



Manitoba Rural Learning Consortium Middle Years Mathematics Essential Learning Document

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Introduction

This draft document is intended to support Middle Years teachers in planning, teaching, assessing, and reporting on their Mathematics programs. The document has been designed to correlate the categories from the new provincial report card with the strands, essential learning (big ideas), and 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 and the new provincial report card. Teachers are encouraged to continue to innovate their practice and inspire their students.

The document should be used alongside the Manitoba Curriculum Framework of Outcomes for Mathematics, as well as the grade-specific support documents. In addition, teachers are encouraged to consider the following issues:

- 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.
- Although the templates have been organized by specific strands of the Mathematics curriculum, the overall program is intended to be presented as a spiral curriculum. Using this approach, strands are interwoven and explored throughout the school year.

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 Five - Strand: Number

Enduring Understanding: Students will understand that developing number sense enables them to count, represent, and compare quantities, and to use operations to determine quantities.

Report Card Subject Categories	Essential Learning	Essential Questions	Concepts	Specific Learning Outcomes	Essential Vocabulary	
Knowledge and Understanding	Describe, represent, compare and order numbers in a variety of ways.	In which different ways can whole numbers, fractions and decimals be represented? How can we compare and order whole numbers, fractions and decimals? How do decimals relate to fractions?	- whole numbers to 1 000 000, fractions (equivalent with like and unlike denominators) and decimals (tenths, hundredths and thousandths) using objects, pictures, and symbols.	5N1, 5N7, 5N8, 5N9, 5N10	base digit expanded notation hundred thousand one million place value ten thousand annex approximate compatible numbers compensation estimate front-end rounding dividend divisor factor product quotient doubling halving	product multiple array partial product divisible remainder denominator equivalent fraction numerator decimal decimal point hundredths tenths thousandths decimal benchmark difference sum
	Understanding that addition and subtraction of decimals is similar to addition and subtraction of whole numbers.	How can we add and subtract decimals?	- addition/subtraction of decimals to thousandths.	5N11		
Mental Math and Estimation	Demonstrate an understanding of multiplication and division and their related properties, and that both are inverse operations.	How can multiplication and division be shown? What is the meaning of multiplication? What is the meaning of division? How are multiplication and division related?	- multiplication (2-digit numerals by 2-digit numerals) and division (3-digit numerals by 1-digit numerals) with and without concrete materials, and remainders.	5N5, 5N6		
	Estimate quantities.	How can estimation strategies be used?	- front-end rounding, compensation, compatible numbers	5N2		
	Determine multiplication facts and related division facts.	How can we use mental math strategies to determine multiplication facts and related division facts? How can we apply mental math strategies for multiplication?	- facts to 81 - annexing then adding zeros, halving and doubling, using the distributive property.	5N3, 5N4		

Problem Solving	Estimate quantities.	How can estimation strategies be used to solve problems?	- front-end rounding, compensation, compatible numbers to solve problems	5N2		
	Demonstrate an understanding of fractions	How can we use fractions to solve problems?	- concrete and pictorial representations of equivalent fractions with like or unlike denominators	5N7		
	Understanding that addition and subtraction of decimals is similar to addition and subtraction of whole numbers.	How can we solve problems using addition and subtraction?	- addition/subtraction of decimals to thousandths to solve problems.	5N11		

Grade Five

Strand: Pattern & Relations

Enduring Understanding: Students will understand that mathematics is the study of patterns and relationships, and by recognizing and exploring the inherent patterns in mathematics, they will see relationships, make predictions, and understand concepts. Real world situations can be represented by algebraic expressions and equations in order to simplify and solve problems.

Report Card Subject Categories	Essential Learning	Essential Questions	Concepts	Specific Learning Outcomes	Essential Vocabulary
Knowledge and Understanding	Determine pattern rules.	How can we determine pattern rules?	- make predictions about subsequent elements.	5PR1	decreasing pattern increasing pattern pattern term term number term value equation solution unknown
	Solve single-variable, one-step equations.	How can we solve single-variable, one-step equations?	- single-variable (expressed as symbols or letters), one-step equations with whole-number coefficients and solutions.	5PR2	
Mental Math and Estimation					
Problem Solving	Determine pattern rules.	How can we determine pattern rules to solve problems?	- make predictions about subsequent elements to solve problems.	5PR1	
	Solve single-variable, one-step equations.	How can we solve problems with single-variable, one-step equations?	- single-variable (expressed as symbols or letters), one-step equations with whole-number coefficients and solutions.	5PR2	

Grade Five - Strand: Shape & Space

Enduring Understanding: Students will understand that spatial sense offers a way to interpret and reflect on the physical environment, and enables them to reason and interpret representations of measurement and geometry.

Report Card Subject Categories	Essential Learning	Essential Questions	Concepts	Specific Learning Outcomes	Essential Vocabulary
Knowledge and Understanding	Understand that all measurements are comparisons, and that length, perimeter, area, volume, capacity, and mass are measurable properties of objects.	How can the attributes of objects be measured? How can the relationship between the attributes of objects be modeled and described?	- length (mm), volume (cm ³ , m ³), capacity (mL, L), perimeter and area - selecting and justifying referents - describe relationships	5SS1, 5SS2, 5SS3, 5SS4	area length perimeter polygon rectangle square width centimetre estimate height measurement metre millimetre referent cubic unit (centimetre and metre) dimension rectangular prism volume capacity litre millilitre cone cube cylinder pyramid edge face sphere triangular prism vertex (vertices) intersecting line line vertical line
	Describe 3-D objects and 2-D shapes.	How can the edges and faces of 3-D objects be described? How can the sides of 2-D shapes be described?	- parallel, intersecting, vertical, horizontal sides, edges, and faces.	5SS5	
	Identify and sort quadrilaterals according to their attributes.	How can quadrilaterals be identified and sorted according to their attributes?	- rectangle, square, trapezoid, parallelogram, rhombus	5SS6	
Mental Math and Estimation	Identify, perform, draw, and describe a single transformation.	How can single transformations be identified, performed, drawn and described?	- translation, rotation or reflection of 2-D shape	5SS7, 5SS8	line segment horizontal line congruent rhombus (rhombuses or rhombi) set parallel side parallelogram square perpendicular square corner quadrilateral trapezoid rectangle clockwise counter-clockwise reflection (flip) rotation (turn) diagonally transformation translation (slide) image line of reflection
	Understand that all measurements are comparisons, and that length, perimeter, area, volume, capacity, and mass are measurable properties of objects.	How can the attributes of shapes be estimated?	- length, volume and capacity	5SS2, 5SS3, 5SS4	
Problem Solving	Understand that all measurements are comparisons, and that length, perimeter, area, volume, capacity, and mass are measurable properties of objects.	How can we solve problems by measuring the attributes of shapes?	- design and construct rectangles when given the perimeter or area, or both (in whole numbers) - solve problems involving length, volume, capacity	5SS1, 5SS2, 5SS3, 5SS4	

Grade Five

Strand: Statistics & Probability

Enduring Understanding: Students will understand that data can be collected and communicated in a variety of ways which helps them make inferences, predictions and /or conclusions about the data. Students will understand that probability is a measure to describe the likelihood that an event will occur.

Report Card Subject Categories	Essential Learning	Essential Questions	Concepts	Specific Learning Outcomes	Essential Vocabulary
Knowledge and Understanding	Differentiate between types of data.	What are the different types of data, and how do they compare?	- first-hand and second-hand data	5SP1	bar graph interval data legend double bar graph scale estimate second-hand data first-hand data vertical axis horizontal axis impossible possible certain less likely more likely equally likely
	Construct and interpret graphs.	How can graphs be constructed and interpreted?	- double bar graph	5SP2	
	Describe the likelihood of a single outcome and the likelihood of two possible outcomes.	What is the likelihood of a single event occurring? What is the likelihood of two possible outcomes occurring?	- impossible, possible, certain - less/equally/more likely	5SP3, 5SP4	
Mental Math and Estimation					
Problem Solving	Construct and interpret graphs.	How can graphs be constructed and interpreted to draw conclusions and solve problems?	- double bar graph	5SP2	
	Describe the likelihood of a single event and the likelihood of two possible outcomes.	How can probability be used to solve problems?	- single/two possible outcomes - impossible, possible, certain, less/equally/more likely	5SP3, 5SP4	

Grade Six

Strand: Number

Enduring Understanding: Students will understand that developing number sense enables them to count, represent, and compare quantities, and to use operations to determine quantities.

Report Card Subject Categories	Essential Learning	Essential Questions	Concepts	Specific Learning Outcomes	Essential Vocabulary
Knowledge and Understanding	Describe, represent, and relate numbers in a variety of ways.	How can quantities be shown? In which different ways can we represent a number? How can we relate improper fractions to mixed numbers?	- numbers greater than 1 000 000 and less than 0.001 - relate improper fractions to mixed numbers - ratio, percent and integers with objects, pictures and symbols	6N1, 6N4, 6N5, 6N6, 6N7	place value million thousand hundred ten tenth hundredth thousandth improper fraction mixed number ratio percent integer negative positive factor multiple prime number composite number order of operations multiplication product division inverse decimal multiplier digit divisor dividend
	Demonstrate an understanding of factors and multiples.	How can we determine multiples and factors of numbers?	- numbers less than 100 - prime and composite numbers	6N3	
	Explain and apply the order of operations.	What is the order of operations and how can we apply them to numbers?	- limited to whole numbers, excluding exponents	6N9	
	Demonstrate an understanding of multiplication and division with decimals and their related properties, and that both are inverse operations.	How can multiplication and division be shown? What is the meaning of multiplication? What is the meaning of division? How are multiplication and division related?	- decimals (1-digit whole-number multipliers and 1-digit natural divisors) - multipliers and divisors which are multiples of 10	6N8	
Mental Math and Estimation	Solve problems with large numbers.	How can technology be used to solve problems with large numbers?	- numbers greater than 1 000 000	6N2	
	Describe, represent, and relate numbers in a variety of ways.	How can we relate improper fractions to mixed numbers?	- relate improper fractions to mixed numbers	6N4	
	Demonstrate an understanding of multiplication and division with decimals and their related properties, and that both are inverse operations.	How can multiplication and division be shown? What is the meaning of multiplication? What is the meaning of division? How is multiplication and division related?	- decimals (1-digit whole-number multipliers and 1-digit natural divisors) - multipliers and divisors which are multiples of 10	6N8	

Problem Solving	Solve problems with large numbers.	How can technology be used to solve problems with large numbers? How can order of operations be used to solve problems?	- numbers greater than 1 000 000 - order of operations with whole numbers excluding exponents	6N2, 6N9	
	Demonstrate an understanding of factors and multiples.	How can we determine multiples and factors of numbers to solve problems?	- numbers less than 100 - prime and composite numbers	6N3	
	Describe, represent, and relate numbers in a variety of ways.	How can we solve problems using percents?	- whole numbers with objects, pictures and symbols	6N6	
	Demonstrate an understanding of multiplication and division with decimals and their related properties, and that both are inverse operations.	How can we solve problems using the multiplication and division of decimals?	- decimals (1-digit whole-number multipliers and 1-digit natural divisors) - multipliers and divisors which are multiples of 10	6N8	

Grade Six

Strand: Pattern & Relations

Enduring Understanding: Students will understand that mathematics is the study of patterns and relationships, and by recognizing and exploring the inherent patterns in mathematics, they will see relationships, make predictions, and understand concepts. Real world situations can be represented by algebraic expressions and equations in order to simplify and solve problems.

Report Card Subject Categories	Essential Learning	Essential Question	Concepts	Specific Learning Outcomes	Essential Vocabulary
Knowledge and Understanding	Represent and describe the patterns and relationships.	How can patterns and relationships be explained in graphs and tables?	- graphs, tables and table of values	6PR1, 6PR2	table of values pattern graph table equation variable letter variable preservation of equality
	Represent number relationships using equations.	How can generalizations from number relationships be represented?	- equations with letter variables	6PR3	
	Demonstrate and explain the preservation of equality.	How can the preservation of equality be demonstrated and explained?	- preservation of equality with objects, pictures and symbols	6PR4	
Mental Math and Estimation	Represent and describe the patterns and relationships.	How can patterns and relationships be explained in graphs and tables?	- graphs, tables and table of values	6PR2	
Problem Solving	Represent and describe the patterns and relationships.	How can graphs and tables be used to explain patterns and relationships when solving problems?	- graphs, tables and table of values	6PR1, 6PR2	
	Represent number relationships using equations.	How can generalizations from number relationships be represented when solving problems?	- equations with letter variables	6PR3	
	Demonstrate and explain the preservation of equality.	How can the preservation of equality be demonstrated and explained when solving problems?	- preservation of equality with objects, pictures and symbols	6PR4	

Grade Six - Strand: Shape & Space

Enduring Understanding: Students will understand that spatial sense offers a way to interpret and reflect on the physical environment, and enables them to reason and interpret representations of measurement and geometry.

Report Card Subject Categories	Essential Learning	Essential Questions	Concepts	Specific Learning Outcomes	Essential Vocabulary
Knowledge and Understanding	Demonstrate an understanding of angles.	How can angles be identified, described, compared, classified, measured, drawn and labeled?	<ul style="list-style-type: none"> - angles in the environment - angles in degrees - sum of interior angles - regular and irregular polygons (angles and sides) 	6SS1, 6SS2, 6SS5	perimeter formula polygon regular polygon irregular polygon area rectangle volume right rectangular prism volume square cube squared cubic mm^2 cm^2 m^2 km^2 mm^3 cm^3 m^3 km angle estimate 45°
	Develop and apply formulae.	How can we develop and apply different formulae to determine perimeter, area and volume?	<ul style="list-style-type: none"> - perimeter of polygons - area of rectangles - volume of right rectangular prisms 	6SS3	
	Construct and compare triangles.	How can different triangles be constructed? What are the similarities and differences between different types of triangles?	<ul style="list-style-type: none"> - scalene, isosceles, equilateral, right, obtuse and acute triangles - different orientations 	6SS4	
	Perform a combination of transformations.	What are the kinds of transformations which can be performed on a single 2-D shape?	<ul style="list-style-type: none"> - translations, rotations, or reflections on 2-D shapes - successive transformations 	6SS6, 6SS7	
	Use the first quadrant in the Cartesian plane.	How can single transformations of 2-D shapes be performed and described in the first quadrant of the Cartesian plane? How can points be identified and plotted in the first quadrant of the Cartesian plane?	<ul style="list-style-type: none"> - whole-number ordered pairs - whole-number vertices 	6SS8, 6SS9	
Mental Math and Estimation	Demonstrate an understanding of angles.	How can the measure of angles be and estimated using reference angles?	<ul style="list-style-type: none"> - 45°, 90°, and 180° as reference angles 	6SS1	90° 180° 360° triangle scalene isosceles equilateral right obtuse acute sum interior angle quadrilateral transformation translation rotation reflection 2D shape quadrant Cartesian plane plot point

Problem Solving	Develop and apply formulae.	How can we develop and apply different formulae to solve perimeter, area and volume problems?	<ul style="list-style-type: none"> - perimeter of polygons - area of rectangles - volume of right rectangular prisms 	6SS3		
	Construct and compare triangles.	How can triangles be constructed and compared to solve problems?	<ul style="list-style-type: none"> - scalene, isosceles, equilateral, right, obtuse and acute triangles - different orientations 	6SS4		
	Describe and compare sides and angles.	How can the sides and angles of regular and irregular polygons be described and compared in order to solve problems?	<ul style="list-style-type: none"> - sides and angles of regular and irregular polygons 	6SS5		
	Perform a combination of transformations.	What kinds of transformations can be performed on a single 2-D shape in order to solve problems?	<ul style="list-style-type: none"> - translations, rotations, or reflections on 2-D shapes 	6SS6		
	Use the first quadrant in the Cartesian plane.	How can single transformations of 2-D shapes be performed and described in the first quadrant of the Cartesian plane when solving problems?	<ul style="list-style-type: none"> - single transformations of 2-D shapes - first quadrant of Cartesian plane - limited to whole number vertices 	6SS9		

Grade Six - Strand: Statistics & Probability

Enduring Understandings: Students will understand that data can be collected and communicated in a variety of ways which helps make inferences, predictions and /or conclusions about the data. Students will understand that probability is a measure to describe the likelihood that an event will occur.

Report Card Subject Categories	Essential Learning	Essential Question	Concepts	Specific Learning Outcomes	Essential Vocabulary
Knowledge and Understanding	Construct graphs to draw conclusions from collected data.	How can graphs be created, labeled, interpreted and analyzed to draw conclusions?	- line graphs	6SP1, 6SP3	data data collection questionnaire experiment database electronic media line graph label vertical axis horizontal axis draw conclusion probability experimental theoretical outcome likely more likely less likely possible impossible certain equally likely
	Collect data through a variety of ways.	How can you select, justify, and use appropriate methods when collecting data?	- questionnaires, experiments, databases, electronic media	6SP2	
	Demonstrate an understanding of probability.	What is probability? How can probability be demonstrated? What are the possible outcomes in a probability experiment?	- experimental and theoretical probability - possible outcomes of experimental and theoretical probability experiments	6SP4	
Mental Math and Estimation	Demonstrate an understanding of probability.	What is probability? How can probability be demonstrated? What are the possible outcomes in a probability experiment?	- experimental and theoretical probability - possible outcomes of experimental and theoretical probability experiments	6SP4	
Problem Solving	Construct graphs to draw conclusions from collected data.	How can graphs be created, labeled, interpreted and analyzed to draw conclusions in order to solve problems?	- line graphs	6SP1, 6SP3	
	Collect data through a variety of ways.	How can you select, justify, and use appropriate methods of data collection to solve problems?	- questionnaires, experiments, databases, electronic media	6SP2	

Grade Seven - Strand: Number

Enduring Understanding: Students will understand that developing number sense enables them to count, represent, and compare quantities, and to use operations to determine quantities.

Report Card Subject Categories	Essential Learning	Essential Questions	Concepts	Specific Learning Outcomes	Essential Vocabulary	
Knowledge and Understanding	Determine and explain divisibility rules.	What are the divisibility rules?	- numbers divisible by 2, 3, 4, 5, 6, 8, 9 or 10 - numbers not divided by 0	7N1	addend Carroll diagram difference dividend divisibility divisible divisor factor multiple prime product quotient sum Venn diagram addition array brackets decimals division estimation front-end estimation hundredths mental mathematics multiplicand multiplication multiplier order of operations parentheses subtraction tenths thousandths equivalent fraction percent proportion ratio simplify	decimal equivalent decimal number denominator fraction equivalent numerator prime number product of prime repeating decimal simplify a fraction to lowest terms terminating decimal difference equivalent fractions greatest common factor improper fraction mixed number multiple least common multiple proper fraction integer minuend negative integer positive integer sign subtrahend zero principle ascending benchmark descending horizontal repeating decimal sequence unlike denominators verify vertical
	Demonstrate an understanding of addition and subtraction.	How can we demonstrate and use addition and subtraction with decimals, fractions and integers?	- addition and subtraction of decimals, positive fractions and integers with objects, pictures and symbols.	7N2, 7N5, 7N6		
	Demonstrate an understanding of multiplication and division of decimals.	How can we demonstrate and use multiplication and division with decimals?	- more than 1-digit divisors or 2-digit multipliers with the use of technology	7N2		
	Understand the relationship between decimals and fractions.	What is the relationship between decimals and fractions?	- repeating decimals and fractions - terminating decimals and fractions	7N4		
	Compare and order fractions, decimals and integers.	How can we compare and order fractions, decimals and integers?	- decimals to thousandths - use benchmarks, place value, equivalent fractions and/or decimals	7N7		
Mental Math and Estimation	Demonstrate an understanding of addition and subtraction.	How can we demonstrate and use addition and subtraction with decimals and fractions?	- addition and subtraction of decimals and positive fractions with objects, pictures and symbols.	7N2, 7N5		
	Demonstrate an understanding of multiplication and division of decimals.	How can we demonstrate and use multiplication and division with decimals?	- more than 1-digit divisors or 2-digit multipliers with the use of technology	7N2		
	Use percents.	How can percents be used to solve problems?	- percents from 1% to 100%	7N3		

Problem Solving	Demonstrate an understanding of addition and subtraction.	How can we demonstrate and use addition and subtraction with decimals, fractions and integers in problem solving?	- addition and subtraction of decimals, positive fractions and integers with objects, pictures and symbols.	7N2, 7N5, 7N6		
	Demonstrate an understanding of multiplication and division of decimals.	How can we demonstrate and use multiplication and division with decimals in problem solving?	- more than 1-digit divisors or 2-digit multipliers with the use of technology	7N2		
	Use percents.	How can percents be used to solve problems?	- 1% to 100%	7N3		

Grade Seven - Strand: Pattern & Relations

Enduring Understanding: Students will understand that mathematics is the study of patterns and relationships, and by recognizing and exploring the inherent patterns in mathematics, they will see relationships, make predictions, and understand concepts. Real world situations can be represented by algebraic expressions and equations in order to simplify and solve problems.

Report Card Subject Categories	Essential Learning	Essential Question	Concepts	Specific Learning Outcomes	Essential Vocabulary
Knowledge and Understanding	Understand patterns and relations.	How can patterns and relations be represented?	- oral and written patterns and their corresponding relations	7PR1	algebraic expression constant coordinates core element equation equivalent evaluate explicit relationship expression graph linear relation numerical coefficient pattern recursive relationship relation solution solve substitution table of values term (step number, figure number) value variable
	Construct a table of values, graph and analyze the graph.	How can a graph be constructed and analyzed from a table of values?	- table of values from a relation	7PR2	
	Understand the preservation of equality.	How can the preservation of equality be demonstrated?	- objects, pictures and symbols - use it to solve problems	7PR3	
	Explain the difference between an expression and equation and evaluate an expression.	What is the difference between an expression and equation? How can an equation be evaluated when given the value of the variable(s)?	- difference between expressions and equations - evaluate the expression given the value of the variable(s)	7PR4, 7PR5	
	Model and solve one-step linear equations.	How can one-step linear equations be modeled and solved?	- $x + a = b$ with objects, pictures and symbols where a and b are integers with objects, pictures and symbols. - $ax = b$, $-ax + b = c$ and $\frac{x}{a} = b$, $a \neq 0$, where a , b and c are whole numbers with objects, pictures and symbols.	7PR6, 7PR7	
Mental Math and Estimation					
Problem Solving	Understand the preservation of equality.	How can the preservation of equality be demonstrated when solving problems?	- objects, pictures and symbols	7PR3	
	Model and solve one-step linear equations.	How can one-step linear equations be modeled and solved in problems?	- $x + a = b$ with objects, pictures and symbols where a and b are integers with objects, pictures and symbols. - $ax = b$, $-ax + b = c$ and $\frac{x}{a} = b$, $a \neq 0$, where a , b and c are whole numbers with objects, pictures and symbols.	7PR6, 7PR7	

Grade Seven - Strand: Shape & Space

Enduring Understanding: Students will understand that spatial sense offers a way to interpret and reflect on the physical environment, and enables them to reason and interpret representations of measurement and geometry.

Report Card Subject Categories	Essential Learning	Essential Question	Concepts	Specific Learning Outcomes	Essential Vocabulary
Knowledge and Understanding	Demonstrate an understanding of circles.	How can circles be described and constructed?	- relationships among radius, diameter and circumference, relating circumference to pi, sum of the central angles, constructing circles with a given radius or diameter	7SS1	angle arc central angle circle circumference classifications of angles (acute, obtuse, reflex, right, and straight) diameter pi radius area rectangle base square units formula triangle (obtuse, right, acute, scalene, equilateral, isosceles) height vertex horizontal vertical intersecting width length parallel parallelogram perpendicular polygon quadrilateral (square, rectangle, rhombus, trapezoid, parallelogram)
	Develop and apply formulae.	How can we develop and apply formulae for determining the area of triangles, parallelograms and circles?	- area of triangles, parallelograms and circles	7SS2	
	Perform geometric constructions.	How can we perform geometric constructions?	- perpendicular and parallel line segments - perpendicular and angle bisectors	7SS3	
	Use all four quadrants of the Cartesian plane.	How can transformations of 2-D shapes be performed and described in all four quadrants of the Cartesian plane? How can pointed be identified and plotted in the four quadrants using ordered pairs?	- transformations of 2-D shapes limited to integral vertices. - ordered pairs	7SS4, 7SS5	
Mental Math and Estimation					centre of rotation clockwise congruent coordinates counter-clockwise image line of reflection quadrant reflection rotation shape transformation translation vertex vertices
Problem Solving	Develop and apply formulae.	How can we develop and apply formulae for determining the area of triangles, parallelograms and circles to solve problems?	- area of triangles, parallelograms and circles	7SS2	
	Use all four quadrants of the Cartesian plane.	How can transformations of 2-D shapes be performed and described in all four quadrants of the Cartesian plane when solving problems?	- transformations of 2-D shapes limited to integral vertices.		

Grade Seven - Strand: Statistics & Probability

Enduring Understanding: Students will understand that data can be collected and communicated in a variety of ways which helps make inferences, predictions and /or conclusions about the data. Students will understand that probability is a measure to describe the likelihood that an event will occur.

Report Card Subject Categories	Essential Learning	Essential Question	Concepts	Specific Learning Outcomes	Essential Vocabulary
Knowledge and Understanding	Understand measures of central tendency.	What are the measures of central tendency? How can the measures of central tendency be determined? How can we describe a set of data using a single value?	- mean, median, mode and range, central tendency, outliers	7SP1, 7SP2	average data mean measure of central tendency median mode outlier range statistics Venn diagram angle circle graph key legend percent pie chart sectors sum sum of the central angles certain event dependent event event experimental probability favourable outcome frequency table or chart impossible event independent event likely outcome possible outcome probability random relative frequency
	Construct and read circle graphs.	How can circle graphs be constructed, labeled and interpreted?	- construct, label and interpret circle graphs	7SP3	
	Express probabilities in different ways.	How can ratios, fractions, and percents be used to express probabilities?	- express probabilities as ratios, fractions, and percents	7SP4	
	Apply the principles of probability of a single event to independent events.	How can the principles of probability be applied to a single event as well as independent events?	- sample space of 36 or fewer elements with two independent events - tree diagram, tables	7SP5, 7SP6	
Mental Math and Estimation	Apply the principles of probability of a single event to independent events.	How can the principles of probability be applied to a single event as well as independent events?	- sample space of 36 or fewer elements with two independent events	7SP5	
Problem Solving	Understand measures of central tendency.	How can the measures of central tendency be used to solve problems?	- mean, median, mode and range, central tendency, outliers	7SP1, 7SP2	
	Construct and read circle graph	How can circle graphs be constructed, labeled and interpreted when solving problems?	- construct, label and interpret circle graphs.	7SP3	
	Apply the principles of probability of a single event to independent events.	How can we apply the principles of probability to a single event as well as independent events when solving problems?	- sample space of 36 or fewer elements with two independent events - tree diagram, tables	7SP5, 7SP6	

Grade Eight - Strand: Number

Enduring Understanding: Students will understand that developing number sense enables them to count, represent, and compare quantities, and to use operations to determine quantities.

Report Card Subject Categories	Essential Learning	Essential Questions	Concepts	Specific Learning Outcomes	Essential Vocabulary
Knowledge and Understanding	Demonstrate an understanding of perfect squares and square roots.	What are perfect squares and square roots?	- represent concretely, pictorially, and symbolically (whole numbers only)	8N1, 8N2	perfect square factor square root prime factorization percent fraction decimal rate ratio two-term ratio three-term ratio quotient product multiplier divisor dividend probability positive fraction numerator denominator improper fraction mixed number order of operations integer positive negative rational number
	Demonstrate an understanding of percents.	How can we express percents as fractions or decimals?	- percents greater than or equal to 0%	8N3	
	Demonstrate an understanding of ratio and rate.	What is ratio and rate?	- two-term ratio, three-term ratio, rates in words and symbols	8N4	
	Demonstrate an understanding of multiplying and dividing fractions and integers.	How can we multiply and divide fractions and integers?	- positive fractions and integers	8N6, 8N7	
Mental Math and Estimation	Determine the approximate square root of numbers.	How can we estimate the approximate square root of numbers?	- perfect squares as benchmark to estimate square root of numbers that are not perfect squares	8N2	
	Demonstrate an understanding of multiplying and dividing fractions.	How can we multiply and divide fractions?	- positive fractions	8N6	
	Estimate solutions for problems involving positive rational numbers.	How can we estimate answers to problems involving positive rational numbers?	- determine the reasonableness of answers	8N7	
Problem Solving	Demonstrate an understanding of percents.	How can we express percents as fractions or decimals to solve problems?	- percents greater than or equal to 0%	8N3	
	Solve problems involving rates, ratios, and proportional reasoning.	How can we solve problems involving rates, ratios, and proportional reasoning.	- fraction, percent, rate, ratio, quotient, quotient, probability	8N5	
	Demonstrate an understanding of multiplying and dividing fractions and integers.	How can we multiply and divide fractions and integers	- positive fractions and integers	8N6, 8N7	
	Solve problems involving positive rational numbers.	How can we add, subtract, multiply, and divide positive rational numbers to solve problems?	- identify operations	8N8	

Enduring Understanding: Students will understand that mathematics is the study of patterns and relationships, and by recognizing and exploring the inherent patterns in mathematics, they will see relationships, make predictions, and understand concepts. Real world situations can be represented by algebraic expressions and equations in order to simplify and solve problems.

Grade Eight - Strand: Pattern & Relations

Report Card Subject Categories	Essential Learning	Essential Questions	Concepts	Specific Learning Outcomes	Essential Vocabulary
Knowledge and Understanding	Graph and analyze relations.	How can we graph and analyze relations?	- two variable linear relations, including integers	8PR1, 8PR2	variable two-variable linear relation missing value ordered pair table of values distributive property
Mental Math and Estimation	Graph and analyze relations.	How can we graph and analyze relations?	- two variable linear relations, including integers	8PR1	
Problem Solving	Graph and analyze relations.	How can we graph and analyze relations to solve problems?	- two variable linear relations, including integers	8PR1, 8PR2	

Grade Eight - Strand: Shape & Space

Enduring Understanding: Students will understand that spatial sense offers a way to interpret and reflect on the physical environment, and enables them to reason and interpret representations of measurement and geometry.

Report Card Subject Categories	Essential Learning	Essential Questions	Concepts	Specific Learning Outcomes	Essential Vocabulary
Knowledge and Understanding	Understand and apply the Pythagorean theorem.	What is the Pythagorean theorem, and how can we use it?	- right triangles, Pythagorean triples	8SS1	Pythagorean theorem formula right triangle Pythagorean triples net 3-D object right circular cylinder right rectangular prism right triangular prism surface area volume right cylinder right prism area base right 3-D object orientation rotation tessellation tessellate regular polygon irregular polygon non-polygon translation reflection rotation transformation
	Draw and construct nets for 3-D objects.	How can we construct nets for 3-D objects?	- right circular cylinder, right rectangular prism, right triangular prism	8SS2	
	Determine the surface area of 3-D objects.	How can we determine the surface area of 3-D objects?	- right circular cylinder, right rectangular prism, right triangular prism	8SS3	
	Develop and apply formulas for determining the volume of 3-D objects.	How can we develop and apply formulas for determining the volume of 3-D objects?	- right circular cylinder, right rectangular prism, right triangular prism	8SS4	
	Draw and interpret views of 3-D objects.	How can we draw and interpret views of 3-D objects?	- front, top, and side views of objects composed of right rectangular prisms	8SS5	
	Demonstrate an understanding of tessellation.	What are tessellations, and how can they be created?	- translations, reflections, and rotations in tessellations	8SS6	
Mental Math and Estimation					

Problem Solving	Understand and apply the Pythagorean theorem.	What is the Pythagorean theorem, and how can we apply it to solve problems?	- right triangles, Pythagorean triples	8SS1	
	Draw and construct nets for 3-D objects.	How can we construct nets for 3-D objects to solve problems?	- right circular cylinder, right rectangular prism, right triangular prism	8SS2	
	Determine the surface area of 3-D objects.	How can we determine the surface area of 3-D objects to solve problems?	- right circular cylinder, right rectangular prism, right triangular prism	8SS3	
	Develop and apply formulas for determining the volume of 3-D objects.	How can we develop and apply formulas for determining the volume of 3-D objects to solve problems?	- right circular cylinder, right rectangular prism, right triangular prism	8SS4	
	Demonstrate an understanding of tessellations.	What are tessellations, and how can they be created to solve problems?	- translations, reflections, and rotations in tessellations	8SS6	

Grade Eight - Strand: Statistics & Probability

Enduring Understandings: Students will understand that data can be collected and communicated in a variety of ways which helps make inferences, predictions and /or conclusions about the data. Students will understand that probability is a measure to describe the likelihood that an event will occur.

Report Card Subject Categories	Essential Learning	Essential Question	Concepts	Specific Learning Outcomes	Essential Vocabulary
Knowledge and Understanding	Critique ways in which data can be presented.	How can data be presented clearly, accurately, and fairly?	- compare and evaluate data presented on line graphs, circle graphs, bar graphs, double bar graphs, pictographs	8SP1	data data collection graph label vertical axis horizontal axis interval bar width line graph circle graph bar graph double bar graph pictograph draw conclusion advantages disadvantages probability independent events experimental theoretical outcome likely more likely less likely possible impossible certain equally likely
	Solve problems involving probability	What is probability? How can probability be demonstrated? What are the possible outcomes in a probability experiment?	- independent events	8SP2	
Mental Math and Estimation					
Problem Solving	Solve problems involving probability	How can we solve problems involving the probability?	- independent events	8SP2	

Middle Years Mathematics Definitions – 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.

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*

Sample Grade Book

Grade Five Math Strand: Number

4	80-100%	Thorough understanding
3	70-79%	Very good understanding
2	60-69%	Basic understanding
1	50-59%	Limited understanding
ND	Less than 50%	Not yet demonstrated

Report Card Categories													
Students	Knowledge and Understanding					Mental Math and Estimation					Problem Solving		
	<u>Essential Questions</u>					<u>Essential Questions</u>					<u>Essential Questions</u>		
	-In which different ways can whole numbers, fractions and decimals be represented? -How can we compare and order whole numbers, fractions and decimals? -How do decimals relate to fractions? How can we add and subtract decimals? -How can multiplication and division be shown? -What is the meaning of multiplication? -What is the meaning of division? -How are multiplication and division related?					How can estimation strategies be used? -How can we use mental math strategies to determine multiplication facts and related division facts? -How can we apply mental math strategies for multiplication?					How can estimation strategies be used to solve problems? How can we use fractions to solve problems? How can we solve problems using addition and subtraction?		
	Evidence from Learning Experiences					Evidence from Learning Experiences					Evidence from Learning Experiences		
	Represent whole numbers, fractions, and decimals	Compare and order whole numbers, fractions, decimals	Add/Subtract decimals	Multiplication	Division	Estimation: front-end rounding	Estimation: compensation	Estimation: compatible numbers	Mental math: multiplication facts to 81	Mental math: Annexing, halving, doubling, distributive property	Problem solving with estimation	Problem solving with fractions	Problem solving with addition and subtraction

