

Grade 12

Essential Mathematics

mRLC

Essential Learning



Manitoba Rural Learning Consortium Grade 12 Essential Mathematics Essential Learning Document

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Introduction

This draft document is intended to support Senior Years teachers in planning, teaching, assessing, and reporting on their Mathematics programs. The document has been designed to correlate the enduring understandings of the program with specific learning outcomes from the Manitoba Mathematics Curriculum. It is important to note that the attached templates are intended to serve as an example of how teachers might identify essential learning and cluster specific learning outcomes. Therefore, the templates may be viewed as a guide and support document to help teachers in implementing the Mathematics curriculum.

On each template, essential vocabulary has been included. This vocabulary has been identified through an examination of the specific learning outcomes for each strand. These are terms that teachers and students will be using as they explore the mathematical concepts related to each strand.

The document should be used alongside the Manitoba Curriculum Framework of Outcomes for Mathematics, as well as the grade-specific support documents. Teachers are encouraged to continue to innovate their practice and inspire their students.

What is mathematical literacy?

- Mathematically literate individuals can effectively communicate in order to learn and express their understanding, connect mathematical ideas to other concepts in mathematics, to everyday experiences, and to other disciplines.
- Mathematically literate individuals demonstrate fluency with mental mathematics and estimation, develop and apply new mathematical knowledge through problem solving and mathematical reasoning.
- Students need to select and use technologies as tools for learning and solving problems as well as develop visualization skills to assist in processing information and making connections.
- Mathematical literacy is an evolving combination of recognizing describing, and working with numerical and non-numerical patterns, having an intuitive number sense, interpreting and reflecting on the physical environment and making predictions.

Grade 12

Essential Mathematics

Suggested Report Card Categories	Enduring Understandings	Essential Learning	Essential Questions	Concepts	Learning Outcomes	Essential Vocabulary
	<p>Statistics Unit:</p> <p>Students will understand that statistics can be used to display data in a variety of ways to represent a point of view.</p>	To Be Determined	<p>How can we choose measures of central tendency to best represent and interpret situations accurately?</p> <p>How can data and statistics be used to influence others?</p> <p>Why is it important to understand the effects of outliers on measures of central tendency?</p>	<p>The mean is not the only way to report the average.</p> <p>Trimming outliers can improve data calculations.</p> <p>Weighting changes the calculation of the mean.</p> <p>Percentiles rank performance.</p>	<p>12E5.S.1.</p> <p>12E5.S.2.</p>	<p>Data, mean, median, mode, central tendency, outlier, trimmed mean, weighting, weighted mean, rank, percentile, percent</p>
	<p>Precision Measurement Unit:</p> <p>Students will understand that different situations require varying degrees of precision, accuracy and tolerance.</p>	To Be Determined	<p>When is a high degree of tolerance, accuracy and precision required in real life?</p> <p>When is a low degree of tolerance, accuracy and precision acceptable in real life?</p> <p>What are the possible implications of not using a high degree of accuracy, precision and/or tolerance when required?</p>	<p>Although related, precision and accuracy are different.</p> <p>All measurements do not need the same degree of precision.</p> <p>Different tools provide varying levels of precision.</p>	<p>12E5.P.1.</p>	<p>Measure, precision, accuracy, measuring instrument, ruler, tape measure, vernier caliper, micrometer, uncertainty, maximum, minimum, tolerance</p>

Suggested Report Card Categories	Enduring Understandings	Essential Learning	Essential Questions	Concepts	Learning Outcomes	Essential Vocabulary
	<p>Geometry and Trigonometry Unit:</p> <p>Students will understand how aspects of trigonometry and geometry can be applied to real-life situations?</p>	To Be Determined	<p>Why is it important to understand properties of polygons in real life?</p> <p>Why is figuring out angle measurements and side lengths important in industrial or construction applications?</p> <p>Where in real life are polygons used?</p>	<p>Non right triangles are solved using the laws of sine and cosine.</p> <p>Regular polygons have predictable properties.</p> <p>Recognize that triangles and regular polygons occur in a real-life situation.</p>	<p>12E5.G.1.</p> <p>12E5.G.2.</p>	<p>Triangle, quadrilateral, polygon, sine, cosine, isosceles, equilateral, angle measure, side length, diagonal, angle of intersection, property, opposite, adjacent, hypotenuse</p>
	<p>Home Finance Unit:</p> <p>Students will understand the economic feasibility of purchasing, owning and operating a home.</p>	To Be Determined	<p>What are the costs associated with purchasing and owning a home?</p> <p>Why is it important to understand the economic feasibility of owning and operating a home in real life?</p> <p>How can decisions be made regarding purchasing a home based on data?</p>	<p>There are many additional costs when buying a home.</p> <p>A mortgage payment is made up of the interest and principal portion.</p> <p>The GDSR can be used to determine the affordability of a house.</p>	<p>12E6.H.1.</p>	<p>Mortgage, costs, land transfer tax, legal/lawyer fees, insurance, expense, maintenance, preventative, emergency repair, owning, renting, energy efficiency, property tax, gross debt service ratio</p>

Suggested Report Card Categories	Enduring Understandings	Essential Learning	Essential Questions	Concepts	Learning Outcomes	Essential Vocabulary
	<p>Vehicle Finance Unit:</p> <p>Students will understand the factors relevant to the decision-making process of acquiring a vehicle.</p>	To Be Determined	<p>What factors should be considered when deciding to lease or buy a vehicle?</p> <p>What are the implications regarding the decision to acquire a vehicle?</p> <p>How can decisions regarding the acquisition of a new vehicle be made using data?</p>	<p>Owning a vehicle cost more than just gas.</p> <p>A vehicle must be insured and maintained.</p> <p>In some situations, leasing makes more sense than buying and vice versa.</p>	12E5.V.1.	Buy/purchase, lease, operating costs, maintenance, repair, depreciation, fuel consumption, insurance, warranty, mileage, safety
	<p>Probability Unit:</p> <p>Students will understand the importance of probability when making decisions in a real-life context.</p>	To Be Determined	<p>Why is understanding probability important in real life?</p> <p>How can probability be used to make decisions?</p> <p>What are the implications of relying solely on theoretic probability without taking into account experimental probability?</p>	<p>Probability is determined by dividing the ways to succeed by the total possible outcomes.</p> <p>Odds are expressed as the ratio of success to failures.</p> <p>Both experimental and theoretical probabilities exist.</p>	12E6.P.1.	Probability, data set, fraction, decimal, percent, expected gain/loss, odds, event, theoretical probability, experimental probability, subjective

Suggested Report Card Categories	Enduring Understandings	Essential Learning	Essential Questions	Concepts	Learning Outcomes	Essential Vocabulary
	<p>Business Finance Unit:</p> <p>Students will understand the importance of profit/loss calculations when operating a small business.</p>	To Be Determined	<p>How can the economic feasibility of the business be determined?</p> <p>How are business expenses determined?</p> <p>What are the other factors that effect profitability?</p>	<p>Income minus expenses equals profit.</p> <p>Accurate keeping of receipts is needed for income tax purposes.</p> <p>Profitability is affected by factors such as seasons and hours of operation.</p> <p>Personal finance is separate from business finance.</p>	<p>12E6.B.1.</p> <p>12E6.B.2.</p>	<p>Business, feasible, profitability, receipts, income tax form, tax schedule, deduction, expense</p>
	<p>Analysis of Games and Numbers:</p> <p>Students will understand that perseverance and a variety of strategies are necessary in solving complex problems.</p>	To Be Determined	<p>When is guess and check an ineffective strategy?</p> <p>Why are patterns useful in problem solving?</p> <p>How do you verify a solution?</p>	<p>Some complex problems will not be solved at first glance.</p> <p>Guess and check does not work well in all situations.</p> <p>Working systematically can reduce the time required to solve a problem.</p>	<p>12E5.A.1.</p> <p>12E6.A.1.</p>	<p>Determine, explain, verify, strategy, guess, check, pattern, systematic, draw/model, eliminate, simplify, backward, alternative, win/loss</p>
	<p>Career Life:</p> <p>Students will understand the factors involved in planning for their future career and desired lifestyle.</p>	To Be Determined	<p>Why is it important to compare and contrast careers?</p> <p>What is the purpose of budgeting?</p> <p>How does career choice influence a person's lifestyle?</p>	<p>Many factors influence career choices.</p> <p>Budgets assist in planning and managing your finances.</p> <p>Lifestyle affects monthly expenses and budgets.</p>	<p>12E5.C.1.</p>	<p>Career, job description, requirements, education, costs, aptitude, value, salary/wage, employment, advancement, budget, negative factor, resume</p>

Grades 9/10 Mathematics Definitions –



Suggested Provincial Report Card Categories:

Knowledge and Understanding

This report card category focuses on student progress related to learning experiences in which students demonstrate knowledge and understanding of grade-specific mathematical concepts and skills in each strand (Number, Patterns and Relations, Shape and Space, Statistics and Probability).

Mental Math and Estimation

This report card category focuses on student progress related to learning experiences in which students use math knowledge and number facts to calculate mentally or estimate. This includes:

- Determining an answer using multiple mental math strategies
- applying mental math strategies that are efficient, accurate and flexible
- making a reasonable estimate of value or quantity using benchmarks and referents
- using estimation to make mathematical judgements in daily life

Problem Solving

This report card category focuses on student progress related to learning experiences in which students apply knowledge, skill, or understanding to solve math problems. This includes:

- applying various strategies to model solutions to problems
- applying mathematical knowledge to solve problems
- using prior knowledge to connect math ideas to other concepts
- using appropriate technology to solve problems
- using visualization or models to demonstrate understanding
- communicating problem-solving solutions mathematically
- justifying mathematical thinking
- thinking logically to make sense of mathematics (reasoning)
- using logic and divergent thinking to present mathematical arguments
- applying algebraic reasoning when solving problems

References:

The Manitoba Report Card Support Document. Manitoba Education. 2012.

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Essential Learning Terminology:

Enduring understanding

“Enduring understandings are statements summarizing important ideas and core processes that are central to a discipline and have lasting value beyond the classroom. They synthesize what students should understand...as a result of studying a particular content area. Moreover, they articulate what students should “revisit” over the course of their lifetimes in relationship to the content area.”

Key performance skills

Key performance skills draw on a variety of skills. Performance skills develop within the individual and grow in sophistication over time. Some examples of key performance skills include problem solving, critical thinking and inquiry, design process etc.

Values/attitudes/dispositions

Students need to develop the values and attitudes that assist them in understanding each discipline with some depth, then knowing how to communicate their understanding while seeing the relationship between each discipline.

Essential questions

Questions that are not answerable with finality in a brief sentence...their aim is to stimulate thought, provoke inquiry and spark more questions.

Wiggins/McTighe 2005

Concepts

The broad concept provides a frame through which students filter information (*Erickson*). When a concept is truly understood it can be explained and is transferrable, or applied to problem-solving. *Wiggins/McTighe 2005*

Essential vocabulary

Vocabulary is introduced when needed to clarify experiences and ideas rather than in a list of new terms that start the unit. Essential vocabulary consists of figurative language, nuances in word meaning, roots, affixes, context clues, dictionary, thesaurus, pronunciation, parts of speech. *Wiggins/McTighe 2005*