annexing, then adding zeros
  - halving and doubling using the distributive property
  - multiples of 10

Problem Solving:

- Organize a collection of library books according to the decimal numbers on the spine.
- Give two decimal numbers (i.e., 4.56, 4.55) and have the students find a number between them.
- Determine how to evenly divide $20 among
  a) two people
  b) three people
  c) five people
  d) six people
  e) ten people

LAL Numeracy Phase 2A: **Number: Operations with Integer Numbers**

Big Ideas: When a mathematics question is composed of more than one operation, the solution depends on the order in which the operations are done. It is important to follow a standardized order of operations so that everyone solving the identical problem will obtain the same answer.

	Numeracy	Language
Outcomes **7N6, 8N7**	■ Demonstrate—concretely, pictorially, and symbolically—an understanding of addition, subtraction, multiplication, and division of integers. ■ Explain generalization about integers (e.g., the Zero Principle—the sum of opposite integers is equal to zero).	■ Know and use with some consistency a range of simple grammatical features required of everyday classroom and foundational academic subject-area learning. ■ Use visuals, realia, and/or their first language to add a developing range of new knowledge, concepts, and skills to complete simple structured mathematical tasks. ■ Demonstrate the foundational and essential knowledge, skills, and attitudes related to the outcomes. ■ Complete, with guidance and modelling, a range of mathematical tasks related to the outcomes. ■ Use a variety of simple cognitive and metacognitive strategies, with guidance, to enhance learning.

Connections to Prior Learning	■ Represent integer operations with models
	  ■ coloured counters
	  ■ horizontal and vertical number lines
	  ■ algebra tiles
	■ Demonstrate—concretely, pictorially, and symbolically—an understanding of operations with whole numbers.
	■ Explain the properties of
	  ■ 0 and 1 for multiplication
	  ■ 1 for division
		Recognize and connect concepts and skills to do the following:
		■ Write solutions to addition, subtraction, multiplication, and division of integers using symbols and an equals sign.
		■ Demonstrate the result when zero is added or taken away from a number.
		■ Derive and explain an estimate of an integer computation.

	Instructional Strategies: ■ Use concrete materials to explore the sum of opposite integers. ■ Using a horizontal or vertical number line, show the results of adding or subtracting negative and positive integers (e.g., a move in one direction followed by an equivalent move in the opposite direction results in no net change in position). ■ Use total physical response (TPR) and manipulatives to determine a pattern and rule for adding and subtracting two integers. Record symbolically. ■ Apply the rule/algorithm for adding and subtracting integers in problem-solving situations. ■ Model the process of multiplying two integers using concrete materials. ■ Generalize and apply a rule for determining the sign of the product or quotient of integers. ■ Model the process of dividing an integer by an integer using concrete materials or pictorial representations, and record the process.	**Assessment Criteria:** ■ Illustrate, using a horizontal or vertical number line, the results of adding or subtracting negative and positive integers. ■ Add, subtract, multiply, or divide two integers using concrete materials or pictorial representations, and record the process symbolically. ■ Identify the operation(s) required to solve a problem involving integers. ■ Solve a problem involving integers, taking into consideration order of operations.

LAL Numeracy Phase 2A: **Number: Operations with Integer Numbers** *(continued)*

Learning Experiences

Language Foundation:

- Use age-appropriate examples and resources.
- Describe the process of ordering integers on a horizontal or vertical number line (e.g., negative is left or down, positive is right or up).
- Discuss examples of opposites, multiplying by 0 and 1, and dividing by 1

Key Vocabulary:

- Integer
- Negative integer
- Opposite integer
- Positive integer
- Order of operation
- Sign

Sentence Frames:

- (negative/positive) (multiplied by/divided by) (negative/positive) gives a (negative/positive) answer. This is (choose one):
  a) Always true
  b) Sometimes true
  c) Never true
- (negative/positive) (added to/minus) (negative/positive) gives a (negative/positive) answer. This is (choose one):
  a) Always true
  b) Sometimes true
  c) Never true
- _____ + (−8) = _____
- −2 − (−5) = _____

Learning Supports:

- Coloured counters
- Number line
- Deck of cards
- 10-sided number cube
- Algebra tiles
- Math journal
- *National Library of Virtual Manipulatives*, 1999–2010 (http://nlvm.usu.edu/en/nav/category_g_2_t_1.html)

Mental Math:

- Demonstrate the integer computations of one- and two-digit numbers.

Problem Solving:

- It was a dry summer in Winnipeg. The Red River was 2 m below its normal level. During August, there was no rain, and the water level went down another metre. How far is the river below the normal level now?
- Maria owed her dad $12. Her dad cancelled $5 of the debt. How much does she still owe?
- Andrea had a collection of bracelets. She sold four bracelets to friends at school and used the money to purchase a new bracelet. What is the resulting change in the number of bracelets in her collection?
- The temperature is −8°C and it goes down 4°C. What is the new temperature?
- You owe your brother $25 and you earn $20. If you give all the money to your brother, how much money do you have? How much do you still owe your brother?

LAL Numeracy Phase 2A: **Number: Problem Solving Using Percent**

Big Ideas: Personal strategies and algorithms provide flexible and efficient methods of calculating that vary depending on the context and the numbers involved. There are a variety of ways to estimate sums, differences, products, and quotients.

	Numeracy	Language
Outcomes **7N3**	■ Demonstrate an understanding of whole number percents from 1% to 100%. ■ Solve problems involving percents from 1% to 100%.	■ Know and use with some consistency a range of simple grammatical features required of everyday classroom and foundational academic subject-area learning. ■ Use visuals, realia, and/or their first language to add a developing range of new knowledge, concepts, and skills to complete simple structured mathematical tasks. ■ Demonstrate the foundational and essential knowledge, skills, and attitudes related to the outcomes. ■ Complete, with guidance and modelling, a range of mathematical tasks related to the outcomes. ■ Use a variety of simple cognitive and metacognitive strategies, with guidance, to enhance learning.
Connections to Prior Learning	■ Demonstrate—concretely, pictorially, and symbolically—conceptual understanding of representing fractions and decimals. ■ Compare and order fractions and decimals using benchmarks and equivalent values. ■ When translating standard notation to percent, demonstrate an understanding of how the decimal point indicates where to read the hundredths in a number.	Know and use emergent repertoires of words and phrases to ■ convert decimals to % ■ convert fractions to % ■ solve problems using percent from 1% to 100%
	Instructional Strategies: ■ Provide visual representations of equivalent fractions. Students record the representation as a fraction, decimal, and percent, using a calculator if needed. The word *percent* means "per hundred" and may be substituted for the word *hundredths* when reading a number. Therefore, $\frac{7}{100}$ or 0.07 may be read as 7 hundredths and also as 7 percent. ■ Create a set of cards with equivalent percent, fraction, and decimal cards (numeric and pictorial). Play a game with the objective to create sets of four matching cards (percent, fraction, decimal, illustration) as in *Rummy* (see Grade 7 Support Document, BLM 7.N.2.3 at https://www.edu.gov.mb.ca/k12/cur/math/support_gr7/index.html).	**Assessment Criteria:** ■ Express a percent as a decimal or fraction. ■ Solve a problem that involves finding a percent. ■ Determine the answer to a percent problem where the answer requires rounding, and explain why an approximate answer is needed.

LAL Numeracy Phase 2A: **Number: Problem Solving Using Percent** *(continued)*

Learning Experiences

Language Foundation:

- Use age-appropriate examples and resources.
- Describe procedures to convert percents to decimals and fractions.
- Discuss the purpose of solving problems using percents, connecting to real-life situations.

Key Vocabulary:

- Decimal
- Equivalent
- Factor
- Fraction
- Multiple
- Percent
- Proportion

Sentence Frames:

- _____ % expressed as a fraction is _____.
- The fraction _____ expressed as a percent is _____.
- _____ % of _____ is _____.
- Adding _____ % to _____ results in _____.

Learning Supports:

- Grid paper
- Base-10 blocks
- Calculator
- Math journal
- Fraction bars
- *National Library of Virtual Manipulatives* (http://nlvm.usu.edu/en/nav/category_g_2_t_1.html)

Mental Math:

- Use multiplication and division facts.
- Convert benchmark fractions to percents (e.g., $\frac{1}{4}$ = 25%, $\frac{1}{2}$ = 50%).

Problem Solving:

- Beckett bought a sweater for $24.99 before tax. Sales tax is 13%. What is the total amount she will pay for the sweater?
- In a collection of 25 marbles, Joe lost 4 marbles. What percent of marbles did he have remaining? What percent of marbles did he lose?
- Phones are on sale for 30% off. The regular price of the phone you want is $249.99.
  a) How much is the discount?
  b) What is the sale price?

LAL Numeracy Phase 2A: **Number: Adding and Subtracting Positive Fractions**

Big Ideas: The four operations are intrinsically related; flexible methods of calculation require a strong understanding of operations and properties of the operation; there are a variety of ways to estimate sums, differences, products, and quotients.

	Numeracy	Language
Outcomes 7N5	■ Demonstrate—concretely, pictorially, and symbolically—an understanding of adding and subtracting positive fractions and mixed numbers, with like and unlike denominators (limited to positive sums and differences).	■ Know and use with some consistency a range of simple grammatical features required for everyday classroom and foundational academic subject-area learning. ■ Use visuals, realia, and/or their first language to add a developing range of new knowledge, concepts, and skills to complete simple structured mathematical tasks. ■ Demonstrate the foundational and essential knowledge, skills, and attitudes related to the outcomes. ■ Complete, with guidance and modelling, a range of mathematical tasks related to the outcomes. ■ Use a variety of simple cognitive and metacognitive strategies, with guidance, to enhance learning.

Connections to Prior Learning	■ 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
	■ Demonstrate—concretely, pictorially, and symbolically—an understanding of addition and subtraction with whole numbers.
	■ Represent values with equivalent fractions.
	■ Determine common multiples of two numbers..
		Use emergent repertoires of words and phrases to do the following:
		■ State equivalent fraction with the same denominator as the other fraction.
		■ Write solutions to addition and subtraction of fractions using symbols and an equals sign.
		■ Demonstrate the result when zero is added or taken away from a number.
		■ Derive and explain an estimate of an addition and a subtraction computation.

	Instructional Strategies: ■ Use fraction strips, Cuisenaire rods, or pattern blocks to compare fractions with like and unlike denominators. ■ Use manipulatives to represent addition and subtraction of fractions with like and unlike denominators. ■ Determine common denominator using arrays (e.g., determine $\frac{2}{3}+\frac{1}{4}$, using a 4×3 array of 12).	**Assessment Criteria:** ■ Model addition and subtraction of positive fractions or mixed numbers using concrete representations, and record symbolically. ■ Determine the sum or difference of two positive fractions or mixed numbers with like denominators. ■ Determine a common denominator for a set of positive fractions or mixed numbers. ■ Determine the sum or difference of two positive fractions or mixed numbers with unlike denominators. ■ Simplify a positive fraction or mixed number by identifying the common factor between the numerator and denominator. ■ Solve a problem involving the addition or subtraction of positive fractions or mixed numbers, and determine whether the solution is reasonable.

LAL Numeracy Phase 2A: **Number: Adding and Subtracting Positive Fractions** *(continued)*

Learning Experiences

Language Foundation:

- Discuss the conceptual understanding of fractions (i.e., parts of a whole).
- Describe the process for adding and subtracting fractions using personal strategies, standard algorithms, estimating, and problem solving.

Key Vocabulary:

- Denominator
- Sum
- Difference
- Equivalent fractions
- Fraction
- Mixed number
- Multiple
- Lowest common multiple
- Numerator
- Simplify

Sentence Frames:

- _____ and _____ have like/unlike denominators.
- _____ and _____ have common denominators.
- _____ and _____ are/are not equivalent fractions.
- _____ is an improper fraction.
- _____ is a mixed number.
- The greatest common factor of _____ and _____ is _____.
- A common denominator for _____ and _____ is _____.

Learning Supports:

- Fraction strips
- Grid paper
- Coloured counters
- Number lines
- Cuisenaire rods
- Pattern blocks
- Clocks
- Money

Mental Math:

- Demonstrate the ability to use the following:
  - Addition facts
  - Subtraction facts
  - Multiplication facts
  - Division facts
  - Multiples

Problem Solving:

- Chris is allowed to play video games for $\frac{5}{3}$ hours each day. He has already played for a $\frac{1}{2}$ hour. What fraction of time does he have left to play video games?
- Mark ate 1 slice of cake. Nova ate 2 slices. If there were initially 5 slices and all the slices are the same size, what fraction of the cake is remaining?
- Emma and Daniel need 1 can of orange paint for a project. Emma has $\frac{2}{5}$ of a can. Daniel has $\frac{1}{2}$ of a can. If they mix their paints together, will they have a full can?

LAL Numeracy Phase 2A: **Patterns and Relations: Patterning and Table of Values**

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.

	Numeracy	Language

Outcomes
7PR1, 7PR2
	■ 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.
		■ Demonstrate, orally and in writing and by using manipulatives, diagrams, sound, and actions, an understanding of increasing and decreasing repeating patterns by
		  ■ describing
		  ■ reproducing
		  ■ extending
		  ■ creating
		in familiar classroom, academic, and social contexts, within the suggested areas of experience.
		■ Know and use with some consistency a range of simple grammatical features required for everyday classroom and foundational academic subject-area learning.
		■ Experiment (with support) with a developing range of simple English structures to express their own ideas in familiar social and classroom situations, attempting to generate rules and to self-correct.
		■ Use visuals, realia, and/or their first language to add a developing range of new knowledge, concepts, and skills to complete simple structured academic tasks.
		■ Complete, with guidance and modelling, a range of academic tasks related to a cross-section of subject areas.

Connections to Prior Learning	■ Describe, translate, repeat, and extend patterns.
	■ Progress from repeating patterns (ABABAB or AABAABAAB) to growing patterns (1, 3, 5, 7, … and 2, 4, 8, 16, …).
	■ Identify, represent, and describe patterns and relationships using graphs and tables.
	■ Use a table of values to record relations.
		■ Recognize and produce a limited range of simple text forms, such as reports, graphs, and charts, to describe, translate, and extend patterns.
		■ Know and use a developing repertoire of words and phrases to
		  ■ construct a table of values
		  ■ create a graph
		  ■ draw conclusions from the data

	Instructional Strategies: ■ Use manipulatives to create, repeat, and extend patterns. ■ Ask students to describe and compare a sample of patterns or patterns they have seen. ■ Use a student example, including three or four terms of a basic growing pattern. Students may build the pattern and record it in their math journals or notebooks. ■ Students can describe the pattern rule using words and a mathematical expression. ■ Have students translate a pattern into a table of values, with one column being the term number x and the other being the term value (the relation to x) or y. ■ Graph the table of values on a grid. Include term number and term value in the labels of the x-axis and y-axis. ■ Connect the x- and y-variables to the term number and the term values and to the coordinate points. Write an equation to represent y in terms of x.	**Assessment Criteria:** ■ Formulate a relation to represent the relationship in an oral or written pattern. ■ Provide a context for a relation that represents a pattern. ■ Represent a pattern in the environment using a relation. ■ Create a table of values for a relation by substituting values for the variable. ■ Sketch the graph from a table of values created for a relation, and describe the patterns found in the graph to draw conclusions (e.g., graph the relationships between n and $2n + 3$). ■ Describe the relationship shown on a graph using everyday language in spoken or written form to solve problems. ■ Match a set of relations to a graph and a graph to a set of relations.

Learning Experiences

Language Foundation:

- Use concrete materials to represent, extend, and explain patterns.
- Explain mathematical relationships using charts and diagrams.
- Use symbols (*x*, *y*, etc.) to represent an unknown.
- Use (*x*, *y*) coordinates to represent points on a grid.
- Appropriately label the *x*-axis and *y*-axis on a graph.

Key Vocabulary:

- Expression
- Coordinates
- Graph
- Grid
- Linear relation
- Next
- Pattern
- Previous
- Relation
- Represent
- Substitution
- Table of values
- Term
- Unknown
- Value
- Variable

Sentence Frames:

- The coordinates (_____, _____) represent a point. _____ represents the horizontal value and _____ represents the vertical value.
- Given this table of values:

Number of Students	Total cost of Going to a Movie
5	$40
10	$80
15	
20	$160
25	

The total cost of going to a movie for _____ number of students will be $_____.

Learning Supports:

- Linking cubes
- Patterns blocks
- Graph paper
- Notebook for math journal

Mental Math:

- What is the next term in the pattern 11, 16, 21, 26, …?
- What is the next term in the pattern 32, 28, 24, …?
- Extend the pattern to determine the next value in the table.

Term	1	2	3	
Value	3	6	9	

Problem Solving:

- Amanda puts a 3 into the function machine and gets out a 7. Use symbols or words to show three different rules the function machine could be following.
- The cost of a taxi ride is $3.00 plus $1.20 per kilometre. Make a table of values showing the relationship between the kilometres travelled and the cost.

LAL Numeracy Phase 2A: **Patterns and Relations: Algebraic Representations with Expressions**

Big Ideas: Algebra, with the use of symbols or variables, is a tool for generalizing arithmetic expressions and representing mathematical situations and patterns in our world.

	Numeracy	Language

Outcomes
7PR4, 7PR5
	■ Explain the difference between an expression and an equation.
	■ Evaluate an expression given the value of the variable(s).
		■ Demonstrate—concretely, pictorially, and symbolically—an understanding of equations and expressions by
		  ■ describing orally and in writing
		  ■ creating
		■ Know and use a developing repertoire of words and phrases in familiar classroom, academic, and social contexts, within the suggested areas of experience.
		■ Know and use with some consistency a range of simple grammatical features required for everyday classroom and foundational academic subject-area learning.
		■ Experiment (with support) with a developing range of simple English structures to express their own ideas in familiar social and classroom situations, attempting to generate rules and to self-correct.
		■ Use visuals, realia, and/or their first language to add a developing range of new knowledge, concepts, and skills to complete simple structured academic tasks.
		■ Complete, with guidance and modelling, a range of academic tasks related to a cross-section of subject areas.

Connections to Prior Learning	■ Demonstrate—concretely, pictorially, and symbolically—and explain the meaning of preservation of equality. ■ Express a problem as an equation in which a symbol is used to represent an unknown number. ■ Solve one-step equations involving a symbol to represent an unknown number. ■ Solve problems involving single-variable (expressed as symbols or letters), one-step equations with whole-number coefficients and whole-number solutions.	Know and use emergent repertoires of words and phrases to do the following: ■ Explain why a term is a constant term. ■ Explain the variable and what it represents in the equation. ■ Describe the process in solving one-step equations.
	Instructional Strategies: ■ Have students use a variety of variables to express contextual relationships or to identify possible contexts for a relation (e.g., $4g = s$. Four students in a group, so $4 \times$ # of groups = the # of students.). ■ Given a relation, establish a process to enable students to describe the relation in words. ■ Use substitution to evaluate an expression. ■ Analyze a relation (such as $x + 1 = y$) by identifying the two expressions, the variables, and their relationship. ■ Create a possible context, situation, or a story to represent a relation. ■ Illustrate how to analyze the description and find the parts to represent x, y, and constants or numerical coefficients by using examples (e.g., a girl owns three horses. She purchases more horses at an auction; consequently, she now has more horses. The equation is $3 + x = y$.).	**Assessment Criteria:** ■ Identify and provide an example of a constant term, a numerical coefficient, and a variable in an expression and an equation. ■ Explain what a variable is and how it is used in an expression. ■ Provide an example of an expression and an equation, and explain how they are similar and different. ■ Substitute a value for each unknown in an expression and evaluate the expression.

LAL Numeracy Phase 2A: **Patterns and Relations: Algebraic Representations with Expressions** *(continued)*

Learning Experiences

Language Foundation:

- Use appropriate mathematics vocabulary to describe an expression and an equation as it relates to a real-life context of a pattern.

Key Vocabulary:

- Constant
- Equation
- Equivalent
- Evaluate
- Expression
- Numerical coefficient
- Relation
- Represent
- Substitution
- Term
- Unknown
- Value
- Variable

Sentence Frames:

- In the relation _____ (e.g., $y = 3x + 2$), the numerical coefficient is _____ and the constant is _____.
- In the equation _____ the variables are _____ and _____.
- Given the relation _____ ($y = x + 5$), the two equal expressions are _____ and _____.
- _____ ($3b + 4$ or $c = 3 - 2$) is an _____ (expression or equation).
- For the expression, $3x + 1$, if $x =$ _____, then the value of the expression is _____.
- For the equation, $3x + 1 = y$, if $x =$ _____, then the value of y is _____.

Learning Supports:

- Algebra tiles
- Coloured counters
- Number lines

Mental Math:

- Find the value of the expression, $x + 3y$, when x is 12 and y is 2.
- Three times a number is 18. What is the number?
- The expression $2x - 1$ has a value of 49. What is the value of x?
- Evaluate the following expressions:
  - $x - 25$, when $x = 89$
  - $3m$, when $m = 17$
  - $\frac{24}{k}$, when $k = 8$
  - $\frac{24}{k}$, when $k = 24$

Problem Solving:

- Write two or three different expressions for the number of loonies and quarters you can use to make $5.00.
- Write two or three different expressions for the number of loonies, quarters, dimes, and/or nickels you can use to make $2.00.

LAL Numeracy Phase 2A: **Patterns and Relations: Representations with Equations**

Big Ideas: The equals sign describes the balance between the quantities on either side of the equals sign; Relationships between quantities can be described using rules involving variables.

	Numeracy	Language

Outcomes
7PR6, 7PR7
	■ Model and solve problems—concretely, pictorially, and symbolically—represented by
	  ■ one-step equations of the form $x + a = b$, where a and b are integers
	  ■ linear equations of the form:
	  — $ax = b$
	  — $ax + b = c$
	  — $\frac{x}{a} = b, a \neq 0$
	  where a, b, and c are integers
		■ Demonstrate—concretely, pictorially, and symbolically—an understanding of linear equations involving whole numbers and one-step equations involving integers.
		■ Know and use a developing repertoire of words and phrases in familiar classroom, academic, and social contexts, within the suggested areas of experience.
		■ Know and use with some consistency a range of simple grammatical features required for everyday classroom and foundational academic subject-area learning.
		■ Experiment (with support) with a developing range of simple English structures to express their own ideas in familiar social and classroom situations, attempting to generate rules and to self-correct.
		■ Use visuals, realia, and/or their first language to add a developing range of new knowledge, concepts, and skills to complete simple structured academic tasks.
		■ Complete, with guidance and modelling, a range of academic tasks related to a cross-section of subject areas.

Connections to Prior Learning	■ Demonstrate—concretely, pictorially, and symbolically—an understanding of the addition, subtraction, multiplication, and division of integers.
	■ Demonstrate—concretely, pictorially, and symbolically—an understanding of the preservation of equality.
	■ Write an equation in which a symbol is used to represent an unknown number in context.
	■ Create a table of values representing a relation.
		■ Demonstrate orally and in writing an understanding of
		  ■ representing
		  ■ solving
		  equations.

	Instructional Strategies: ■ Use counters and a pan balance—concretely and pictorially—to solve an equation using whole numbers. Describe and connect this strategy to symbolic representation of equation solving. ■ Use coloured tiles and a balance metaphor to solve equations using integers. Describe and connect this strategy to a symbolic representation of equation solving. ■ Students may substitute a value for a variable. Substitution may be used as a guess-and-check strategy. ■ Create a table of values and a graph to solve the equation.	**Assessment Criteria:** ■ Represent a problem with a linear equation and solve the equation using concrete models. ■ Solve a problem using a linear equation and record the process. ■ Verify the solution to a linear equation using concrete materials or diagrams. ■ Substitute a possible solution for the variable in a linear equation to verify the equality. ■ Draw a visual representation of the steps used to solve a linear equation. ■ Solve a problem using a linear equation and record the process. ■ Verify the solution to a linear equation using concrete materials or diagrams. ■ Substitute a possible solution for the variable in a linear equation to verify the equality.

LAL Numeracy Phase 2A: **Patterns and Relations: Algebraic Representations with Equations** *(continued)*

Learning Experiences

Language Foundation:

- Use appropriate vocabulary to describe the connections between the concrete and symbolic representations of an equation.
- Apply the knowledge of mathematical vocabulary to solve equations (e.g., doubling, halving).
- Describe the steps involved in solving equations algebraically and graphically.

Key Vocabulary:

- Substitution
- Halving
- Multiplying
- Value
- Variable
- Positive numbers
- Negative numbers

Sentence Frames:

- To solve the equation $3x = 24$, the first step is to _____ on _____ side(s) of the equation.
- In the _____ (equation, expression) $2x + 1 = y$, if $x = 3$, then y equals _____.

Learning Supports:

- Coloured counters
- Pan balance
- Graph paper

Mental Math:

- Solve the equations:
  - $x + 1 = 4$
  - $x + 4 = 1$
  - $2y = 12$
  - $14y = 2$
  - $x - 3 = -5$

Problem Solving:

- In the relation $2x + 3 = y$,
  - find the value of y when x is any number from 1 to 5. Describe patterns you see.
  - find the value of x when y is 21

LAL Numeracy Phase 2A: **Shape and Space: Circles**

Big Ideas: It is necessary to understand the attributes of an object before anything can be measured; measurement involves a selected attribute of an object (length) and a comparison of the object being measured against non-standard and standard units of the same attributes.

	Numeracy	Language
Outcomes **7SS1**	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 central angles ■ constructing circles with a given radius or diameter ■ solving problems involving the radii, diameter, and circumference of a circle	■ Know and use a developing repertoire of words and phrases in familiar classroom, academic, and social contexts within the suggested areas of experience. ■ Draw on prior life experiences for a limited range of academic tasks. ■ Ask for and provide information on familiar topics in structured situations. ■ Record essential information into a graphic organizer after receiving guidance (e.g., complete a T-chart, Venn diagram). ■ Recognize and share with others some information concerning similarities and differences concerning their first language, English, and other languages.

Connections to Prior Learning	■ 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 benchmarks
	  ■ determining angle measures in degrees
	  ■ drawing and labelling angles when the measure is specified
	■ Describe, compare, and order fractions, decimals, and percents.
		Use visuals, realia, and/or first language to add a developing range of new knowledge, concepts, and skills to demonstrate an understanding of circle properties, including the following:
		■ size of circle
		■ radius
		■ diameter
		■ concept of pi (π)
		■ circumference
		■ angles

	Instructional Strategies: ■ Discuss where you would find circles in the environment (e.g., clock, compass, oven dial, pizza, etc.). ■ Using large cut-outs of angles (two copies of 45° and 90° angles, one copy of a 180° angle), have students explore central angles. For example, when the vertex of the angles are put together, the sum of the angles is 360° and a circle is formed. ■ Draw circles using the radius and the diameter. ■ Using a string, directly measure the length of the string to determine the circumference, diameter, and radius of that circle; calculate the radius, diameter, and circumference to compare the values and look for patterns. ■ Use measurements of circles to confirm that pi (π) is the ratio of the circumference to the diameter.	**Assessment Criteria:** ■ Illustrate and explain that the diameter is twice the radius in a circle. ■ Illustrate and explain that the circumference is approximately three times the diameter in a circle. ■ Explain that, for all circles, pi (π) is the ratio of the circumference to the diameter (d), and its value is approximately 3.14. ■ Explain, using an illustration, that the sum of the central angles of a circle is 360°. ■ Draw a circle with a given radius or diameter with or without a compass. ■ Solve a contextual problem involving circles.

Learning Experiences

Language Foundation:

- Develop foundational oral language through kinesthetic movement (e.g., students forming circles), realia, and visuals.
- Describe the relationship between the radius, diameter, and circumference of a circle.
- Identify central angles and their relationship to the whole circle.

Key Vocabulary:

- Angle
- Arc
- Central angle
- Circle
- Circumference
- Diameter
- Pi
- Radius
- Right angle
- Estimate
- Approximately

Sentence Frames:

- The total angle of a circle is _____.
- Each degree is _____ of a circle.
- The circumference of a circle can be found by _____ pi by the _____ the circle.
- If you know radius of a circle, the _____ is twice as large.
- If a central angle is _____, then the other central angle must be _____.

Learning Supports:

- Cut-outs for angles of different measures copied on card stock or on bond paper (two copies of 45° and 90° angles, one copy of 180° angle)
- Pictures/illustrations
- Scissors
- Protractors
- Rulers
- String

Mental Math:

- Determine the value of n:
  - $(90)(n) = 360$
  - $(45)(n) = 360$
  - $(30)(n) = 360$
  - $(90 + n) = 360$
  - $(225 + n) = 360$
- Mystery angle: Students work with a partner. One partner gives the central angle of an incomplete circle. The other student must identify the angle of the missing part.

Problem Solving:

- The radius of a clock is 43 cm. What is the clock's diameter?
- A plate has a diameter of 15 cm. Find the circumference.

LAL Numeracy Phase 2A: **Shape and Space: Area**

Big Ideas: Measurement involves a selected attribute of an object (e.g., length, area) and a comparison of the object being measured against non-standard and standard units.

	Numeracy	Language

Outcomes
7SS2
	■ Develop and apply formulas for determining areas of
	  ■ parallelograms
	  ■ triangles
	  ■ circles
		■ Know and use a developing repertoire of words and phrases in familiar classroom, academic, and social contexts within the suggested areas of experience.
		■ Draw on prior life experiences for a limited range of academic tasks.
		■ Use visuals, realia, and/or their first language to add a developing range of new knowledge, concepts, and skills to complete simple structured academic tasks.
		■ Demonstrate the foundational and essential knowledge, skills, and attitudes related to the core subject areas.
		■ Complete, with guidance and modelling, a range of academic tasks related to a cross-section of subject areas.
		■ Recognize and share with others some information concerning similarities and differences concerning their first language, English, and other languages.

Connections to Prior Learning	Students build on their prior knowledge of rectangles to generalize rules for determining the area of other shapes. Students should be able to do the following: ■ Describe area as the number of squares required to cover a flat surface. The squares can be any size (e.g., squares on a grid, square inches, square centimetres, etc.). ■ Identify different classifications of triangles and quadrilaterals according to their attributes. ■ Identify parallel, perpendicular, intersecting, horizontal, and vertical lines. ■ Identify the base and height of shapes. ■ Demonstrate that the area covered doesn't change when a shape is cut up into pieces and re-arranged into a different shape. ■ Calculate the area of rectangles.	Use visuals, realia, and/or their first language to add a developing range of new knowledge, concepts, and skills to do the following: ■ Identify different shapes. ■ Describe the process or the formula for calculating the area of different shapes. ■ Calculate the area of a given shape.
	Instructional Strategies: Students will explore the area of a parallelogram: ■ Determine the area of parallelograms on grid paper by counting the number of squares and partial squares. ■ Cut a parallelogram shape with one cut and rearrange the pieces to form a rectangle. Demonstrate that the area of the parallelogram is the same as the corresponding rectangle. Measure the base and height, and then calculate the area of the rectangle and, thus, the parallelogram. ■ Show how the height of a parallelogram relates to the height of a corresponding rectangle and the base of the parallelogram is the same as the base of a corresponding rectangle. ■ Generalize a formula for the area of parallelograms as base × height. ■ Find the area of parallelograms on grid paper by determining their base and height.	**Assessment Criteria:** ■ Illustrate and explain how the area of a rectangle can be used to determine the area of a triangle. ■ Generalize a rule to create a formula for determining the area of triangles. ■ Illustrate and explain how the area of a rectangle can be used to determine the area of a parallelogram. ■ Generalize a rule to create a formula for determining the area of parallelograms. ■ Illustrate and explain how to estimate the area of a circle without the use of a formula. ■ Apply a formula for determining the area of a circle. ■ Solve a problem involving the area of triangles, parallelograms, or circles.

Instructional Strategies: ***(continued)***

Students will explore the area of a triangle:

- Determine the area of triangles on grid paper by counting the number of squares and partial squares.
- Cut a parallelogram shape with one cut along a diagonal to form two identical triangles. Demonstrate that the area of each triangle is half the area of the corresponding parallelogram. Measure the base and height, and then calculate the area of the parallelogram. Determine the area of the triangle.
- Show how the height of a triangle relates to the height of a corresponding parallelogram. The base of the triangle is the same as the base of a corresponding parallelogram (and thus corresponding rectangle).
- Generalize a formula for the area of triangles as $\frac{1}{2}$(base $\times$ height).
- Find the area of triangles on grid paper by determining their base and height.

Students will explore the area of a circle:

- Estimate the area of circles on grid paper by counting the number of squares and partial squares.
- Using various-sized circle-shaped cut-outs, measure the radius and calculate the circumference. Cut the circle shape into eight pie-shaped wedges and arrange them into a parallelogram. Calculate the area of the circle using the formula for a parallelogram and the measurements of radius and circumference.
- Develop a formula for the area of a circle, pi $\times$ r $\times$ r or πr^2.

Learning Experiences

Language Foundation:

- Discuss the relationship between triangles and parallelograms.
- Describe the process for deriving areas of triangles and parallelograms.
- Identify and label parts of a circle, triangle, or parallelogram used in calculating the area of circle.

Key Vocabulary:

- Area
- Rectangle
- Perimeter
- Circumference
- Base
- Square units
- Formula
- Height
- Vertex
- Horizontal
- Vertical
- Intersecting
- Width
- Length
- Parallel
- Parallelogram
- Perpendicular
- Polygon

Sentence Frames:

- The rule to determine the area of triangles is _____.
- The rule to determine the area of parallelograms is _____.
- A circle with a radius of _____ cm has an area of _____ cm^2.

Learning Supports:

- Scissors
- Grid paper
- Protractors
- Rulers
- Calculators
- Geoboard

Mental Math:

- Find the area of a parallelogram that has a base of 3 and a perpendicular height of 2.
- Given a parallelogram, find the area and perimeter.
- Given the radius of a circle, estimate the area and the circumference (for mental math purposes only, it may be helpful to approximate pi as 3).

Problem Solving:

- If the base of the triangle is 6 cm and the height is 3 cm, what is the area?
- If the base of a parallelogram is 6 cm and the height is 3 times its base, what is the area?
- Create a square and triangle with the same area.
- Create a rectangle and a parallelogram with the same area.
- If you have a triangle with a base of 24 and a perpendicular height of 8, create other triangles with the same area.

LAL Numeracy Phase 2A: **Shape and Space: Position and Motion—Plotting Points**

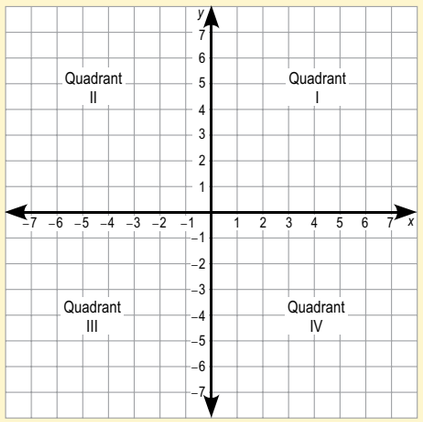
Big Ideas: Shapes can be relocated and reoriented using mathematical procedures; shapes can be described in terms of their location in a plane or in a space.

	Numeracy	Language
Outcomes **6SS8, 7SS4**	■ Demonstrate an understanding of the Cartesian plane (formed by a horizontal [*x*] axis and a vertical [*y*] axis, creating four quadrants). ■ 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.	■ Know and use a developing repertoire of words and phrases in familiar classroom, academic, and social contexts within the suggested areas of experience. ■ Draw on prior life experiences for a limited range of academic tasks. ■ Use visuals, realia, and/or their first language to add a developing range of new knowledge, concepts, and skills to demonstrate an understanding of the Cartesian coordinate system and plot points in each of the four quadrants. ■ Demonstrate the foundational and essential knowledge, skills, and attitudes related to the core subject areas. ■ Complete, with guidance and modelling, a range of academic tasks related to a cross-section of subject areas. ■ Use basic print conventions with developing consistency (e.g., numbers, letters, capitalization, spacing, basic punctuation, abbreviations). ■ Listen to and understand the main points of an oral representation or interaction on a familiar topic with guidance, with or without visual aids such as gestures, role-playing/acting out, pictures, realia, or other representations. ■ Express meaning, spontaneously and/or with guidance, through a short oral presentation or interaction on a familiar topic and some supported unfamiliar routines and contexts in a structured situation.
Connections to Prior Learning	■ Demonstrate an understanding of integers—concretely, pictorially, and symbolically. ■ Place a set of numbers on a horizontal or vertical number line. ■ Create, label, and interpret line graphs. ■ Construct a table of values from a relation, graph the table of values, and analyze the graph to draw conclusions and solve problems. ■ Graph collected data and analyze the graph to solve problems. ■ Use total physical responses (TPR) strategies without and then with a large Cartesian plane on the floor of the classroom to describe locations or describe movement of students/objects.	■ Demonstrate—orally, graphically, and in writing—an understanding of plotting points in any of the four quadrants of the Cartesian coordinate system.

Connections to Prior Learning

Instructional Strategies:

- Discuss the features of the Cartesian plane:
  - The horizontal number line in the Cartesian number line is termed the *x*-axis, and the vertical number line the *y*-axis.
  - The point found at (0, 0) is called the origin.
- Develop the concept of ordered pairs (i.e., horizontal direction first, vertical direction second) and how to plot coordinates on a Cartesian plane.
- Plot and connect a list of ordered pairs (given by the teacher) to form a simple shape or a picture.
- Create a simple shape, such as a polygon, and generate a list of ordered pairs for the vertices of the shape.
- Students verify each other's work.
- Play a version of games such as *Battleship*, *Private Detective*, hide-and-seek, etc., with a focus on quadrant 1.
- Have students create a math story. The story will require a main character who is able to move about freely (e.g., a dog in a field, a person on a bus, a soccer player on a field).



Assessment Criteria:

Use keywords, short phrases, and short sentences to do the following:

- Label the axes of a Cartesian plane and identify the origin.
- Plot a point in a Cartesian plane given its ordered pair.
- Match points in a Cartesian plane with their corresponding ordered pair.
- Label the axes of a Cartesian plane and identify the origin.
- Identify the location of a point in any quadrant of a Cartesian plane using an ordered pair.
- Plot the point corresponding to an ordered pair on a Cartesian plane with units of 1, 2, 5, or 10 on its axes.
- Draw shapes and designs, using ordered pairs, on a Cartesian plane.
- Create shapes and designs on a Cartesian plane and identify the points used.

Learning Experiences

Language Foundation:

- Develop foundational oral language through realia and visuals.
- Discuss the use of horizontal and vertical number lines.
- Describe movement on a Cartesian coordinate plane.

Key Vocabulary:

- Cartesian plane
- Horizontal
- Vertical
- Ordered pairs
- Origin
- Point
- Quadrant
- Coordinates
- Axes (plural)
- *x*-axis
- *y*-axis
- Negative
- Positive

Sentence Frames:

- The _____ (horizontal, vertical) axis is the _____ (*x*-axis, *y*-axis).
- Quadrant _____ (1, 2, 3, 4) is in the _____ _____ (top, right, left, bottom) of the Cartesian plane.
- The point (0, 0) is called the _____.
- The ordered pair (4, 3) is repositioned three spaces to the left. What are the new coordinates?

Learning Supports:

- Grid paper
- Geoboards
- Stickers

Mental Math:

- In which quadrant is the point (3, −4)?
- In which quadrant is the point (−5, −1)?
- Write the coordinate pairs of a point that is in quadrant IV.
- What are four ordered pairs that are 5 spaces away in all four directions from the point (3, 1)

Problem Solving:

- If you start at a point (1, 4) and move up 2 units, left 5 units, and down 3 units, determine your end point.
- Determine four coordinate pairs that, when joined, form a square.

LAL Numeracy Phase 2A: **Shape and Space: Position and Motion—Transformations**

Big Ideas: 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.

	Numeracy	Language
Outcomes **7SS5**	Perform transformations of 2-D shapes through ■ translations ■ rotations ■ reflections in all four quadrants of a Cartesian coordinate plane, limited to integral vertices.	■ Know and use a developing repertoire of words and phrases in familiar classroom, academic, and social contexts within the suggested areas of experience. ■ Know and use with some consistency a range of simple grammatical features required for foundational academic subject-area learning. ■ Experiment (with support) with a developing range of simple English structures to express their own ideas in familiar social and classroom situations, attempting to generate rules and to self-correct. ■ Listen to and understand the main points of an oral presentation or interaction on a familiar topic with guidance, with or without visual aids such as gestures, role-playing/acting out, pictures, realia, or other representations. ■ Begin to initiate interactions and respond to questions on familiar topics; manage simple, routine interactions without undue difficulty, asking for repetition or clarification when necessary; respond to English-speaking peers. ■ Initiate interactions, and respond using simple social interaction patterns in face-to-face situations (e.g., request–acceptance/refusal; social invitations; buying a drink at the convenience store). ■ Collaborate with other learners of diverse backgrounds and interests, and begin to identify the value of different languages, cultures, and other forms of diversity.
Connections to Prior Learning	■ Identify polygons. ■ Identify transformations without coordinates. ■ Identify and plot points in all quadrants of a Cartesian plane using integer ordered pairs. ■ Perform and identify a single transformation (e.g., translation, rotation, or reflection) of a 2-D shape, and draw and describe the image. ■ Perform a combination of successive transformations of 2-D shapes to create a design, and identify and describe the transformations.	Using emergent vocabulary, express the following with keywords and simple sentences: ■ Demonstrate the process for translations, rotations, and reflections of 2-D shapes in all four quadrants of the Cartesian coordinate plane.
	Instructional Strategies: ■ Using TPR, students work in groups to demonstrate and discuss transformations concretely, using strings, mirrors, etc. ■ Using grid paper with a Cartesian plane and polygon cutouts, place a polygon on grid paper and demonstrate translations, reflections, and rotations with coordinate points.	**Assessment Criteria:** Use keywords, short phrases, and short sentences to do the following: ■ Identify the coordinates of the vertices of a 2-D shape on a Cartesian plane. ■ Describe the horizontal and vertical movement required to move from a given point to another point on a Cartesian plane.

Instructional Strategies: ***(continued)***

- On a grid paper with polygons sketched, perform a specific transformation and label the image with coordinate points.
- Model recording various transformations and review correct labelling of the following:
  - vertices (ABC)—corresponding vertices (A′, B′, C′—A prime, B prime, C prime)
  - slide arrows
  - lines of reflection
  - centre of rotation
  - direction and amount of degrees of rotation

Assessment Criteria: ***(continued)***

- Describe the positional change of the vertices of a 2-D shape to the corresponding vertices of its image as a result of a transformation or successive transformations on a Cartesian plane.
- Perform a transformation or consecutive transformations on a 2-D shape, and identify the coordinates of the vertices of the image.
- Describe the image resulting from the transformation of a 2-D shape on a Cartesian plane by comparing the coordinates of the vertices of the image.

Learning Experiences

Language Foundation:

- Develop foundational oral language through TPR.
- Describe the transformations orally and in writing.

Key Vocabulary:

- Cartesian plane
- Centre of rotation
- Clockwise
- Counter-clockwise
- Congruent
- Coordinates
- Original
- Image
- Line of reflection
- Prime
- Quadrant
- Reflection
- Rotation
- Transformation
- Translation
- Vertex
- Vertices

Sentence Frames:

- To _____ (translate, rotate, and reflect) a shape means to _____ it.
- The shape or figure before the transformation is called the _____.
- A vertex labelled A in the original shape will now be labelled _____ in the image shape

Learning Supports:

- Polygon cut-outs
- String
- Mira
- Mirror
- Grid paper with Cartesian plane
- Linking cubes

Mental Math:

- Point A (3, −2) is translated 5 left. Where is A′?
- Point A (−1, −2) is translated 5 left, 4 down. Where is A′?
- Point B (−4, 3) is reflected over the *x*-axis. Where is B′?
- Point C (−5, 3) is rotated 180° clockwise about the origin. Where is C?
- Point D (−9, −3) is reflected over the *y*-axis. Where is D?
- Point E (3, −5) is rotated 90° clockwise about the origin. Where is E?

Problem Solving:

- The image of a point is at (5, 3) after being translated 4 down and 1 up. Where was the original point?
- A point is at (3, −2) and is reflected over the *x*-axis and then over the *y*-axis. What are the new coordinates?
- Starting at (−1, 3), describe the horizontal and vertical movements to end at (2, −3).

LAL Numeracy Phase 2A: **Statistics and Probability: Circle Graphs**

Big Ideas: Data is gathered and organized in order to answer questions; visual displays quickly reveal information about the data.

Outcomes 7SP3

Numeracy

- Construct, label, and interpret a circle graph to solve problems.
- Recognize that the circle graph displays the distribution of data, not the actual data values.
- Group data by categories expressed as a percent of the whole.
- Represent each sector of the graph as a part-to-whole ratio.

Language

- Know and use with some consistency a range of simple grammatical features required of everyday classroom and foundational academic subject-area learning.
- Use visuals, realia, and/or their first language to add a developing range of new knowledge, concepts, and skills to complete simple structured mathematical tasks.
- Demonstrate the foundational and essential knowledge, skills, and attitudes related to the outcomes.
- Complete, with guidance and modelling, a range of mathematical tasks related to the outcomes.
- Use a variety of simple cognitive and metacognitive strategies, with guidance, to enhance learning.

Connections to Prior Learning

- Demonstrate an understanding of angles by
  - estimating the measure of angles using 45°, 90°, and 180° as reference angles
  - determining angle measures in degrees
- Compare, order, and demonstrate an understanding of operations involving fractions, decimals, and percents.
- Demonstrate an understanding of circles by determining the sum of the central angles as 360°.

- Using cognitive and interpersonal strategies, construct a labelled circle graph and describe each sector compared to the whole circle.

Instructional Strategies:

Make a connection to prior learning on fractions:

- Choose a fraction circle that matches the number of pieces of data. For example, if there are 10 marbles in a set, choose a circle divided into tenths. Each tenth represents one marble. If six of the marbles are blue, colour $\frac{6}{10}$ of the circle blue; if three of the marbles are yellow, colour $\frac{3}{10}$ of the circle yellow; and if the remaining marble is red, colour $\frac{1}{10}$ of the circle red.
- Use age-appropriate examples and resources to collect real-life data.

Construct and label circle graphs:

- Express the number in each category as a fraction of the whole set.
- Convert each fraction to a decimal number and then to a percent.
- Create sectors to represent the percent of each category.
- Create and complete a chart such as the one below:

Category	Quantity	Fraction of the Whole	Percent of the Whole	Percent Times 360° in the Circle	Size of the Central Angle

Assessment Criteria:

- Identify common attributes of circle graphs, such as the following:
  - title, label, or legend
  - the sum of the central angles is 360°
  - the data is reported as a percent of the total
  - the sum of the percents is equal to 100%
- Create and label a circle graph, with or without technology, to display a set of data.
- Find and compare circle graphs in a variety of print and electronic media, such as newspapers, magazines, and the Internet.
- Translate percents displayed in a circle graph into quantities to solve a problem.
- Interpret a circle graph to answer questions.

Instructional Strategies: ***(continued)***

- Draw a circle with a radius.
- Use the radius as a reference point to draw one of the central angles.
- Create successive central angles.

Interpret data in circle graphs:

- Provide examples of circle graphs for interpretation.

Learning Experiences

Language Foundation:

- Discuss attributes of a circle (e.g., circumference, diameter, radius, area, pi).
- Describe the interpretation of the circle graph.

Key Vocabulary:

- Angle
- Circle
- Graph
- Legend
- Percent
- Pie chart
- Sum
- Sum of the central angles
- Attributes

Sentence Frames:

- _____ % of the circle is _____ (content).
- _____ (fraction) of the circle is equal to _____ % of the circle graph.
- The sum of central angles is equal to _____ degrees.
- The angle measure for _____ % of the circle is _____.

Learning Supports:

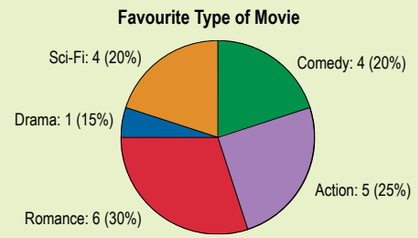
- Protractors
- Compass
- Calculators
- Fraction Circles
- Rulers
- Grid paper

Mental Math:

- Demonstrate the ability to use the following:
  - Fractions to percents
  - Percents to fractions
  - Addition
  - Subtraction
  - Sum of central angles in a circle
- Estimate percent of a number using benchmarks.

Problem Solving:

- Steve sold 50 guitar picks. 25 were made of thin plastic, 10 were made from medium plastic, and 15 were made from thick plastic. Create a circle graph to represent Steve's sales.
- In the circle graph below, which two movie selections represent more than 50% of the choices?



LAL Numeracy Phase 2A: **Statistics and Probability: Measures of Central Tendencies**

Big Ideas: 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.

	Numeracy	Language
Outcomes **7SP1, 7SP2**	Demonstrate an understanding of central tendency and range by doing the following: ■ Determine the central tendencies and the range. ■ Determine the most appropriate measure of central tendency to describe a data set. ■ Determine the effect on mean, median, and mode when an outlier is included in a data set.	■ Know and use with some consistency a range of simple grammatical features required of everyday classroom and foundational academic subject-area learning. ■ Use visuals, realia, and/or their first language to add a developing range of new knowledge, concepts, and skills to complete simple structured mathematical tasks. ■ Demonstrate the foundational and essential knowledge, skills, and attitudes related to the outcomes. ■ Complete, with guidance and modelling, a range of mathematical tasks related to the outcomes. ■ Use a variety of simple cognitive and metacognitive strategies, with guidance, to enhance learning.
Connections to Prior Learning	■ Compare, order, and demonstrate an understanding of operations involving fractions, decimals, and percents. ■ Graph collected data and analyze the graph to solve problems.	Use emergent repertoire of words and phrases to do the following: ■ Describe the difference between the central tendencies. ■ Calculate the central tendencies and determine which measure of central tendency is most appropriate.
	Instructional Strategies: ■ Demonstrate how to calculate mean, median, mode, and range of a set of data where each measure of central tendency will have a unique value (i.e., 10, 20, 20, 30, 40, 50 has a mean of 28.3, median of 30, a mode of 20, and a range of 40). ■ Use age-appropriate examples and resources to collect real-life data and determine the most appropriate measure of central tendency to describe this data. ■ Calculate mean, median, and mode using a given set of data, including an outlier. Identify and remove the outlier from the set of data and recalculate the mean, median, and mode. Which measure of central tendency was most affected and least affected?	**Assessment Criteria:** ■ Determine the mean, median, and mode for a set of data, and explain why these values may be the same or different. ■ Determine the range of a set of data. ■ Provide a context in which the mean, median, or mode is the most appropriate measure of central tendency to use when reporting findings. ■ Solve a problem involving the measures of central tendency. ■ Analyze a set of data to identify any outliers. ■ Explain the effect of outliers on the measures of central tendency for a data set. ■ Identify outliers in a set of data and justify whether or not they are to be included in the reporting of the measures of central tendency. ■ Provide examples of situations in which outliers would or would not be used in determining the measures of central tendency.

LAL Numeracy Phase 2A: **Statistics and Probability: Measures of Central Tendencies** *(continued)*

Learning Experiences

Language Foundation:

- Use age-appropriate examples and resources.
- Discuss whether or not a particular measure of central tendency represents the data better than the others.
- Discuss why a set of data may have an identical mean, median, and mode.
- Describe how an outlier may affect measures of central tendencies.

Key Vocabulary:

- Average
- Data
- Mean
- Measure of central tendency
- Median
- Mode
- Range
- Statistics

Sentence Frames:

- The mean of this set of data is _____.
- The mode of this set of data is _____ because _____.
- The median of this set is _____ because _____.
- _____ (mean, median, mode) is the best description of this data because _____.
- The range of a set of data is found by _____.
- _____ is an outlier because _____.

Learning Supports:

- Calculator
- Measurement tools to collect data
- Dice and spinners to generate data

Mental Math:

- Demonstrate the ability to use the following:
  - Order a set of numbers
  - Addition facts
  - Subtraction facts
  - Division facts

Problem Solving:

- Given: Set A: 10, 11, 12
  Set B: 1, 11, 21
  What is the mean of each set? For which set is the mean a better representation of the data?
- Which measure of central tendency would best describe the age or height of our class?
- A class of 18 students has one student with a green pencil and the rest with a yellow pencil. What is the mean, median, and mode for this data? Which measure of central tendency would be the most appropriate description of the data set? Why?