

Purpose of This Document

All students bring valuable experiences to the learning environment. This includes newcomer students in our schools who are learning the language of instruction and who have limited formal schooling. They also bring valuable experiences to add to our schools' cultures, but they face a more complex and challenging journey to success as they transition into Manitoba schools. Thus, in the Manitoba K–12 education system, the term *literacy, academics, and language (LAL) learner* is used to describe this subset of students who are learning English as an additional language (EAL) and who need to develop literacy and foundational academic knowledge and skills as well. For a variety of reasons, including war, environmental disasters, civil unrest, poverty, or culture, these students may have attended school sporadically or not at all. The content of their previous formal education may have been limited by resources, teacher training, or a narrow curriculum. This term does not denote cognitive abilities; it assumes the usual range of learner abilities while pointing to the emphasis on literacy, academics, and language. Although younger newcomer students may also have experienced similar disruptions in their education, the term *LAL* focuses on Middle and Senior Years students who will need intensive and accelerated learning to catch up with their Manitoba peers.

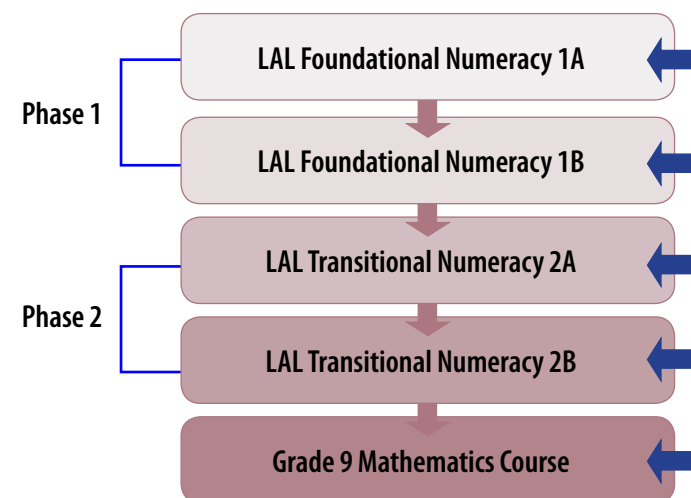
Learning literacy and academics is a more complex and challenging process for LAL learners because they need to develop foundational academic skills in the subject areas parallel to learning English. LAL learners may appear to progress more slowly than other EAL students in the classroom because they are learning the language of instruction and subject-area content at the same time as they are establishing the practices and processes of formal education and the classroom. They may have limited experience with writing implements and classroom technology and they may be unfamiliar with using books to find information. The students may have experienced grief and trauma in their home country and on their journey to Canada and thus benefit from psychological and well-being supports. LAL students may also need intensive supports as they develop an understanding of the culture and function of schools, the processes of a classroom, and their own academic skills, and as they plan for long-term learning.

Because strong numeracy skills are foundational to success in mathematics as well as other subjects, LAL learners will need intensive and focused foundational experiences with mathematical concepts OR focused and intensive supports for developing the conceptual understanding of mathematical concepts that in Manitoba are developed over time within the Kindergarten to Grade 8 Mathematics curriculum. At the same time, students need to learn English as used in mathematics and they also need to develop the practical applications of numeracy in everyday life in Canadian schools and communities. The courses represented in this document offer opportunities to develop background knowledge and processes in mathematics and language to enable the students to transition more successfully into the grade-level Grade 9 Mathematics course.

These courses are drawn from learning outcomes in *Kindergarten to Grade 8 Mathematics: Manitoba Curriculum Framework of Outcomes*. The big ideas presented and the groupings of outcomes have been drawn from the *Glance Across the Grades – Kindergarten to Grade 9 Mathematics* document. The intent of these courses is to clearly communicate high expectations for students in mathematics education to all educational partners across Manitoba, and to facilitate the development of common learning resources in order to successfully prepare students entering Grade 9 Mathematics. These courses will be delivered as four half-credit courses:

- LAL Foundational Numeracy Course Phase 1A
- LAL Foundational Numeracy Course Phase 1B
- LAL Transitional Numeracy Course Phase 2A
- LAL Transitional Numeracy Course Phase 2B

This curriculum is designed to address the mathematical and the language needs of individual LAL students. When it has been determined that a student already has the necessary skills for a particular half course, he or she can register directly for the next half course. When students show proficiency in any LAL numeracy half course, they can transition into the next half course. In the case of the LAL Transitional Numeracy Course Phase 2B, the expectation is that they transition into the grade-level Grade 9 Mathematics course, not Grade 9 E-credit mathematics.



Manitoba Education and Training requires that the grades in these courses be reported on the Provincial Report Card. When a final grade is reported, the LAL student will have shown proficiency in both the English language and the content represented in the course, and the half credit is recorded for that course. If a student is continuing in the course next semester or next year, a final term mark may be given but a final grade for the course should not appear on the report card.

Each course addresses selected topics within all four strands (Number, Patterns and Relations, Shape and Space, and Statistics and Probability) in the Manitoba mathematics curriculum. There are two sets of expectations for each math topic—mathematical outcomes and language goals. The LAL students will develop mathematical proficiency while they simultaneously build their language proficiency. The different components of the courses include scaffolds that enhance academic language, conceptual understanding, mathematical practice, mathematical reasoning, and problem solving. There is a financial literacy component added to these courses, as many LAL students may not have an understanding of income, expenses, debt, and budgeting needed in a Canadian context.

It is important to remember that the end of LAL Transitional Numeracy 2B is not the end of the students' linguistic and academic development. Successfully completing LAL Transitional Numeracy 2B means students are ready for the compulsory Grade 9 Mathematics course. As students have limited literacy, academic knowledge, and skills in numeracy, LAL programming will be more intensive and take more time. Furthermore, their literacy and academic learning will continue to require additional time and support as they transition to and continue in EAL and academic programming. It is important for LAL learners to develop the skills needed for future learning and work opportunities beyond high school.

Numeracy

Numeracy is the ability to use mathematics in everyday life. Literacy and numeracy enable us to understand, interpret, create, communicate, and interact with ideas, others, and the world around us. They are complex and dynamic processes that involve building on prior knowledge, language, culture, and experiences in order to develop new knowledge and deepen understanding. Being literate or numerate is a lifelong endeavour and is always evolving. Literacy and numeracy are fundamental to all learning, and they enable personal growth and active participation in society.

Students need both numeracy essentials and academic language in mathematics. Numeracy essentials are the mathematical skills and attitudes our LAL students require in order to use mathematical concepts to make competent and confident decisions at home and at work, including financial decisions. Academic language refers to the language necessary for students to acquire a deeper understanding of a subject area. Academic language in mathematics represents linguistic features specific to mathematical discourse that includes vocabulary development and grammatical features. "Academic language is developmental in nature, with increased complexity and sophistication in language use from grade to grade" (Gottlieb et al. 2).

Rationale

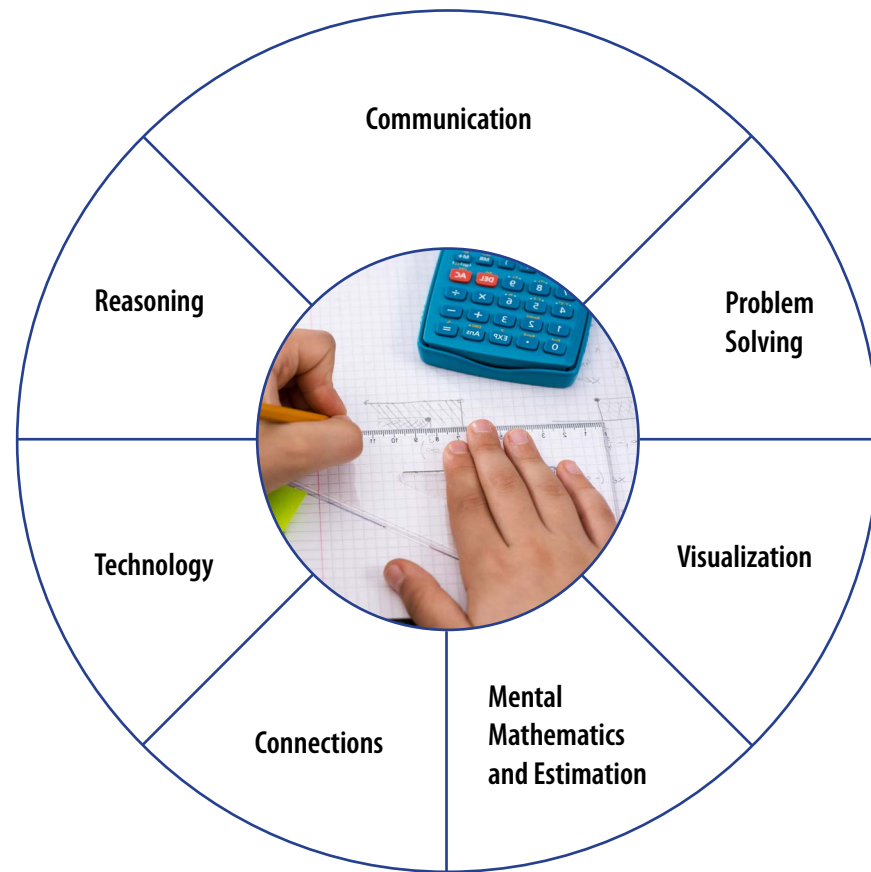
Increased literacy and numeracy skills have personal, social, and economic benefits for individuals, families, communities, and the province. Increased numeracy is associated with decision-making skills, logical thinking, enhanced employment, and opportunities to effectively participate in the digital age. The goal of these courses is to develop language skills parallel to the mathematical content. It is important to remember that language proficiency is more than learning specialized vocabulary; it also involves extended communication that includes syntax, organization, and academic and language registers.

Time Allotments

The time allotment for each half course will vary. The time spent on each topic will depend on individual student needs and abilities to acquire and apply the new terminology and operations along with language learning. Thus, it may take longer than a semester to complete two half courses. If we consider that, the time to complete these courses can be varied but the expectations for learning, content, and rigour cannot be compromised. The goal is to enable these students to transition more easily into mainstream math classes.

Mathematical Processes

The seven interrelated mathematical processes are intended to permeate teaching and describe the critical aspects of learning, doing, and understanding mathematics. The processes allow students to engage in thinking about mathematics, and they support the acquisition and the use of the mathematical knowledge and foundational skills that develop conceptual understanding. The processes are outlined in detail in [Kindergarten to Grade 8 Mathematics: Manitoba Curriculum Framework of Outcomes \(2013\)](#) and in [Grades 9 to 12 Mathematics: Manitoba Curriculum Framework of Outcomes \(2014\)](#).



Students are expected to

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

Students must encounter the math processes regularly in their mathematics program in order to achieve the goals of mathematics education. The main goals of mathematics education are to prepare students to

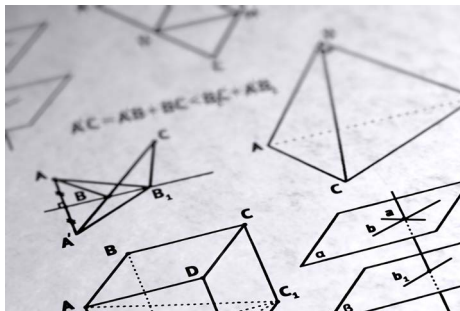
- communicate and reason mathematically
- use mathematics confidently, accurately, and efficiently to solve problems
- appreciate and value mathematics
- make connections between mathematical knowledge and skills and their applications
- commit themselves to lifelong learning
- become mathematically literate citizens, using mathematics to contribute to society and to think critically about the world (Manitoba Education, 2013, 5)

The mathematical processes underlie and support math content through all grade levels. In essence, they are the vehicles that allow students to engage in thinking about math content. The processes are interwoven – the development of one can help with the development of others.

A numeracy-rich community includes evidence of the following:

- problem solving as a way of teaching and learning
- reflection and dialogue about math
- math talk that focuses on student understanding of math
- risk taking in problem solving
- teacher plans for the development of “big ideas” in mathematics

- teacher plans for intentional math communication and vocabulary (e.g., word walls, graphic organizers, anchor charts, journals)
- using manipulatives and providing links among concrete, pictorial, and symbolic representations of mathematics
- integrating the seven mathematical processes into the teaching and learning of mathematics
- using literature that promotes exploration and application of math concepts
- established math routines/structures that promote understanding (math meetings, group work, journaling, number of the day, math word walls, math dictionaries, math fluency, and contests)
- promoting mathematics in the community through special math activities throughout the year (math Olympics, math day, bulletin boards that promote math in the school/class, math week, math nights, and writing articles in school newsletters)



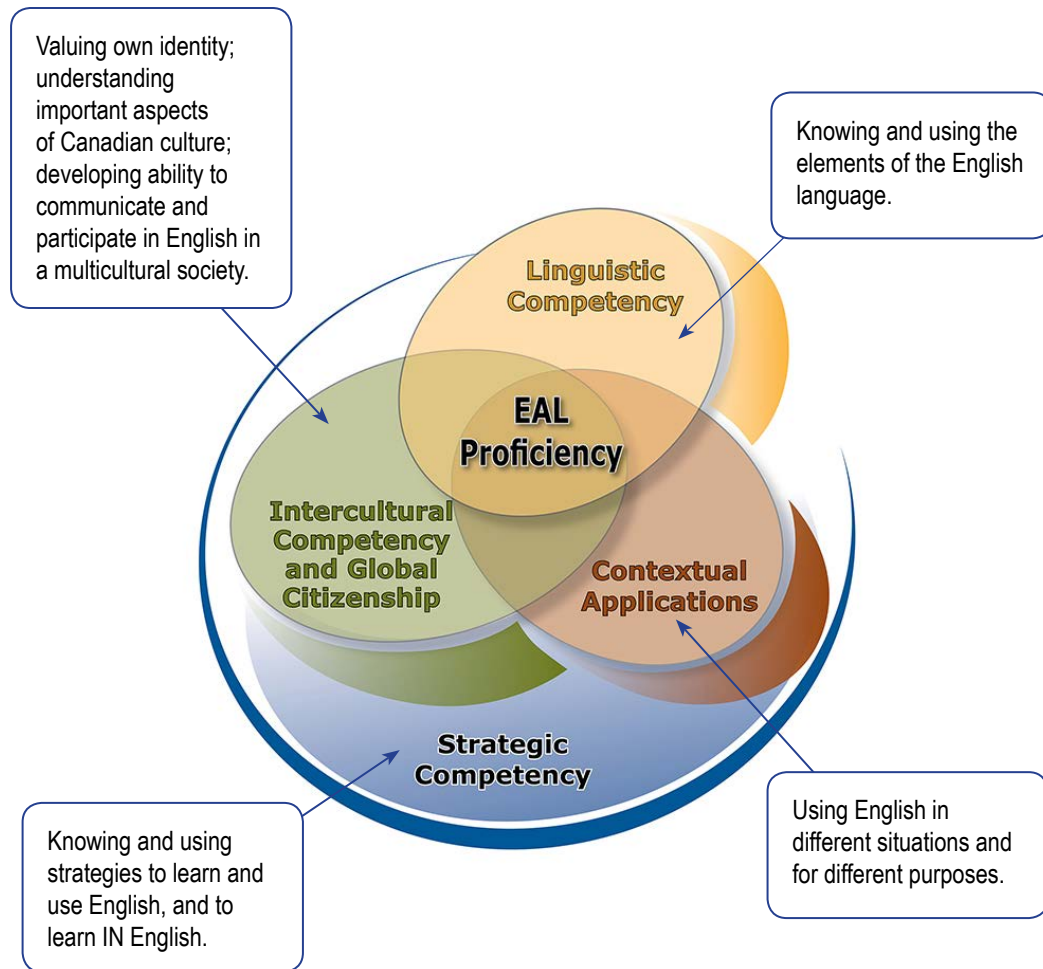
Reference to Manitoba EAL Framework and the Manitoba Mathematics Curriculum

Manitoba Education and Training's EAL and LAL programming curriculum framework documents for Middle Years and Senior Years include descriptions of LAL students, the domains of LAL learning, as well as the LAL acquisition continuum. The language goals presented in this document are also listed in these frameworks. The mathematics outcomes are listed. The mathematics outcomes are listed in *Kindergarten to Grade 8 Mathematics: Manitoba Curriculum Framework of Outcomes* (Manitoba Education, 2013). In these LAL Numeracy courses, the mathematics outcomes described are intertwined with the language acquisition outcomes. It is important to keep in mind that LAL students are developing competencies in literacy, numeracy, and academics in addition to negotiating learning a new culture and adjusting to life in a school environment.

LAL Domains

The four general domains of LAL learning include the knowledge, skills, strategies, and attitudes required to achieve EAL proficiency. The following are the four domains:

- Foundational Linguistic Competency
- Foundational Contextual Applications
- Foundational Strategic Competency
- Foundational Intercultural Communications and Global Citizenship



The students at the end of LAL Phase 2 are not expected to have achieved full linguistic competency or age-/grade-level appropriate academic development. The emphasis in all LAL programming is literacy, numeracy and foundational and transitional subject-area knowledge and skills.

a) Foundational Linguistic Competence

Students are learning the English language while learning the language of mathematics. Instruction on building vocabulary, using mathematical phrases, explaining how to derive a solution, solving word problems, and applying mathematical concepts to their everyday lives will allow them to talk and write about what they learn in mathematics.

Building on background knowledge by accessing what the student already knows will lead to new understandings and skill development. Using effective teaching and learning strategies, graphic organizers, scaffolding, realia (concrete manipulations) representing the math problem, and oral language development using mathematical concepts will enhance their linguistic competence.

b) Foundational Competence in Contextual Applications

Students will acquire and use English mathematical terminology and skills in a variety of contexts and for a variety of purposes.

- a) In a variety of non-academic contexts and for a variety of non-academic purposes, students will use their developing mathematical terminology and skills as part of their everyday lives. These LAL numeracy courses' contexts include the following:
- Financial Literacy
 - shopping
 - banking
 - ordering/paying for food in cafeteria/restaurant
 - money exchange and checking change
 - paying with cash or credit card
 - paying bills, household expenses
 - using coupons
 - simple banking, reading and writing cheques

- Daily Living Skills
 - taking a bus, using bus tickets versus bus passes, reading a bus schedule
 - attending medical/dental appointments
 - following a recipe
 - using the telephone
 - reading flyers
 - locating addresses
 - being punctual, telling time
 - completing forms such as SIN, driver's license, job application, etc.
 - reading schedules
 - using a map
 - reading and following street signs
 - taking part in activities such as going to a movie

b) In a variety of academic contexts and for a variety of academic purposes, students will transfer prior knowledge, concepts, and skills.

c) Students will acquire new mathematical knowledge, concepts, and skills while using the mathematical vocabulary.

d) Students will become familiar with and accurately use the mathematical vocabulary and the symbols associated with it correctly, in mathematical situations.

- Currency: nickel, dime, quarter, loonie, toonie, \$5, \$10, \$20, \$50, \$100, make change, exchange, trade
- Time: o'clock, minute(s), hour(s), week(s), day(s), month(s), year(s), timetable, morning, afternoon, evening, A.M., P.M., breakfast, lunch, supper, half hour, quarter hour, today, tomorrow, yesterday
- Ordinal numbers: first, second, third, fourth, fifth, etc.
- Shapes: circle, square, rectangle, triangle, oval
- Temperature: celsius, degree(s), thermometer, windchill
- Measurement: centimetre(s), metre(s), kilogram(s), gram(s), weight, weigh, litre(s), millilitre, metre stick, ruler
- Adjectives that denote size: small, smaller, smallest, tall, taller, tallest, big, bigger, biggest, little, littler, littlest, medium, large, larger, largest, extra large, extra small, few, fewer, fewest, odd, even

These themes will be interwoven throughout each topic of study presented in this document.

c) Foundational Strategic Competence

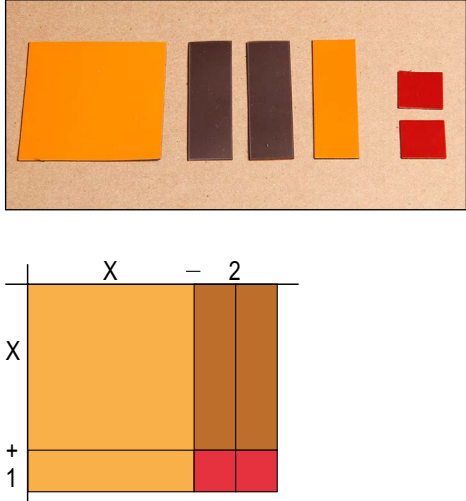
Students will learn to use a variety of mathematical strategies effectively to manage personal, social, and academic mathematical learning demands while learning English. It is recommended that teachers model strategies and provide scaffolding to develop students' conceptual understanding and strategic competence. For example:

- Strategies:
 - accessing prior knowledge
 - graphic organizers
 - peer-to-peer support
 - games
- Supports:
 - addition and multiplication tables
 - calculators (not recommended for the LAL Foundational Numeracy 1A course)
 - number lines
 - computer math programs and websites (e.g., [Khan Academy library](#) [Khan Academy, 2018a], [Sense & Dollars](#) [MPT], [Mathies](#) [OAME])
 - mental math
 - compass
 - protractor
 - ruler
 - bus schedules, other schedules

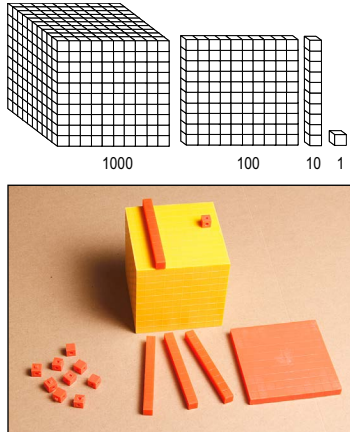

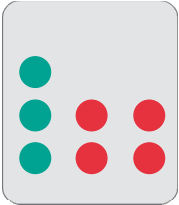
■ Manipulatives:

Manipulatives are essential tools to help students reason, make connections, and communicate their thinking as they develop a conceptual understanding of the mathematics moving from the concrete to the pictorial to the symbolic.

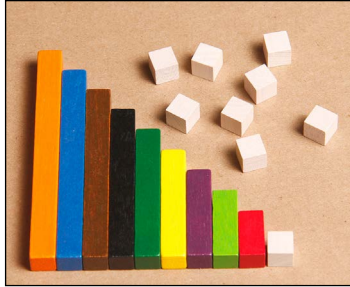
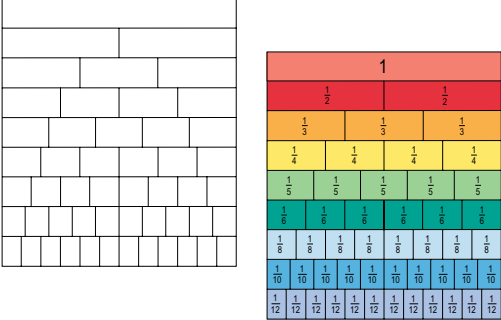
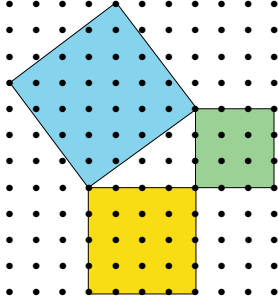
“Students learn by attaching meaning to what they do, and need to construct their own meaning of mathematics. This meaning is best developed when learners encounter mathematical experiences that proceed from the simple to the complex and from the concrete to the abstract. The use of manipulatives and a variety of pedagogical approaches can address the diversity of learning styles and developmental stages of students, and enhance the formation of sound, transferable mathematical concepts. At all levels, students benefit from working with a variety of materials, tools, and contexts when constructing meaning about new mathematical ideas. Meaningful student discussions can provide essential links among concrete, pictorial, and symbolic representations of mathematics.” (Manitoba Education, 2013, 3)

Name/ Visual	Description/Possible Use
<p>Algebra Tiles (Area Models)</p> 	<p>Algebra tiles represent algebraic concepts using an area model. Includes the following:</p> <ul style="list-style-type: none"> ■ “integer tiles” (small squares) ■ “X” tiles (rectangles) ■ “X²” tiles (large squares) ■ two colours to represent +/- ■ may contain other rectangles for “Y” and “Y²” <p>Useful for exploring and developing concepts involving</p> <ul style="list-style-type: none"> ■ integers ■ expressions and equations ■ factoring ■ distributive property ■ fractions and ratios ■ perimeter and area

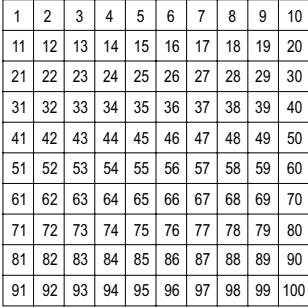
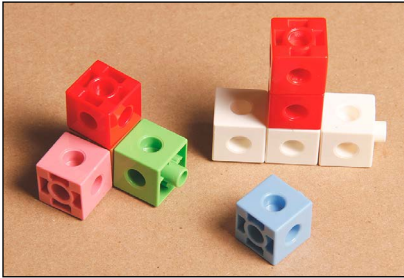
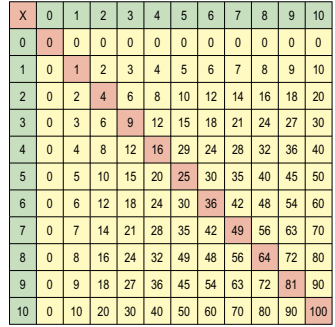
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Name/Visual	Description/Possible Use
<p>Base-10 Blocks</p> 	<p>Base-10 blocks are 3-dimensional models that include the following:</p> <ul style="list-style-type: none"> ■ unit cubes (1s) ■ rods (10s) ■ flats (100s) ■ large cubes (1000) <p>They are useful for exploring and developing concepts of</p> <ul style="list-style-type: none"> ■ number ■ place value ■ perimeter, area, and volume ■ modelling operations with whole numbers and decimal values ■ establishing a helpful visual for problem solving
<p>Coins/Currency</p> 	<p>Coins and currency are effective realia and useful for exploring and developing understanding of</p> <ul style="list-style-type: none"> ■ whole numbers ■ equivalent values ■ decimals ■ place value
<p>Coloured Counters</p> 	<p>Coloured counters are two-sided/two-coloured shapes that are useful for exploring and developing conceptual understanding of</p> <ul style="list-style-type: none"> ■ number ■ proportional reasoning ■ probability ■ operations with whole numbers, fractions, and integers

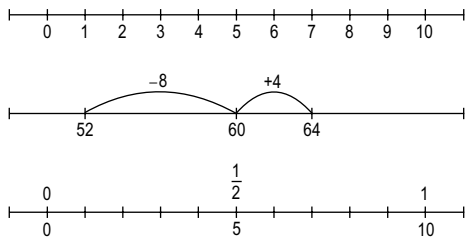
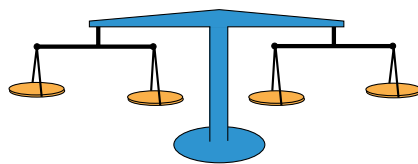
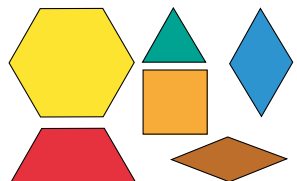
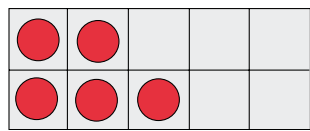
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Name/ Visual	Description/Possible Use
<p>Cuisenaire Rods® (Relational Rods)</p> 	<p>Cuisenaire rods are rectangular solids of related lengths that are useful for exploring and developing concepts involving</p> <ul style="list-style-type: none"> proportional reasoning (parts-whole) fractions model problems and operations with both whole and rational numbers
<p>Fraction Bars (Fraction Strips)</p> 	<p>Fraction bars use a visual of area to compare one whole with possible parts. These fraction bars may be used as a whole or cut into strips (or individual segments). Fraction bars are helpful for exploring and developing conceptual understanding of</p> <ul style="list-style-type: none"> part-whole relationships meaning of fractions equivalent fractions operations with fractions
<p>Geoboard</p> 	<p>Geoboards are a grid arrangement of pegs that hold elastic bands in position. The visual model of the shapes created by the elastics are helpful for exploring and developing conceptual understanding of</p> <ul style="list-style-type: none"> area and perimeter exponents square roots Pythagorean theorem patterns and transformations

continued

Name/Visual	Description/Possible Use
<p>Hundred Chart (Hundred Grid)</p> 	<p>A hundred chart is a ten-by-ten grid of the numbers 1-100 or 0-99. A hundred grid is a ten-by-ten array without numbers. Both are useful for exploring and developing conceptual understanding of</p> <ul style="list-style-type: none"> place value area patterns algebra operations with natural numbers
<p>Linking Cubes</p> 	<p>Linking cubes are interlocking 2-cm cubes of various colours. They are useful for exploring and developing concepts involving</p> <ul style="list-style-type: none"> spatial sense number sense measurement patterns fractions ratios probability
<p>Multiplication Table</p> 	<p>A multiplication table is a chart that displays the product of whole numbers. It is useful for exploring and developing a conceptual understanding of</p> <ul style="list-style-type: none"> arrays multiplication of whole numbers commutative property patterns

continued

Name/Visual	Description/Possible Use
<p>Number Lines (open number lines and double number lines)</p> 	<p>Number lines use equal segments to compare numbers and are helpful for exploring and developing conceptual understanding of</p> <ul style="list-style-type: none"> ■ counting ■ comparing quantities ■ operations whole numbers, integers, and rational numbers ■ graphing <p>Open number lines do not include pre-marked divisions with numbers.</p> <p>Double number lines visualize equivalent ratios and describe a relationship between two quantities.</p>
<p>Pan Balance</p> 	<p>A pan balance is an equal-arm balance that is useful for exploring and developing understanding of</p> <ul style="list-style-type: none"> ■ equality (as a relationship, not an operation) ■ order of operations for number and algebra
<p>Pattern Blocks</p> 	<p>Pattern blocks are colour-coded geometric solids that are useful for exploring and developing conceptual understanding of</p> <ul style="list-style-type: none"> ■ fractions ■ angles ■ patterns ■ transformations
<p>Tens Frames</p> 	<p>Tens frames are 2-by-5 arrays that are large enough to hold two-coloured counters and provide visual references to explore and develop</p> <ul style="list-style-type: none"> ■ number sense with benchmarks of 5 and 10 ■ composing and decomposing numbers ■ operations with whole numbers

Virtual Manipulatives (As virtual representations, these are no longer concrete.)

- www.edugains.ca/newsite/math/manipulative_use.html
Tip sheets and support videos describe each manipulative and ways it can help; recommended sample activities are also provided.
- <https://illuminations.nctm.org/>
Organized by strand and grade level, these interactive tools, lessons, apps, and games use a variety of visual models to explore mathematical relationships.
- <https://mathies.ca/learningTools.php>
Digital math learning tools from Ontario Ministry of Education for exploring and visualizing mathematics. Can be searched by topics and includes browser based activities and free apps.
- <http://nlvm.usu.edu/en/nav/vlibrary.html>
The National Library of Virtual Manipulatives understands that mathematics is not a spectator sport. This is a collection of interactive manipulatives and concept tutorials of many concrete manipulatives.
- https://www.edu.gov.mb.ca/k12/cur/math/support_gr7/index.html
Manitoba Education and Training has provided teachers with a variety of blackline masters that are helpful with developing conceptual understanding.

d) Foundational Intercultural Competence and Global Citizenship

Students will acquire knowledge, skills, and attitudes that will enable them to participate, communicate, and contribute to an interdependent, multilingual, and multicultural local and global society by

- affirming and valuing first language and culture
- developing and using knowledge and understanding of themselves as bilingual/bicultural or multilingual/multicultural learners
- valuing diversity from which the origins of numeracy developed
- developing and using knowledge and understandings concerning Canada's Indigenous Peoples, their contributions, and their use of numeracy in their cultures and traditions
- developing and using knowledge and understanding of the global society
- engaging in intercultural communication
- building community and recognizing community interdependence

Spiral Learning

As students are progressing in numeracy development, revisiting content and ideas, skills, vocabulary, and language over a period of time is essential to numeracy and literacy success. Repeated and ongoing contact allows students to practise these skills and language until it is learned. Revisiting previously taught content will solidify content knowledge and enhance connections as students move forward with new knowledge.



Lesson Planning Considerations

LAL students may not have formal background knowledge in mathematics, but they may have experiences in numeracy by working in a market, manufacturing items to sell and use, or buying and reselling goods. When presenting mathematical concepts and developing numeracy skills, build on background knowledge by

- supporting students to use their first or home language to access the content
- connecting content with what students already know
- using visual aids, manipulatives, and technology to provide opportunities for the student to actively participate in the math lesson
- making cultural connections
- interweaving language outcomes and supports within each lesson
- connections between concrete ↔ pictorial ↔ symbolic representations

Instructional Focus

Consider the following when planning for instruction:

- Instructional design focused on conceptual understanding, procedural thinking, and problem solving will enable students to master the mathematical skills and concepts of the curriculum.
- Integration of the mathematical processes within each strand is expected.
- Problem solving, conceptual understanding, reasoning, making connections, and procedural thinking are vital to increasing mathematical fluency, and must be integrated throughout the program.
- Concepts should be introduced using manipulatives and gradually developed from the concrete to the pictorial to the symbolic.
- Students in Manitoba bring a diversity of learning styles and cultural backgrounds to the classroom and they may be at varying developmental stages. Methods of instruction should be based on the learning styles and abilities of the students.
- Use educational resources by adapting to the context, experiences, and interests of students.
- Collaborate with teachers at other grade levels to ensure the continuity of learning of all students.
- Familiarize yourself with exemplary practices supported by pedagogical research in continuous professional learning.
- Provide students with several opportunities to communicate mathematical concepts and to discuss them in their own words. (Manitoba Education, 2013)

See the Instructional Focus section (page 17) in *Kindergarten to Grade 8 Mathematics: Manitoba Curriculum Framework of Outcomes (2013)*.

www.edu.gov.mb.ca/k12/cur/math/framework_k-8/index.html

Resources for Lesson Planning

1. Documents:

- *Glance Across the Grades: Kindergarten to Grade 9 Mathematics*
This 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.
www.edu.gov.mb.ca/k12/cur/math/glance_K-9/index.html
- *Manitoba Curriculum Frameworks for EAL and LAL Programming: Middle Years and Senior Years*
These documents include the curriculum frameworks for Early, Middle, and Senior Years EAL/LAL education in Manitoba, as well as assessment guidelines. These frameworks set out the goals and principles for EAL/LAL programming in Manitoba schools, providing a description of the students, the EAL/LAL stages, the relationship of the framework to other provincial curricula, programming models, practical information, theoretical approaches, and research related to welcoming and planning for new students who are learning EAL.
www.edu.gov.mb.ca/k12/cur/eal/framework/index.html
- *Kindergarten to Grade 8 Mathematics: Manitoba Curriculum Framework of Outcomes (2013)*
The framework identifies beliefs about mathematics, general and specific learning outcomes, and achievement indicators agreed upon by the seven jurisdictions.
www.edu.gov.mb.ca/k12/cur/math/framework_k-8/index.html
- *Manitoba Education and Training Mathematics*
Kindergarten to Grade 8 Mathematics Support Documents for Teachers
These documents provide various instructional activities, assessment strategies, and learning resources meant to promote the meaningful engagement of math learners. They are meant to be used as an aid to teachers as they work with students in achieving the prescribed outcomes and achievement indicators as outlined in the Manitoba mathematics curriculum.
www.edu.gov.mb.ca/k12/cur/math/index.html

2. Lesson Plan Template

- A sample lesson plan template, a corresponding guide, and some examples of using this template can be found in the Appendix.

3. Instructional Strategies

- *Manitoba Education and Training Mathematics*
Kindergarten to Grade 8 Mathematics Support Documents for Teachers
www.edu.gov.mb.ca/k12/cur/math/index.html
- *Teaching Student-Centered Mathematics: Developmentally Appropriate Instruction for Grades Pre-K–2* (2018) by John A. Van de Walle, LouAnn H. Lovin, Karen S. Karp, and Jennifer M. Bay-Williams
- *Great Ways to Differentiate Secondary Mathematics Instruction* (2010) by Marian Small and Amy Lin
- Web resources:
 - Nzmaths: The Home of Mathematics Education in New Zealand
“Cuisenaire Mats”
<https://nzmaths.co.nz/resource/cuisenaire-mats>
“Material Masters”
<https://nzmaths.co.nz/material-masters>
 - Province of Ontario Edugains Website
Edugains is an Ontario Ministry of Education resource that supports improved learning and teaching strategies in K–12 schools.
www.edugains.ca
“Manipulatives”
www.edugains.ca/newsite/math/manipulative_use.html
“Lessons and Supports”
www.edugains.ca/newsite/math/lesson_supports.html
 - Utah State University
National Library of Virtual Manipulatives
“The National Library of Virtual Manipulatives (NLVM) is a National Science Foundation–supported project that began in 1999 to develop a library of uniquely interactive, web-based virtual manipulatives or concept tutorials, mostly in the form of Java applets, for mathematics instruction (K–12 emphasis). The project includes dissemination and extensive internal and external evaluation.”
<http://nlvm.usu.edu/en/nav/vlibrary.html>

- Math Learning Center
“Pattern Shapes”
“Students use Pattern Shapes to explore geometry and fractions, creating their own designs, or filling in outlines. As they work with the shapes, students explore geometric relationships, think about angles, investigate symmetry, and compose and decompose larger shapes. Many of these explorations lead naturally to thinking about fractions as parts of a whole.”
<https://apps.mathlearningcenter.org/pattern-shapes/>
- Ontario Ministry of Education Math Clips (Critical Learning Instructional Paths Supports)
Mathclips provides interactive activities that are grounded in educational research.
“Pattern Block Template”
<http://mathclips.ca/tools/PatternBlocks.pdf>
- Youcubed.org
Youcubed is a website created by Dr. Jo Boaler that works to “inspire, educate and empower teachers of mathematics, transforming the latest research on math into accessible and practical forms.”

4. Key Vocabulary

- *Kindergarten to Grade 8 Mathematics Glossary: Support Document for Teachers*
This glossary for Manitoba teachers provides an understanding of the mathematical terms used in Kindergarten to Grade 8 mathematics, as reflected in *Kindergarten to Grade 8 Mathematics: Manitoba Curriculum Framework of Outcomes*.
www.edu.gov.mb.ca/k12/cur/math/glossary_k-8/index.html

5. Language

- Curriculum Frameworks for EAL and LAL Programming: Middle Years and Senior Years
www.edu.gov.mb.ca/k12/cur/eal/framework/index.html

6. Assessment

- Mathematics Support Documents for Teachers
www.edu.gov.mb.ca/k12/cur/math/index.html
- Assessment *for/as/of* learning

7. Problem Solving

- *Making Math Meaningful*, 3rd edition (2015) by Marian Small

8. Financial Literacy

- Bow Valley College Centre for Excellence in Immigrant and Intercultural Advancement
Financial ESL Literacy Toolkit
https://globalaccess.bowvalleycollege.ca/sites/default/files/financial_ESL_literacy_toolkit_0.pdf
- Centre for Family Literacy
Dollars & Sense: Financial Literacy Course, Curriculum Manual
www.famlit.ca/resources/Dollars_&Sense2012.pdf
- Canadian Foundation for Economic Education
Money and Youth: A Guide to Financial Literacy
<https://www.kobo.com/ca/en/ebook/money-and-youth>

Teachers may use other resources that may be available and appropriate.

Language Goals

- Know and use an emergent repertoire of mathematical words and phrases.
- Recognize and use basic English mechanical features in modelled situations, such as by copying number symbols and words with appropriate spacing.
- Express simple ideas using keywords, short phrases, and short sentences in structured, familiar situations, with or without visual aids such as physical movement, gestures, realia, pictures, or acting out.
- Add basic knowledge, concepts, and skills related to mathematics using realia and visuals.

What Is a Language Objective?

Language objectives are learning targets that specifically outline the type of language that students will need to learn and use in order to accomplish the goals of the lesson. Quality language objectives complement the content knowledge and skills identified in content-area standards and address the aspects of academic language that will be developed or reinforced during the teaching of grade-level content concepts.

These objectives involve the four language skills (speaking, listening, reading, and writing), but they also include the following:

- the language functions related to the topic of the lesson (e.g., justify, hypothesize)
- vocabulary essential for a student to be able to fully participate in the lesson (e.g., *x*-axis, locate, graph)
- language learning strategies to aid in comprehension (e.g., questioning, making predictions)

Possible Language Objectives

- Students will **record** ideas in a graphic organizer showing the steps in the process.
- Students will **write** a summary of the process followed to solve the problem.
- Students will **define and use** key math vocabulary (list key vocabulary).
- Students will **read** a story problem, identify key information, and solve the problem.
- Students will **create** their own story problems.

Possible Teaching Strategies

The organization *Teaching Tolerance* created the following nine suggested anti-bias strategies for use with ELL students:

1. *Anchor charts* remind students of prior learning built over multiple lessons. They help level the playing field by providing all students, regardless of prior knowledge or background, with visual reminders of the vocabulary they are responsible for.
2. *Realia* are real-life objects that enable students to make connections to their own lives as they try to make sense of new concepts and ideas. Realia also evoke physical responses that help students recall ideas and themes from the text in later discussions.

3. *Readers' theatre* helps children gain reading fluency and engage fully with texts. The strategy involves attention to pronunciation, unfamiliar vocabulary, and interpretation.
4. Students *make connections* to read-aloud texts by relating the text to themselves (lived experiences), to other texts (read in any setting), and to the world (current and historical events).
5. During *shared reading*, learners observe experts reading with fluency and expression while following along or otherwise engaging with the text. This strategy improves targeted reading comprehension skills while promoting the joy of reading.
6. The *think-aloud* strategy encourages conversations about reading for understanding, providing insight into how students are processing texts. This strategy fosters the metacognition skills necessary for students to become successful independent readers.
7. Students use *vocabulary frames* to identify a word's meaning, its parts, and its opposite. Vocabulary frames combine several word-learning strategies in a single diagram, helping students retain the new word.
8. *Word walls* reinforce sight-word acquisition and build content literacy across grades and disciplines. They also help students see relationships between words and ideas. (Note: Use large print and match words with pictures or diagrams. Keep word wall accessible during tests.)
9. A personal *picture dictionary* is an individual vocabulary and spelling resource students make themselves. This strategy allows students to take ownership of their learning.

It may also be useful for students to document their thinking and problem-solving steps in a *math journal*. They may write in English or their home language and create diagrams and charts to clarify the content for themselves. They may also find using graphic organizers and think-pair-share-write strategies to be helpful.

Language Acquisition Strategies

- **Metacognitive Development:** Providing students with skills and vocabulary to talk about their learning. Examples: self-assessments, note taking and studying techniques, and vocabulary assignments.
- **Bridging:** Establishing a link between the students' prior knowledge and the material. Examples: think-pair-share, quick-writes, and anticipatory charts.
- **Schema Building:** Helping students see the relationships between various concepts. Examples: compare and contrast, jigsaw learning, peer teaching, and projects.
- **Contextualization:** Familiarizes unknown concepts through direct experience. Examples: Demonstrations, media, manipulatives, repetition, and local opportunities.

- Text Representation: Inviting students to extend understandings of text and apply them in a new way. Examples: student-created drawings, videos, and games.
- Modelling: Speaking slowly and clearly, modelling the language you want students to use, and providing samples of student work.
- L1 Scaffolding: A review of literature shows that supporting ELL students' use of their native language helps them comprehend and learn English. It develops greater brain density in areas related to language, memory, and attention (Moughamian et al., 2009; Protheroe, 2011).
- Know who your LAL students are and their proficiency in English. This can be obtained from the EAL/ bilingual teacher, guidance counsellor, social worker, or administration. It is important to note that EAL student proficiency in listening, reading, speaking, and writing will vary.
- As with all your students, set high expectations.
- Embed multicultural education throughout the curriculum.
- Assess and utilize the background knowledge of your students.
- Learn to pronounce student names correctly to help develop rapport.
- Use technology and multimedia such as class websites, blogs, and videos.
- Provide opportunities for students to use their home language, as they may not be able to demonstrate their learning exclusively in English.
- Use structured note-taking formats such as graphic organizers.
- Utilize classroom routines and play music as appropriate.

Instructional Strategies

- Slow down your speech and use shorter sentences, present tense of words, synonyms, examples, gestures, and demonstrations.
- Avoid expressions or sayings that are only common locally.
- Use as many ways as possible to convey information. Examples: oral, written, videos, teacher demonstrations, student demonstrations.
- Use think-alouds and think-pair-shares when asking questions, and don't forget to give students enough time to process the question.
- Use student-developed bilingual dictionaries.
- Use metaphors and imagery for cues.

Environmental Strategies

In its web resource “Teaching Strategies for English Language Learners,” SupportREALTeachers.org listed the following useful strategies that teachers can use for student success:

- Create a warm, inviting, and welcoming classroom environment.
- Create print-rich environments using bulletin boards (see PE Central at www.pecentral.org/bulletinboard/bulletinboardmenu.asp for an example). The website *Top Notch Teacher Products* also provides useful strategies for creating print-rich environments (Melinda).
- Use visual displays, portable white boards, and posters when giving instructions.
- Create word walls: displays of high-frequency words for a unit, arranged alphabetically. The organization *We Are Teachers* created an album (www.buzzfeed.com/weareteachers/19-word-walls-that-will-blow-your-mind-h0xt) of particularly effective word walls.
- Display numeracy-rich examples.

Teachers can enhance their lessons by

- providing a low-stress environment and setting high expectations for students to learn
- concentrating on meaning and process rather than grammar
- including and engaging all LAL students in the class
- explicitly modelling the steps and processes students need to learn
- using slower speech and simpler language, and paying attention to enunciation and pronunciation
- highlighting key vocabulary on a word wall so it is accessible throughout the lesson
- using simple vocabulary and sentences and visual supports with modelling, manipulatives, realia, graphic organizers, and cooperative learning strategies
- enabling students to interact with questions and comments during the lesson
- having students draw pictures or act out what is happening
- using sentence frames to prompt students during class discussions and when formulating answers to questions
- practising an extended wait time and giving students time to process the content of the lesson
- providing comprehensible input with hands-on, experiential learning
- talking in a normal voice, with proper enunciation and pronunciation, gestures, and body language
- repeating instructions several times, perhaps in a different way

- encouraging students to incorporate their first or home language in their learning
- providing contextual mathematical exercises that promote rigour
- modelling language as well as mathematical concepts
- reinforcing previous lessons throughout the course
- triangulating your assessment – what the student demonstrates, what the student explains, and what you observe with regards to language learning and mathematical concepts
- encouraging students to use pictures, manipulatives, realia, etc. to explain their learning and to be aware of non-verbal responses

Calculators and Technology

The use of calculators and technology is encouraged. When a student is working on basic arithmetic skills, mental math, or developing a new concept, other strategies may be more effective for numerical fluency.

As the LAL Numeracy Phase 1A deals with patterns and basic numerical computations, pen-and-paper strategies are encouraged for this half course.

Problem Solving

Problem solving is much more than a list of word problems done at the end of a unit. The goal is to have students apply math skills and concepts to find solutions to a variety of math problems, and it is the vehicle through which students are able to discuss, explore, and develop math skills. Students should learn about and learn through problem solving.

Open Problems

Some problems can be classified as “open” since there may be more than one answer or more than one solution path to arrive at an answer. The following is an example of an open-ended problem: “If the area of a rectangle is 36 m^2 , what might the length and width be?” The following are examples of open-middle problems: “Find the product of 15×4 ” or “What is the sum of $98 + 17$?” There is only one answer: “The product is 60” or “The sum is 115”; however, different students may have used different strategies to find an answer. For the open-middle problems, it is important for students to share their strategies and thinking with the class and/or with the teacher.

Word Problems That Focus on Operations

Word problems or story problems are one type of problem that can help students connect different meanings and relationships to the four operations of addition, subtraction, multiplication, and division. There are many different types of problem structures involving the operations. Students should have experience with all types. For an overview of addition and subtraction problems and division and multiplication problems, see pages 24–25 of *First Steps in Mathematics: Operation Sense* by the Government of Western Australia Department of Education and Training at https://arpdcreources.ca/resources/first_steps_in_mathematics/documents/operation-sense.pdf.

Problem-Solving Teaching Strategies

Problem solving can be useful to create interdisciplinary connections to broaden students’ field of learning. Problems can pose a challenge for LAL students because of their language, literacy, and contextual needs. As with non-LAL students, they may have difficulty reading the problem, understanding the meaning of what is given and what is asked for, and identifying relevant and irrelevant information. Depending on their experience in their native country, even the form of the word problem may be new to some students. They may need some strategies to tackle the language and the mathematics of word problems. For example:

- Students must be able to comprehend the vocabulary that is used in the word problem.
 - The vocabulary used in the word problem may be in a new mathematical context and may not be simple and clear.
- Students may not be able to understand complex sentences.
 - Read word problems slowly and carefully several times.
 - Consider using sentences limited to a subject, verb, and an object.
 - Break long sentences into multiple, short sentences.
 - If possible, break up the problem into smaller segments.
- Assess the word problem by asking questions like the following:
 - What is the problem about?
 - What is the problem asking for?
 - What information will you need to solve the problem?
 - What information is given?

- What information is missing?
- What information is not needed?
- What can you do to begin to solve the problem?
- Students may be able to act out the word problems to better comprehend what they are being asked to solve.
- Supplement the word problem with an illustration.
 - Share a simpler example of a similar problem.
 - Draw a picture to represent the problem.
- Provide manipulatives.
- Write a format for the solution of a word problem on the board as a sentence frame. For example, “The distance is miles because the route is a (square, rectangle, triangle, . . .).”
- Modelling Thinking through Think-Alouds
 - During a think-aloud, the teacher or student says aloud what they are thinking while they work through a problem. The teacher verbalizes the math content, talks about strategies they are using, and says what to do to solve the problem.
 - In think-alouds, students are able to hear what the teacher or other students are thinking as they analyze the problem and make decisions on how to solve it.

When doing problem solving of all types, it is often effective for students to work in pairs or small groups rather than individually. Working with others facilitates students in communicating ideas, sharing solution strategies, and posing questions, and it can bring misunderstanding to light. If there is another student in the classroom who speaks a particular student’s first language, you could pair the two of them up. Reading the problem and working together can build the confidence of both students. The website *YourDictionary.com* has a useful resource on teaching mathematics to EAL students that can be found at <http://esl.yourdictionary.com/esl/esl-lessons-and-materials/tips-for-teaching-math-to-esl-students.html>.

The Understanding Language Initiative at Stanford University has compiled some additional useful strategies in its 2013 document *Supporting ELLs in Mathematics*, which can be found at https://ell.stanford.edu/sites/default/files/math_archives/Ful%20set_UL%20Math%20Resources%2010-28-13%20updated.pdf.

Financial Literacy

Becoming proficient in financial literacy allows students to make wise financial decisions in their day-to-day lives, get insights into planning for their futures, and to become debt aware while making charges and payments to credit cards. There are suggested topics for each half course:

1A: Money, shopping (groceries and other shopping), and household expenses

1B: Spending, sales taxes, importance of receipts

2A: Banking (chequing and savings accounts, RRSP)

2B: Credit cards, debt, fraud

Financial literacy can be a context to apply problem solving to mathematical concepts. Teachers can intersperse these financial literacy topics throughout the half course or explicitly teach them. These topics are discussed in greater detail in Grades 10 and 11 Essential Mathematics. It is more important to expose students to the concepts presented in each half course. It is important for the students to be familiar with financial literacy concepts to make wise financial decisions, to know the consequences of credit card debt, and to avoid being victims of fraud.

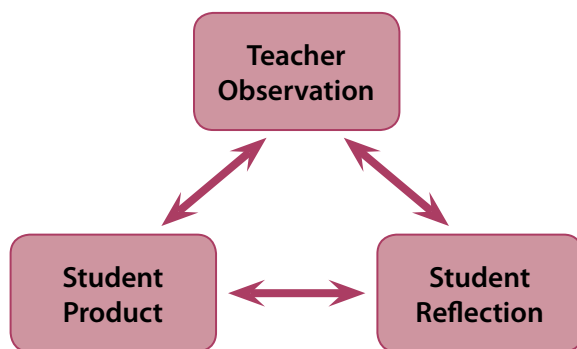
Assessment

EAL assessment in these numeracy courses will provide information to

- assist in determining the mathematics course placement and programming plans
- identify and diagnose student needs, strengths, and next steps
- monitor and measure linguistic and mathematical progress
- determine whether changes are needed in instructional approaches, content, and associated mathematics and language development activities
- help students participate in their learning process by giving constructive feedback that encourages them to reflect on their learning
- inform parents of student progress

Whether conducting assessment *for*, *as*, or *of* learning, a teacher needs sufficient evidence of language learning and mathematics learning. By using triangulation of data for assessment, teachers can get an accurate indication of whether the student has met curricular goals. Triangulation is a process by which a teacher collects evidence about student learning from three different sources:

- Teacher observation in class
- Conversation with the student and/or student reflection
- Student production, such as projects, tasks, tests, etc.



A mathematics assessment can be developed and administered to LAL students to determine which mathematics course is most appropriate when they register.

A mathematics assessment can also be developed and administered to LAL students to determine if they are ready for the next LAL half-credit course or for Grade 9 Mathematics.

Please note that when students have successfully completed the LAL Transitional Numeracy 2B half course, they will register for the Grade 9 Mathematics 10F course.

Grade Reporting

Because LAL students are developing their English language skills in addition to their numeracy background knowledge, it may take them longer than the allotted time to develop language and numeracy proficiency in these courses. The expectations for learning, content, and rigour cannot be compromised. Manitoba Education and Training requires that the grades in these courses be reported as either Complete (CO) or Incomplete (IN) on the Provincial Report Card. When Complete (CO) is reported as a final grade, the LAL student will have shown proficiency in both the English language and the content represented in the course, and the ½ credit will be recorded for that course. An Incomplete can be given as a final term mark but should not appear as a final grade on the report card. This will indicate that the student is continuing in the course in the next semester or the next school year.

According to *Manitoba Provincial Report Card Policy and Guidelines* (Manitoba Education and Training, 2018, p. 22), the following curriculum expectations indicate an understanding and application of concepts:

Criteria for Complete:	
<i>Good understanding and application of concepts and skills</i>	<i>Very good to excellent understanding and application of concepts and skills</i>
<ul style="list-style-type: none"> ■ understands most concepts and skills ■ often makes connections to similar concepts and skills ■ sometimes applies to own life and to support new learning 	<ul style="list-style-type: none"> ■ thoroughly understands all or nearly all concepts and/or skills ■ routinely makes connections to similar concepts and skills ■ applies creatively to own life and to support new learning

An indication of Complete reflects good, very good, or excellent understanding and application of concepts and skills and consistent learning with respect to learning goals addressed from the beginning of the course. This requires the teacher’s professional judgment and evidence of learning. Achievement should be based on clear evidence of the achievement of the learning goals and what the students know and can do relative to the curriculum. Non-academic factors, such as attendance, punctuality, attitude, effort, and behaviour, should not be included in academic achievement.

An Incomplete can be given as a term mark but should not appear as a final grade on the report card. This will indicate that the student is continuing in the course in the next semester or the next school year. The circumstances should be explained in the comment box.

For an interim mark, Incomplete may be given. An explanation in the comment box should indicate areas that the student has met criteria and areas they will be continuing on next.