MTH1W De-streamed Mathematics, Grade 9
Curriculum Expectations

STRAND AA - SOCIAL-EMOTIONAL LEARNING (SEL) SKILLS

OVERALL EXPECTATION

AA1. Social-Emotional Learning (SEL) Skills

develop and explore a variety of social-emotional learning skills in a context that supports and reflects this learning in connection with the expectations across all other strands

To the best of their ability, students will learn to:

- Recognizing and identifying emotions that support mathematical learning
- Recognizing sources of stress that present challenges to mathematical learning
- Identifying resources and supports that aid perseverance in mathematical learning
- Building healthy relationships and communicating effectively in mathematics
- Developing a healthy mathematical identity through building self-awareness
- Developing critical and creative mathematical thinking

STRAND A - MATHEMATICAL THINKING AND MAKING CONNECTIONS

OVERALL EXPECTATION

A1. Mathematical Processes

apply the mathematical processes to develop a conceptual understanding of, and procedural fluency with, the mathematics they are learning

SPECIFIC PROCESS EXPECTATIONS

- **problem solving:** develop, select, and apply problem-solving strategies
- **reasoning and proving:** develop and apply reasoning skills (e.g., classification, recognition of relationships, use of counter-examples) to justify thinking, make and investigate conjectures, and construct and defend arguments
- **reflecting:** demonstrate that as they solve problems, they are pausing, looking back, and monitoring their thinking to help clarify their understanding (e.g., by comparing and adjusting strategies used, by explaining why they think their results are reasonable, by recording their thinking in a math journal)
- **connecting:** make connections among mathematical concepts, procedures, and representations, and relate mathematical ideas to other contexts (e.g., other curriculum areas, daily life, sports)
- **communicating:** express and understand mathematical thinking, and engage in mathematical arguments using everyday language, language resources as necessary, appropriate mathematical terminology, a variety of representations, and mathematical conventions
- **representing:** select from and create a variety of representations of mathematical ideas (e.g., representations involving physical models, pictures, numbers, variables, graphs), and apply them to solve problems
- **selecting tools and strategies:** select and use a variety of concrete, visual, and electronic learning tools and appropriate strategies to investigate mathematical ideas and to solve problems

OVERALL EXPECTATION

A2. Making Connections

make connections between mathematics and various knowledge systems, their lived experiences, and various real-life applications of mathematics, including careers

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STRAND B - NUMBER

OVERALL EXPECTATION

B1. Development of Numbers and Number Sets
demonstrate an understanding of the development and use of numbers, and make connections between sets of numbers

Suggested Focus Time	SPECIFIC EXPECTATIONS	RELATED RESOURCES

10%* explored early and interleaved or spiralled throughout the course	**Development and Use of Numbers**
	● B1.1 research a number concept to tell a story about its development and use in a specific culture, and describe its relevance in a current context
	Number Sets
	● B1.2 describe how various subsets of a number system are defined, and describe similarities and differences between these subsets
	● B1.3 use patterns and number relationships to explain density, infinity, and limit as they relate to number sets
		● Development and Use of Algebra
		  ○ [Russian and Ancient Egyptian Multiplication](#) [TED Talk]
		  ○ [A Brief History of Numerical Systems](#) [Video]
		  ○ [Why Counting In Twelves Would Make Life Easier - Base 12](#) [Video]

OVERALL EXPECTATION

B2. Powers
represent numbers in various ways, evaluate powers, and simplify expressions by using the relationships between powers and their exponents

Suggested Focus Time	SPECIFIC EXPECTATIONS	RELATED RESOURCES

10%* interleaved or spiralled throughout the course	**Powers**
	● B2.1 analyse, through the use of patterning, the relationship between the sign and size of an exponent and the value of a power, and use this relationship to express numbers in scientific notation and evaluate powers
	● B2.2 analyse, through the use of patterning, the relationships between the exponents of powers and the operations with powers, and use these relationships to simplify numeric and algebraic expressions
		● Problem Based Lessons/Units
		  ○ [Penny a Day](#) [Introducing Powers and Compound Interest Lesson]
		  ○ [Double Sunglasses](#) [Powers with a Fractional/Decimal Base]
		  ○ [Planning an Exponents Program without Coding](#) [HPEDSB Activity]]
		● Resources/Printables/Handouts
		  ○ [Number Sense 1](#) & [Number Sense 2](#) [HPEDSB Worksheet]
		● 1D Textbook: Sec 3.2 and 3.3

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Curriculum Expectations

<table>
<tr><td colspan="3" align="center">STRAND B - NUMBER (continued)</td></tr>
<tr><td colspan="3">OVERALL EXPECTATION</td></tr>
<tr><td colspan="3">B3. Number Sense and Operations
apply an understanding of rational numbers, ratios, rates, percentages, and proportions, in various mathematical contexts, and to solve problems</td></tr>
<tr><td>Suggested Focus Time</td><td>SPECIFIC EXPECTATIONS</td><td>RELATED RESOURCES</td></tr>
<tr>
<td>20%*
explored early and interleaved or spiralled throughout the course</td>
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Rational Numbers
- B3.1 apply an understanding of integers to describe location, direction, amount, and changes in any of these, in various contexts
- B3.2 apply an understanding of unit fractions and their relationship to other fractional amounts, in various contexts, including the use of measuring tools
- B3.3 apply an understanding of integers to explain the effects that positive and negative signs have on the values of ratios, rates, fractions, and decimals, in various contexts

Applications
- B3.4 solve problems involving operations with positive and negative fractions and mixed numbers, including problems involving formulas, measurements, and linear relations, using technology when appropriate
- B3.5 pose and solve problems involving rates, percentages, and proportions in various contexts, including contexts connected to real-life applications of data, measurement, geometry, linear relations, and financial literacy

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- Modified TIPS4RM MFM1P
  - Proportional Reasoning: Proportion, Ratio & Rate [Word DOC | SMART Notebook]
- Problem Based Lessons/Units
  - Sowing Seeds [Uncovering The Two Types of Division Unit]
  - Snack Time! [Whole Number Partitive Division Resulting in Rational Rate]
  - Planting Flowers [Connecting Division to Ratios PBL Unit]
  - Rice Ratios [Ratio Reasoning and Rate Reasoning PBL Unit]
- 1P Textbook
  - Chapter 1: Ratios, Rates, and Proportions

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Curriculum Expectations

STRAND C - ALGEBRA	
OVERALL EXPECTATION	
C1. Algebraic Expressions and Equations demonstrate an understanding of the development and use of algebraic concepts and of their connection to numbers, using various tools and representations	

Suggested Focus Time	SPECIFIC EXPECTATIONS	RELATED RESOURCES

15%*
 	
interleaved or spiralled throughout the course
	Development and Use of Algebra
	● C1.1 research an algebraic concept to tell a story about its development and use in a specific culture, and describe its relevance in a current context
	Algebraic Expressions and Equations
	● C1.2 create algebraic expressions to generalize relationships expressed in words, numbers, and visual representations, in various contexts
	● C1.3 compare algebraic expressions using concrete, numerical, graphical, and algebraic methods to identify those that are equivalent, and justify their choices
	● C1.4 simplify algebraic expressions by applying properties of operations of numbers, using various representations and tools, in different contexts
	● C1.5 create and solve equations for various contexts, and verify their solutions
		● Development and Use of Algebra
		  ○ Why Is "x" the Unknown? [TED Talk]
		● Modified TIPS4RM MFM1P
		  ○ Unit 7: Algebraic Models [Word DOC
			SMART Notebook]
			● Math Talk Resources & Lesson Starters
			  ○ Math Is Visual [One- & Two-Step Equations
			● Lessons/Units
			  ○ Order Up [Collecting Like Terms PBL Lesson]
			  ○ Sowing Seed Revisited [Solving One- and Two-Step Equations PBL Unit]
			  ○ Planting Flowers Revisited [Solving Two-Step Algebraic Equations]
			  ○ Shot Put [Evaluating Expressions and Solving Equations extending to Substitution & Elimination Unit]
			  ○ Introduction to Algebra - Terms & History [DESMOS]
			● Resources/Printables/Handouts
			  ○ Collecting Like Terms 1 & Collecting Like Terms 2 [HPEDSB Worksheet]
			● 1P Textbook
			  ○ Chapter 7: Algebraic Modelling
			● 1D Textbook
			  ○ Chapter 3: Polynomials
			  ○ Chapter 4: Equations

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Curriculum Expectations

OVERALL EXPECTATION

C2. Coding
apply coding skills to represent mathematical concepts and relationships dynamically, and to solve problems, in algebra and across the other strands

Suggested Focus Time	SPECIFIC EXPECTATIONS	RELATED RESOURCES

5% possibly introduced near the end of the course as a means to reinforce earlier learning	**Coding**
	● C2.1 use coding to demonstrate an understanding of algebraic concepts including variables, parameters, equations, and inequalities
	● C2.2 create code by decomposing situations into computational steps in order to represent mathematical concepts and relationships, and to solve problems
	● C2.3 read code to predict its outcome, and alter code to adjust constraints, parameters, and outcomes to represent a similar or new mathematical situation
		● Lessons/Units/Ideas
		  ○ Pythagorean Theorem [HPEDSB Coding Activity]
		  ○ Side-Length Relationships [HPEDSB Coding Activity]
		● Coding Websites / Resources
		  ○ Coding.org Curriculum Units
		  ○ Minecraft: Education Edition - Math Kit
		  ○ GECDSB PD Portal Coding Webinar Replays
		  ○ Ontario Math Curriculum Project: Coding
		  ○ EduGains: Grade 8 Coding Resources
		  ○ CSUnplugged: Coding Without Tech

STRAND C - ALGEBRA (continued)

OVERALL EXPECTATION

C3. Application of Relations
represent and compare linear and non-linear relations that model real-life situations, and use these representations to make predictions

Suggested Focus Time	SPECIFIC EXPECTATIONS	RELATED RESOURCES

15%* interleaved or spiralled throughout the course	**Application of Linear and Non-Linear Relations**
	● C3.1 compare the shapes of graphs of linear and non-linear relations to describe their rates of change, to make connections to growing and shrinking patterns, and to make predictions
	● C3.2 represent linear relations using concrete materials, tables of values, graphs, and equations, and make connections between the various representations to demonstrate an understanding of rates of change and initial values
	● C3.3 compare two linear relations of the form $y = ax + b$ graphically and algebraically, and interpret the meaning of their point of intersection in terms of a given context
		● Modified TIPS4RM MFM1P
		  ○ Unit 5: Linear Relations [Word DOC | SMART Notebook]
		● Math Talk Resources & Lesson Starters
		  ○ Visual Patterns
		● Resources/Printables/Handouts
		  ○ First Difference 1 & First Difference 2 [HPEDSB Worksheet]
		● 1P Textbook
		  ○ Chapter 4: Characteristics of Linear Relations
		  ○ Chapter 5: Linear Relations
		● 1D Textbook
		  ○ Chapter 5: Modelling with Graphs

		○ Chapter 6: Analyze Linear Relations

OVERALL EXPECTATION

C4. Characteristics of Relations
demonstrate an understanding of the characteristics of various representations of linear and non-linear relations, using tools, including coding when appropriate

Suggested Focus Time	SPECIFIC EXPECTATIONS	RELATED RESOURCES

15%*
interleaved or spiralled throughout the course
	Characteristics of Linear and Non-Linear Relations
	● C4.1 compare characteristics of graphs, tables of values, and equations of linear and non-linear relations
	● C4.2 graph relations represented as algebraic equations of the forms x = k, y = k, x + y = k, x – y = k, ax + by = k, and xy = k, and their associated inequalities, where a, b, and k are constants, to identify various characteristics and the points and/or regions defined by these equations and inequalities
	● C4.3 translate, reflect, and rotate lines defined by y = ax, where a is a constant, and describe how each transformation affects the graphs and equations of the defined lines
	● C4.4 determine the equations of lines from graphs, tables of values, and concrete representations of linear relations by making connections between rates of change and slopes, and between initial values and y-intercepts, and use these equations to solve problems
		● Modified TIPS4RM MFM1P
		  ○ Unit 6: Multiple Representations of Linear Relations [Word DOC
			SMART Notebook]
			● 1P Textbook
			  ○ Chapter 4: Characteristics of Linear Relations
			  ○ Chapter 5: Linear Relations
			● 1D Textbook
			  ○ Chapter 5: Modelling with Graphs
			  ○ Chapter 6: Analyze Linear Relations

STRAND D - DATA

OVERALL EXPECTATION

D1. Collection, Representation, and Analysis of Data
describe the collection and use of data, and represent and analyse data involving one and two variables

Suggested Focus Time	SPECIFIC EXPECTATIONS	RELATED RESOURCES

15%*
interleaved or spiralled throughout the course
	Application of Data
	● D1.1 identify a current context involving a large amount of data, and describe potential implications and consequences of its collection, storage, representation, and use
	Representation and Analysis of Data
	● D1.2 represent and statistically analyse data from a real-life situation involving a single variable in various ways, including the use of quartile values and box plots
		● Modified TIPS4RM MFM1P
		  ○ Exploring Relationships and Curves of Best Fit [Word DOC
			SMART Notebook]
			● Problem Based Lessons/Units
			  ○ Candle Burning [Two-Variable Relationships, Scatter Plots, Line of Best Fit Lesson]

● D1.3 create a scatter plot to represent the relationship between two variables, determine the correlation between these variables by testing different regression models using technology, and use a model to make predictions when appropriate	○ Barbie Bungee [NCTM Version | Jenn Vadnais Version | Dan Meyer Version] ● 1P Textbook 　○ Chapter 3: Data Relationships ● 1D Textbook 　○ Chapter 2: Relations

OVERALL EXPECTATION

D2. Mathematical Modelling
apply the process of mathematical modelling, using data and mathematical concepts from other strands, to represent, analyse, make predictions, and provide insight into real-life situations

Suggested Focus Time	SPECIFIC EXPECTATIONS	RELATED RESOURCES
10%* interleaved or spiralled throughout the course	**Application of Mathematical Modelling** ● D2.1 describe the value of mathematical modelling and how it is used in real life to inform decisions **Process of Mathematical Modelling** ● D2.2 identify a question of interest requiring the collection and analysis of data, and identify the information needed to answer the question ● D2.3 create a plan to collect the necessary data on the question of interest from an appropriate source, identify assumptions, identify what may vary and what may remain the same in the situation, and then carry out the plan ● D2.4 determine ways to display and analyse the data in order to create a mathematical model to answer the original question of interest, taking into account the nature of the data, the context, and the assumptions made ● D2.5 report how the model can be used to answer the question of interest, how well the model fits the context, potential limitations of the model, and what predictions can be made based on the model	● 1P Textbook 　○ Chapter 3: Data Relationships ● 1D Textbook 　○ Chapter 2: Relations

STRAND E - GEOMETRY AND MEASUREMENT

OVERALL EXPECTATION

E1. Geometric and Measurement Relationships
demonstrate an understanding of the development and use of geometric and measurement relationships, and apply these relationships to solve problems, including problems involving real-life situations

Suggested Focus Time	SPECIFIC EXPECTATIONS	RELATED RESOURCES
15%*	**Geometric and Measurement Relationships**	● Modified TIPS4RM MFM1P

| interleaved or spiralled throughout the course | E1.1 research a geometric concept or a measurement system to tell a story about its development and use in a specific culture or community, and describe its relevance in connection to careers and to other disciplines E1.2 create and analyse designs involving geometric relationships and circle and triangle properties, using various tools E1.3 solve problems involving different units within a measurement system and between measurement systems, including those from various cultures or communities, using various representations and technology, when appropriate E1.4 show how changing one or more dimensions of a two-dimensional shape and a three-dimensional object affects perimeter/circumference, area, surface area, and volume, using technology when appropriate E1.5 solve problems involving the side-length relationship for right triangles in real-life situations, including problems that involve composite shapes E1.6 solve problems using the relationships between the volume of prisms and pyramids and between the volume of cylinders and cones, involving various units of measure | Measurement 2D & 3D [Word DOC | SMART Notebook] Measurement Optimization [Word DOC | SMART Notebook] Explorations/Investigations Geometeric Relationships and Circle and Triangle Properties [Coding] Circle Geometry: Circle Properties [Google Doc] Problem Based Lessons/Units Perimeter & Area Relationships [Desmos Activity] R2D2 Post-Its [Non-standard Area] Squares to Triangles [Pythagorean Theorem Unit] Mowing the Lawn [Pythagorean Theorem, Area & Proportional Relationships Lesson] Going in Circles [π, Circumference & Area of a Circle Unit] Sugar Cubes [Volume of Rectangular Prisms Unit] Prisms and Pyramids [Volume of Prisms & Pyramids Lesson] Cones and Spheres [Volume of Spheres Lesson] Resources/Printables/Handouts Perimeter/Area 1 & Perimeter/Area 2 [HPEDSB Worksheet] 1P Textbook Chapter 2: One- and Two-Dimensional Measurement Chapter 6: Three-Dimensional Measurement 1D Textbook Chapter 8: Measurement Relationships |

STRAND F - FINANCIAL LITERACY

OVERALL EXPECTATION

F1. Financial Decisions
demonstrate the knowledge and skills needed to make informed financial decisions

Suggested Focus Time	SPECIFIC EXPECTATIONS	RELATED RESOURCES
10%* interleaved or spiralled throughout the course	**Financial Decisions** ● F1.1 identify a past or current financial situation and explain how it can inform financial decisions, by applying an understanding of the context of the situation and related mathematical knowledge **Financial Management** ● F1.2 identify financial situations that involve appreciation and depreciation, and use associated graphs to answer related questions ● F1.3 compare the effects that different interest rates, lengths of borrowing time, ways in which interest is calculated, and amounts of down payments have on the overall costs associated with purchasing goods or services, using appropriate tools ● F1.4 modify budgets displayed in various ways to reflect specific changes in circumstances, and provide a rationale for the modifications	● [CFEE: Talk With Our Kids About Money](#) ● [EVERFI: Financial Literacy Resources](#) ● [Penny Drops Anywhere: Financial Literacy Resources](#) ● [Ontario Math Curriculum Project: Financial Literacy](#) ● OAME Financial Literacy Resources [[LESSONS](#)	[PD GUIDE](#)	[OVERVIEW](#)]

*While **Suggested Focus Time** is offered as a percentage, note that many concepts and skills can be interleaved/spiralled throughout the course and thus the total Suggested Focus Time percentage is greater than 100% and may be adjusted over time to reflect the suggestions from educators who deliver this course in the first few years of implementation.