Education Perfect Mathematics Grades 3 Ontario Curriculum Alignment

This document outlines how our platform's content and assessments are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all strands and fostering key mathematical processes to support student success.

Education Perfect Mathematics Grade 3		
Expectations	Number of Lessons	Topic Assessment
A1. Social-Emotional Learning (SEL) Skills and the Mathematical Processes		
A1.1 identify and manage emotions	Strand A is embedded throughout all of the content we develop in the following ways: • Quick corrections and built-in support within the platform help students positively manage challenges and emotions during tasks. • Self-paced, interactive lessons featuring engaging elements like gamification keep students motivated while reducing learning pressure. • Integrated tools allow students to easily track their learning progress, which builds self-awareness about their strengths and areas for growth. • Platform activities naturally incorporate problem-solving, helping students develop critical and creative thinking as they engage with math concepts. • Assessment features, including practice tests and flexible pacing, help reduce student anxiety around evaluations.	
A1.2 recognize sources of stress and cope with challenges		
A1.3 maintain positive motivation and perseverance		
A1.4 build relationships and communicate effectively		
A1.5 develop self-awareness and sense of identity		
A1.6 think critically and creatively		
B1. Number Sense		
B1.1 read, represent, compose, and decompose whole numbers up to and including 1000, using a variety of tools and strategies, and describe various ways they are used in everyday life.	1	Whole Numbers
B1.2 compare and order whole numbers up to and including 1000, in various contexts	1	Comparing and Counting Whole Numbers
B1.3 round whole numbers to the nearest ten or hundred, in various contexts	1	Whole Numbers
B1.4 count to 1000, including by 50s, 100s, and 200s, using a variety of tools and strategies	1	Comparing and Counting Whole Numbers

B1.5 use place value when describing and representing multi-digit numbers in a variety of ways, including with base ten materials	4	Whole Numbers
B1.6 use drawings to represent, solve, and compare the results of fair-share problems that involve sharing up to 20 items among 2, 3, 4, 5, 6, 8, and 10 sharers, including problems that result in whole numbers, mixed numbers, and fractional amounts	1	Fractions
B1.7 represent and solve fair-share problems that focus on determining and using equivalent fractions, including problems that involve halves, fourths, and eighths; thirds and sixths; and fifths and tenths	1	Fractions
B2. Operations		
B2.1 use the properties of operations, and the relationships between multiplication and division, to solve problems and check calculations	6	Multiplication and Division
B2.2 recall and demonstrate multiplication facts of 2, 5, and 10, and related division facts	1	Multiplication and Division
B2.3 use mental math strategies, including estimation, to add and subtract whole numbers that add up to no more than 1000, and explain the strategies used	1	Addition and Subtraction
B2.4 demonstrate an understanding of algorithms for adding and subtracting whole numbers by making connections to and describing the way other tools and strategies are used to add and subtract	1	Addition and Subtraction
B2.5 represent and solve problems involving the addition and subtraction of whole numbers that add up to no more than 1000, using various tools and algorithms	1	Addition and Subtraction
B2.6 represent multiplication of numbers up to 10 × 10 and division up to 100 ÷ 10, using a variety of tools and drawings, including arrays	1	Multiplication and Division
B2.7 represent and solve problems involving multiplication and division, including problems that involve groups of one half, one fourth, and one third, using tools and drawings	1	Multiplication and Division Involving Fractions
B2.8 represent the connection between the numerator of a fraction and the repeated addition of the unit fraction with the same denominator using various tools and drawings, and standard fractional notation	2	Multiplication and Division Involving Fractions
B2.9 use the ratios of 1 to 2, 1 to 5, and 1 to 10 to scale up numbers and to solve problems	2	Multiplication and Division Involving Fractions

C1. Patterns and Relationships		
C1.1 identify and describe repeating elements and operations in a variety of patterns, including patterns found in real-life contexts	1	Patterns
C1.2 create and translate patterns that have repeating elements, movements, or operations using various representations, including shapes, numbers, and tables of values	1	Patterns
C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in patterns that have repeating elements, movements, or operations	1	Patterns
C1.4 create and describe patterns to illustrate relationships among whole numbers up to 1000	3	Patterns
C2. Equations and Inequalities		
C2.1 describe how variables are used, and use them in various contexts as appropriate	1	Expressions and Equivalent Relationships
C2.2 determine whether given sets of addition, subtraction, multiplication, and division expressions are equivalent or not	1	Expressions and Equivalent Relationships
C2.3 identify and use equivalent relationships for whole numbers up to 1000, in various contexts	1	Expressions and Equivalent Relationships
C3. Coding		
C3.1 solve problems and create computational representations of mathematical situations by writing and executing code, including code that involves sequential, concurrent, and repeating events	4	Coding
C3.2 read and alter existing code, including code that involves sequential, concurrent, and repeating events, and describe how changes to the code affect the outcomes	4	Coding
C4. Mathematical Modelling		
C4 apply the process of mathematical modelling to represent, analyse, make predictions, and provide insight into real-life situations	Embedded Throughout	

D1. Data Literacy		
D1.1 sort sets of data about people or things according to two and three attributes, using tables and logic diagrams, including Venn, Carroll, and tree diagrams, as appropriate	1	Data Collection and Organization
D1.2 collect data through observations, experiments, and interviews to answer questions of interest that focus on qualitative and quantitative data, and organize the data using frequency tables	1	Not currently assessed
D1.3 display sets of data, using many-to-one correspondence, in pictographs and bar graphs with proper sources, titles, and labels, and appropriate scales	1	Data Visualization
D1.4 determine the mean and identify the mode(s), if any, for various data sets involving whole numbers, and explain what each of these measures indicates about the data	1	Data Analysis
D1.5 analyse different sets of data presented in various ways, including in frequency tables and in graphs with different scales, by asking and answering questions about the data and drawing conclusions, then making convincing arguments and informed decisions	1	Data Analysis
D2. Probability		
D2.1 use mathematical language, including the terms “impossible”, “unlikely”, “equally likely”, “likely”, and “certain”, to describe the likelihood of events happening, and use that likelihood to make predications and informed decisions	1	Probability
D2.2 make and test predictions about the likelihood that the mean and the mode(s) of a data set will be the same for data collected from different populations	1	Not currently assessed
E1. Geometric and Spatial Reasoning		
E1.1 sort, construct, and identify cubes, prisms, pyramids, cylinders, and cones by comparing their faces, edges, vertices, and angles	1	Geometric Reasoning
E1.2 compose and decompose various structures, and identify the two-dimensional shapes and three-dimensional objects that these structures contain	1	Geometric Reasoning
E1.3 identify congruent lengths, angles, and faces of three-dimensional objects by mentally and physically matching them, and determine if the objects are congruent	1	Geometric Reasoning
E1.4 give and follow multistep instructions involving movements from one location to another, including distances and half- and quarter-turns	1	Location and Movement

E2. Measurement		
E2.1 use appropriate units of length to estimate, measure, and compare the perimeters of polygons and curved shapes, and construct polygons with a given perimeter	1	Perimeter and Measurement
E2.2 explain the relationships between millimetres, centimetres, metres, and kilometres as metric units of length, and use benchmarks for these units to estimate lengths	1	Perimeter and Measurement
E2.3 use non-standard units appropriately to estimate, measure, and compare capacity, and explain the effect that overfilling or underfilling, and gaps between units, have on accuracy	1	Capacity and Mass
E2.4 compare, estimate, and measure the mass of various objects, using a pan balance and non-standard units	1	Capacity and Mass
E2.5 use various units of different sizes to measure the same attribute of a given item, and demonstrate that even though using different-sized units produces a different count, the size of the attribute remains the same	5	Capacity and Mass
E2.6 use analog and digital clocks and timers to tell time in hours, minutes, and seconds	1	Time
E2.7 compare the areas of two-dimensional shapes by matching, covering, or decomposing and recomposing the shapes, and demonstrate that different shapes can have the same area	1	Area
E2.8 use appropriate non-standard units to measure area, and explain the effect that gaps and overlaps have on accuracy	1	Area
E2.9 use square centimetres (cm^2) and square metres (m^2) to estimate, measure, and compare the areas of various two-dimensional shapes, including those with curved sides	1	Area
F1. Money and Finances		
F1.1 estimate and calculate the change required for various simple cash transactions involving whole-dollar amounts and amounts of less than one dollar	1	Money Concepts

Education Perfect
Mathematics
Grades 4 Ontario Curriculum Alignment

This document outlines how our platform's content and assessments are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all strands and fostering key mathematical processes to support student success.

<table>
<tr><th colspan="3">Education Perfect Mathematics Grade 4</th></tr>
<tr><td>Expectations</td><td>Number of Lessons</td><td>Topic Assessment</td></tr>
<tr><td colspan="3">A1. Social-Emotional Learning (SEL) Skills and the Mathematical Processes</td></tr>
<tr><td>A1.1 identify and manage emotions</td><td colspan="2" rowspan="6">Strand A is embedded throughout all of the content we develop in the following ways:
Quick corrections and built-in support within the platform help students positively manage challenges and emotions during tasks.
Self-paced, interactive lessons featuring engaging elements like gamification keep students motivated while reducing learning pressure.
Integrated tools allow students to easily track their learning progress, which builds self-awareness about their strengths and areas for growth.
Platform activities naturally incorporate problem-solving, helping students develop critical and creative thinking as they engage with math concepts.
Assessment features, including practice tests and flexible pacing, help reduce student anxiety around evaluations.</td></tr>
<tr><td>A1.2 recognize sources of stress and cope with challenges</td></tr>
<tr><td>A1.3 maintain positive motivation and perseverance</td></tr>
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<tr><td>A1.5 develop self-awareness and sense of identity</td></tr>
<tr><td>A1.6 think critically and creatively</td></tr>
<tr><td colspan="3">B1. Number Sense</td></tr>
<tr><td>B1.1 read, represent, compose, and decompose whole numbers up to and including 10 000, using appropriate tools and strategies, and describe various ways they are used in everyday life</td><td>1</td><td>Whole Numbers</td></tr>
<tr><td>B1.2 compare and order whole numbers up to and including 10 000, in various contexts</td><td>1</td><td>Whole Numbers</td></tr>
<tr><td>B1.3 round whole numbers to the nearest ten, hundred, or thousand, in various contexts</td><td>1</td><td>Whole Numbers</td></tr>
<tr><td>B1.4 represent fractions from halves to tenths using drawings, tools, and standard fractional notation, and explain the meanings of the denominator and the numerator</td><td>1</td><td>Fractions</td></tr>
</table>

B1.5 use drawings and models to represent, compare, and order fractions representing the individual portions that result from two different fair-share scenarios involving any combination of 2, 3, 4, 5, 6, 8, and 10 sharers	1	Fractions
B1.6 count to 10 by halves, thirds, fourths, fifths, sixths, eighths, and tenths, with and without the use of tools	1	Fractions
B1.7 read, represent, compare, and order decimal tenths, in various contexts	1	Decimal Tenths
B1.8 round decimal numbers to the nearest whole number, in various contexts	1	Decimal Tenths
B1.9 describe relationships and show equivalences among fractions and decimal tenths, in various contexts	1	Decimal Tenths
B2. Operations		
B2.1 use the properties of operations, and the relationships between addition, subtraction, multiplication, and division, to solve problems involving whole numbers, including those requiring more than one operation, and check calculations	2	Properties of Operations
B2.2 recall and demonstrate multiplication facts for 1×1 to 10×10, and related division facts	1	Properties of Operations
B2.3 use mental math strategies to multiple whole numbers by 10, 100, and 1000, divide whole numbers by 10, and add and subtract decimal tenths, and explain strategies used	1	Properties of Operations
B2.4 represent and solve problems involving the addition and subtraction of whole numbers that add up to no more than 10 000 and of decimal tenths, using appropriate tools and strategies, including algorithms	1	Addition and Subtraction
B2.5 represent and solve problems involving the multiplication of two- or three-digit whole numbers by one-digit whole numbers and by 10, 100, and 1000, using appropriate tools, including arrays	1	Multiplication and Division
B2.6 represent and solve problems involving the division of two- or three-digit whole numbers by one-digit whole numbers, expressing any remainder as a fraction when appropriate, using appropriate tools, including arrays	1	Multiplication and Division
B2.7 represent the relationship between the repeated addition of a unit fraction and the multiplication of that unit fraction by a whole number, using tools, drawings, and standard fractional notation	1	Multiplication and Division
B2.8 show simple multiplicative relationships involving whole-number rates, using various tools and drawings	1	Multiplication and Division

C1. Patterns and Relationships		
C1.1 identify and describe repeating and growing patterns, including patterns found in real-life contexts	1	Patterns
C1.2 create and translate repeating and growing patterns using various representations, including tables of values and graphs	1	Patterns
C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating and growing patterns	1	Patterns
C1.4 create and describe patterns to illustrate relationships among whole numbers and decimal tenths	1	Patterns
C2. Equations and Inequalities		
C2.1 identify and use symbols as variables in expressions and equations	1	Expressions, Equations and Inequalities
C2.2 solve equations that involve whole numbers up to 50 in various contexts, and verify solutions	1	Expressions, Equations and Inequalities
C2.3 solve inequalities that involve addition and subtraction of whole numbers up to 20, and verify and graph the solutions	1	Expressions, Equations and Inequalities
C3. Coding		
C3.1 solve problems and create computational representations of mathematical situations by writing and executing code, including code that involves sequential, concurrent, repeating, and nested events	1	Coding
C3.2 read and alter existing code, including code that involves sequential, concurrent, repeating, and nested events, and describe how changes to the code affect the outcomes	1	Coding
C4. Mathematical Modelling		
C4 apply the process of mathematical modelling to represent, analyse, make predictions, and provide insight into real-life situations	Embedded Throughout	
D1. Data Literacy		
D1.1 describe the difference between qualitative and quantitative data, and describe situations where each would be used	1	Data Collection
D1.2 collect data from different primary and secondary sources to answer questions of interest that involve comparing two or more sets of data, and organize the data in frequency tables and stem-and-leaf plots	1	Data Collection

D1.3 select from among a variety of graphs, including multiple-bar graphs, the type of graph best suited to represent various sets of data; display the data in the graphs with proper sources, titles, and labels, and appropriate scales; and justify their choice of graphs	1	Data Visualization and Analysis
D1.4 create an infographic about a data set, representing the data in appropriate ways, including in frequency tables, stem-and-leaf plots, and multiple-bar graphs, and incorporating any other relevant information that helps to tell a story about the data	1	Data Visualization and Analysis
D1.5 determine the mean and the median and identify the mode(s), if any, for various data sets involving whole numbers, and explain what each of these measures indicates about the data	1	Data Visualization and Analysis
D1.6 analyse different sets of data presented in various ways, including in stem-and-leaf plots and multiple-bar graphs, by asking and answering questions about the data and drawing conclusions, then make convincing arguments and informed decisions	1	Not currently assessed
D2. Probability		
D2.1 use mathematical language, including the terms “impossible”, “unlikely”, “equally likely”, “likely”, and “certain”, to describe the likelihood of events happening, represent this likelihood on a probability line, and use it to make predictions and informed decisions	1	Probability
D2.2 make and test predictions about the likelihood that the mean, median, and mode(s) of a data set will be the same for data collected from different populations	1	Probability
E1. Geometric and Spatial Reasoning		
E1.1 identify geometric properties of rectangles, including the number of right angles, parallel and perpendicular sides, and lines of symmetry	1	Rectangles and the Cartesian Plane
E1.2 plot and read coordinates in the first quadrant of a Cartesian plane, and describe the translations that move a point from one coordinate to another	1	Rectangles and the Cartesian Plane
E1.3 describe and perform translations and reflections on a grid, and predict the results of these transformations	1	Rectangles and the Cartesian Plane

E2. Measurement		
E2.1 explain the relationships between grams and kilograms as metric units of mass, and between litres and millilitres as metric units of capacity, and use benchmarks for these units to estimate mass and capacity	1	Measurement
E2.2 use metric prefixes to describe the relative size of different metric units, and choose appropriate units and tools to measure length, mass, and capacity	1	Measurement
E2.3 solve problems involving elapsed time by applying the relationships between different units of time	1	Time
E2.4 identify angles and classify them as right, straight, acute, or obtuse	1	Angles and Area
E2.5 use the row and column structure of an array to measure the areas of rectangles and to show that the area of any rectangle can be found by multiplying its side lengths	1	Angles and Area
E2.6 apply the formula for the area of a rectangle to find the unknown measurement when given two of the three	1	Angles and Area
F1. Money and Finances		
F1.1 identify various methods of payment that can be used to purchase goods and services	1	Payments and Spending
F1.2 estimate and calculate the cost of transactions involving multiple items priced in whole-dollar amounts, not including sales tax, and the amount of change needed when payment is made in cash, using mental math	1	Payments and Spending
F1.3 explain the concepts of spending, saving, earning, investing, and donating, and identify key factors to consider when making basic decisions related to each	1	Payments and Spending
F1.4 explain the relationship between spending and saving, and describe how spending and saving behaviours may differ from one person to another	1	Payments and Spending
F1.5 describe some ways of determining whether something is reasonably priced and therefore a good purchase	1	Payments and Spending

Education Perfect Mathematics Grades 5 Ontario Curriculum Alignment

This document outlines how our platform's content and assessments are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all strands and fostering key mathematical processes to support student success.

<table>
<tr><th colspan="3">Education Perfect Mathematics Grade 5</th></tr>
<tr><td>Expectations</td><td>Number of Lessons</td><td>Topic Assessment</td></tr>
<tr><td colspan="3">A1. Social-Emotional Learning (SEL) Skills and the Mathematical Processes</td></tr>
<tr><td>A1.1 identify and manage emotions</td><td colspan="2" rowspan="6">Strand A is embedded throughout all of the content we develop in the following ways:
Quick corrections and built-in support within the platform help students positively manage challenges and emotions during tasks.
Self-paced, interactive lessons featuring engaging elements like gamification keep students motivated while reducing learning pressure.
Integrated tools allow students to easily track their learning progress, which builds self-awareness about their strengths and areas for growth.
Platform activities naturally incorporate problem-solving, helping students develop critical and creative thinking as they engage with math concepts.
Assessment features, including practice tests and flexible pacing, help reduce student anxiety around evaluations.</td></tr>
<tr><td>A1.2 recognize sources of stress and cope with challenges</td></tr>
<tr><td>A1.3 maintain positive motivation and perseverance</td></tr>
<tr><td>A1.4 build relationships and communicate effectively</td></tr>
<tr><td>A1.5 develop self-awareness and sense of identity</td></tr>
<tr><td>A1.6 think critically and creatively</td></tr>
<tr><td colspan="3">B1. Number Sense</td></tr>
<tr><td>B1.1 read, represent, compose, and decompose whole numbers up to and including 100 000, using appropriate tools and strategies, and describe various ways they are used in everyday life</td><td>1</td><td>Whole Numbers</td></tr>
<tr><td>B1.2 compare and order whole numbers up to and including 100 000, in various contexts</td><td>1</td><td>Whole Numbers</td></tr>
<tr><td>B1.3 represent equivalent fractions from halves to twelfths, including improper fractions and mixed numbers, using appropriate tools, in various contexts</td><td>1</td><td>Fractions, Decimals and Percents</td></tr>
</table>

B1.4 compare and order fractions from halves to twelfths, including improper fractions and mixed numbers, in various contexts	1	Fractions, Decimals and Percents
B1.5 read, represent, compare, and order decimal numbers up to hundredths, in various contexts	1	Fractions, Decimals and Percents
B1.6 round decimal numbers to the nearest tenth, in various contexts	1	Fractions, Decimals and Percents
B1.7 describe relationships and show equivalences among fractions, decimal numbers up to hundredths, and whole number percents, using appropriate tools and drawings, in various contexts	1	Fractions, Decimals and Percents
B2. Operations		
B2.1 use the properties of operations, and the relationships between operations, to solve problems involving whole numbers and decimal numbers, including those requiring more than one operation, and check calculations	1	Properties of Operations
B2.2 recall and demonstrate multiplication facts from 0 × 0 to 12 × 12, and related division facts	Times table practice	Properties of Operations
B2.3 use mental math strategies to multiply whole numbers by 0.1 and 0.01 and estimate sums and differences of decimal numbers up to hundredths, and explain the strategies used	1	Properties of Operations
B2.4 represent and solve problems involving the addition and subtraction of whole numbers that add up to no more than 100 000, and of decimal numbers up to hundredths, using appropriate tools, strategies, and algorithms	1	Addition and Subtraction
B2.5 add and subtract fractions with like denominators, in various contexts	1	Addition and Subtraction
B2.6 represent and solve problems involving the multiplication of two-digit whole numbers by two-digit whole numbers using the area model and using algorithms, and make connections between the two methods	1	Multiplication and Division
B2.7 represent and solve problems involving the division of three-digit whole numbers by two-digit whole numbers using the area model and using algorithms, and make connections between the two methods, while expressing any remainder appropriately	1	Multiplication and Division
B2.8 multiply and divide one-digit whole numbers by unit fractions, using appropriate tools and drawings	1	Multiplication and Division
B2.9 represent and create equivalent ratios and rates, using a variety of tools and models, in various contexts	1	Properties of Operations

C1. Patterns and Relationships		
C1.1 identify and describe repeating, growing, and shrinking patterns, including patterns found in real-life contexts	1	Patterns
C1.2 create and translate growing and shrinking patterns using various representations, including tables of values and graphs	1	Patterns
C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns	1	Patterns
C1.4 create and describe patterns to illustrate relationships among whole numbers and decimal tenths and hundredths	1	Patterns
C2. Equations and Inequalities		
C2.1 translate among words, algebraic expressions, and visual representations that describe equivalent relationships	1	Expressions, Equations and Inequalities
C2.2 evaluate algebraic expressions that involve whole numbers	1	Expressions, Equations and Inequalities
C2.3 solve equations that involve whole numbers up to 100 in various contexts, and verify solutions	1	Expressions, Equations and Inequalities
C2.4 solve inequalities that involve one operation and whole numbers up to 50, and verify and graph the solutions	1	Expressions, Equations and Inequalities
C3. Coding		
C3.1 solve problems and create computational representations of mathematical situations by writing and executing code, including code that involves conditional statements and other control structures	1	Coding
C3.2 read and alter existing code, including code that involves conditional statements and other control structures, and describe how changes to the code affect the outcomes	1	Coding
C4. Mathematical Modelling		
C4 apply the process of mathematical modelling to represent, analyse, make predictions, and provide insight into real-life situations	Embedded Throughout	

D1. Data Literacy		
D1.1 explain the importance of various sampling techniques for collecting a sample of data that is representative of a population	1	Data Collection, Visualization and Analysis
D1.2 collect data, using appropriate sampling techniques as needed, to answer questions of interest about a population, and organize the data in relative-frequency tables	1	Data Collection, Visualization and Analysis
D1.3 select from among a variety of graphs, including stacked-bar graphs, the type of graph best suited to represent various sets of data; display the data in the graphs with proper sources, titles, and labels, and appropriate scales; and justify their choice of graphs	2	Data Collection, Visualization and Analysis
D1.4 create an infographic about a data set, representing the data in appropriate ways, including in relative-frequency tables and stacked-bar graphs, and incorporating any other relevant information that helps to tell a story about the data	1	Data Collection, Visualization and Analysis
D1.5 determine the mean and the median and identify the mode(s), if any, for various data sets involving whole numbers and decimal numbers, and explain what each of these measures indicates about the data	2	Data Collection, Visualization and Analysis
D1.6 analyse different sets of data presented in various ways, including in stacked-bar graphs and in misleading graphs, by asking and answering questions about the data, challenging preconceived notions, and drawing conclusions, then make convincing arguments and informed decisions	1	Data Collection, Visualization and Analysis
D2. Probability		
D2.1 use fractions to express the probability of events happening, represent this probability on a probability line, and use it to make predictions and informed decisions	1	Probability
D2.2 determine and compare the theoretical and experimental probabilities of an event happening	1	Probability
E1. Geometric and Spatial Reasoning		
E1.1 identify geometric properties of triangles, and construct different types of triangles when given side or angle measurements	1	Geometric Reasoning
E1.2 identify and construct congruent triangles, rectangles, and parallelograms	1	Geometric Reasoning
E1.3 draw top, front, and side views of objects, and match drawings with objects	1	Geometric Reasoning

E1.4 plot and read coordinates in the first quadrant of a Cartesian plane using various scales, and describe the translations that move a point from one coordinate to another	1	Location and Movement
E1.5 describe and perform translations, reflections, and rotations up to 180° on a grid, and predict the results of these transformations	1	Location and Movement
E2. Measurement		
E2.1 use appropriate metric units to estimate and measure length, area, mass, and capacity	1	Measurement
E2.2 solve problems that involve converting larger metric units into smaller ones, and describe the base ten relationships among metric units	1	Measurement
E2.3 compare angles and determine their relative size by matching them and by measuring them using appropriate non-standard units	1	Angles and Area
E2.4 explain how protractors work, use them to measure and construct angles up to 180°, and use benchmark angles to estimate the size of other angles	1	Angles and Area
E2.5 use the area relationships among rectangles, parallelograms, and triangles to develop the formulas for the area of a parallelogram and the area of a triangle, and solve related problems	1	Angles and Area
E2.6 show that two-dimensional shapes with the same area can have different perimeters, and solve related problems	1	Angles and Area
F1. Money and Finances		
F1.1 describe several ways money can be transferred among individuals, organizations, and businesses	1	Financial Concepts
F1.2 estimate and calculate the cost of transactions involving multiple items priced in dollars and cents, including sales tax, using various strategies	1	Financial Calculations
F1.3 design sample basic budgets to manage finances for various earning and spending scenarios	1	Financial Calculations
F1.4 explain the concepts of credit and debt, and describe how financial decisions may be impacted by each	1	Financial Concepts
F1.5 calculate unit rates for various goods and services, and identify which rates offer the best value	1	Financial Calculations
F1.6 describe the types of taxes that are collected by the different levels of government in Canada, and explain how tax revenue is used to provide services in the community	1	Financial Concepts

Education Perfect Mathematics Grades 6 Ontario Curriculum Alignment

This document outlines how our platform's content and assessments are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all strands and fostering key mathematical processes to support student success.

This alignment document shows the current content on the platform, which is scheduled to be replaced across the 2025-2026 school year by the content detailed in our new alignment.

Education Perfect Mathematics Grade 6		
Expectations	Number of Lessons	Topic Assessment
A1. Social-Emotional Learning (SEL) Skills and the Mathematical Processes		
A1.1 identify and manage emotions	Strand A is embedded throughout all of the content we develop in the following ways: • Quick corrections and built-in support within the platform help students positively manage challenges and emotions during tasks. • Self-paced, interactive lessons featuring engaging elements like gamification keep students motivated while reducing learning pressure. • Integrated tools allow students to easily track their learning progress, which builds self-awareness about their strengths and areas for growth. • Platform activities naturally incorporate problem-solving, helping students develop critical and creative thinking as they engage with math concepts. • Assessment features, including practice tests and flexible pacing, help reduce student anxiety around evaluations.	
A1.2 recognize sources of stress and cope with challenges		
A1.3 maintain positive motivation and perseverance		
A1.4 build relationships and communicate effectively		
A1.5 develop self-awareness and sense of identity		
A1.6 think critically and creatively		
B1. Number Sense		
B1.1 read and represent whole numbers up to and including one million, using appropriate tools and strategies, and describe various ways they are used in everyday life	1	Whole Numbers
B1.2 read and represent integers, using a variety of tools and strategies, including horizontal and vertical number lines	1	Integers, Decimal Numbers and Fractions

B1.3 compare and order integers, decimal numbers, and fractions, separately and in combination, in various contexts	1	Whole Numbers
	1	Integers, Decimal Numbers and Fractions
B1.4 read, represent, compare, and order decimal numbers up to thousandths, in various contexts	1	Fractions and Decimals
B1.5 round decimal numbers, both terminating and repeating, to the nearest tenth, hundredth, or whole number, as applicable, in various contexts	1	Fractions and Decimals
B1.6 describe relationships and show equivalences among fractions and decimal numbers up to thousandths, using appropriate tools and drawings, in various contexts	1	Fractions and Decimals
B2. Operation		
B2.1 use the properties of operations, and the relationships between operations, to solve problems involving whole numbers, decimal numbers, fractions, ratios, rates, and whole number percents, including those requiring multiple steps or multiple operations	1	Divisibility Rules, Rates, Ratios and Percent
B2.2 understand the divisibility rules and use them to determine whether numbers are divisible by 2, 3, 4, 5, 6, 8, 9, and 10	1	Divisibility Rules, Rates, Ratios and Percent
B2.3 use mental math strategies to calculate percents of whole numbers, including 1%, 5%, 10%, 15%, 25%, and 50%, and explain the strategies used	1	Divisibility Rules, Rates, Ratios and Percent
B2.4 represent and solve problems involving the addition and subtraction of whole numbers and decimal numbers, using estimation and algorithms	1	Addition and Subtraction
B2.5 add and subtract fractions with like and unlike denominators, using appropriate tools, in various contexts	1	Addition and Subtraction
B2.6 represent composite numbers as a product of their prime factors, including through the use of factor trees	1	Multiplication and Division with Fractions
B2.7 represent and solve problems involving the multiplication of three-digit whole numbers by decimal tenths, using algorithms	1	Multiplication and Division with Decimals
B2.8 represent and solve problems involving the division of three-digit whole numbers by decimal tenths, using appropriate tools, strategies, and algorithms, and expressing remainders as appropriate	1	Multiplication and Division with Decimals
B2.9 multiply whole numbers by proper fractions, using appropriate tools and strategies	1	Multiplication and Division with Fractions

B2.10 divide whole numbers by proper fractions, using appropriate tools and strategies	1	Multiplication and Division with Fractions
B2.11 represent and solve problems involving the division of decimal numbers up to thousandths by whole numbers up to 10, using appropriate tools and strategies	1	Multiplication and Division with Decimals
B2.12 solve problems involving ratios, including percents and rates, using appropriate tools and strategies	1	Problems Involving Rations, Percents and Rates
C1. Patterns and Relationships		
C1.1 identify and describe repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and specify which growing patterns are linear	1	Patterns
C1.2 create and translate repeating, growing, and shrinking patterns using various representations, including tables of values, graphs, and, for linear growing patterns, algebraic expressions and equations	1	Patterns
C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns, and use algebraic representations of the pattern rules to solve for unknown values in linear growing patterns	1	Patterns
C1.4 create and describe patterns to illustrate relationships among whole numbers and decimal numbers	1	Patterns
C2. Equations and Inequalities		
C2.1 add monomials with a degree of 1 that involve whole numbers, using tools	1	Algebraic Expressions, Equations and Inequalities
C2.2 evaluate algebraic expressions that involve whole numbers and decimal tenths	1	Algebraic Expressions, Equations and Inequalities
C2.3 solve equations that involve multiple terms and whole numbers in various contexts, and verify solutions	1	Algebraic Expressions, Equations and Inequalities
C2.4 solve inequalities that involve two operations and whole numbers up to 100 and verify and graph the solutions	1	Algebraic Expressions, Equations and Inequalities

C3. Coding		
C3.1 solve problems and create computational representations of mathematical situations by writing and executing efficient code, including code that involves conditional statements and other control structures	1	Coding
C3.2 read and alter existing code, including code that involves conditional statements and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code	1	Coding
C4. Mathematical Modelling		
C4 apply the process of mathematical modelling to represent, analyse, make predictions, and provide insight into real-life situations	Embedded Throughout	
D1. Data Literacy		
D1.1 describe the difference between discrete and continuous data, and provide examples of each	1	Data Collection, Visualization and Analysis
D1.2 collect qualitative data and discrete and continuous quantitative data to answer questions of interest about a population, and organize the sets of data as appropriate, including using intervals	1	Data Collection, Visualization and Analysis
D1.3 select from among a variety of graphs, including histograms and broken-line graphs, the type of graph best suited to represent various sets of data; display the data in the graphs with proper sources, titles, and labels, and appropriate scales; and justify their choice of graphs	1	Data Collection, Visualization and Analysis
D1.4 create an infographic about a data set, representing the data in appropriate ways, including in tables, histograms, and broken-line graphs, and incorporating any other relevant information that helps to tell a story about the data	1	Data Collection, Visualization and Analysis
D1.5 determine the range as a measure of spread and the measures of central tendency for various data sets, and use this information to compare two or more data sets	1	Data Collection, Visualization and Analysis
D1.6 analyse different sets of data presented in various ways, including in histograms and broken-line graphs and in misleading graphs, by asking and answering questions about the data, challenging preconceived notions, and drawing conclusions, then make convincing arguments and informed decisions	1	Data Collection, Visualization and Analysis

D2. Probability		
D2.1 use fractions, decimals, and percents to express the probability of events happening, represent this probability on a probability line, and use it to make predictions and informed decisions	1	Probability
D2.2 determine and compare the theoretical and experimental probabilities of two independent events happening	1	Probability
E1. Geometric and Spatial Reasoning		
E1.1 create lists of the geometric properties of various types of quadrilaterals, including the properties of the diagonals, rotational symmetry, and line symmetry	1	Geometric Reasoning, Location and Movement
E1.2 construct three-dimensional objects when given their top, front, and side views	1	Area and Surface Area
E1.3 plot and read coordinates in all four quadrants of a Cartesian plane, and describe the translations that move a point from one coordinate to another	1	Geometric Reasoning, Location and Movement
E1.4 describe and perform combinations of translations, reflections, and rotations up to 360° on a grid, and predict the results of these transformations	1	Geometric Reasoning, Location and Movement
E2. Measurement		
E2.1 measure length, area, mass, and capacity using the appropriate metric units, and solve problems that require converting smaller units to larger ones and vice versa	1	Measurement and Angles and Area and Surface Area
E2.2 use a protractor to measure and construct angles up to 360°, and state the relationship between angles that are measured clockwise and those that are measured counterclockwise	1	Measurement and Angles
E2.3 use the properties of supplementary angles, complementary angles, opposite angles, and interior and exterior angles to solve for unknown angle measures	1	Measurement and Angles
E2.4 determine the areas of trapezoids, rhombuses, kites, and composite polygons by decomposing them into shapes with known areas	1	Area and Surface Area
E2.5 create and use nets to demonstrate the relationship between the faces of prisms and pyramids and their surface areas	1	Area and Surface Area
E2.6 determine the surface areas of prisms and pyramids by calculating the areas of their two-dimensional faces and adding them together	1	Area and Surface Area

F1. Money and Finances		
F1.1 describe the advantages and disadvantages of various methods of payment that can be used to purchase goods and services	1	Money Concepts
F1.2 identify different types of financial goals, including earning and saving goals, and outline some key steps in achieving them	1	Money Concepts
F1.3 identify and describe various factors that may help or interfere with reaching financial goals	1	Money Concepts
F1.4 explain the concept of interest rates, and identify types of interest rates and fees associated with different accounts and loans offered by various banks and other financial institutions	1	Money Concepts
F1.5 describe trading, lending, borrowing, and donating as different ways to distribute financial and other resources among individuals and organizations	1	Money Concepts

Education Perfect Mathematics Grades 6 Ontario Curriculum Alignment

This document outlines how our platform's content and assessments are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all strands and fostering key mathematical processes to support student success.

This alignment document outlines the content scheduled for full release on the platform across the 2025-2026 school year.

Education Perfect Mathematics Grade 6		
Expectations	Number of Lessons	Topic Assessment
A1. Social-Emotional Learning (SEL) Skills and the Mathematical Processes		
A1.1 identify and manage emotions	Strand A is embedded throughout all of the content we develop in the following ways: • Quick corrections and built-in support within the platform help students positively manage challenges and emotions during tasks. • Self-paced, interactive lessons featuring engaging elements like gamification keep students motivated while reducing learning pressure. • Integrated tools allow students to easily track their learning progress, which builds self-awareness about their strengths and areas for growth. • Platform activities naturally incorporate problem-solving, helping students develop critical and creative thinking as they engage with math concepts. • Assessment features, including practice tests and flexible pacing, help reduce student anxiety around evaluations.	
A1.2 recognize sources of stress and cope with challenges		
A1.3 maintain positive motivation and perseverance		
A1.4 build relationships and communicate effectively		
A1.5 develop self-awareness and sense of identity		
A1.6 think critically and creatively		
B1. Number Sense		
B1.1 read and represent whole numbers up to and including one million, using appropriate tools and strategies, and describe various ways they are used in everyday life	3	Whole Numbers
B1.2 read and represent integers, using a variety of tools and strategies, including horizontal and vertical number lines	2	Reading, Representing, and Ordering Integers

B1.3 compare and order integers, decimal numbers, and fractions, separately and in combination, in various contexts	2	Whole Numbers
	5	Integers, Fractions, and Decimals
B1.4 read, represent, compare, and order decimal numbers up to thousandths, in various contexts	4	Reading, Representing, and Ordering Decimals
B1.5 round decimal numbers, both terminating and repeating, to the nearest tenth, hundredth, or whole number, as applicable, in various contexts	3	Rounding Decimals
B1.6 describe relationships and show equivalences among fractions and decimal numbers up to thousandths, using appropriate tools and drawings, in various contexts	3	Fractions and Decimals
B2. Operations		
B2.1 use the properties of operations, and the relationships between operations, to solve problems involving whole numbers, decimal numbers, fractions, ratios, rates, and whole number percents, including those requiring multiple steps or multiple operations	2	Rates, Ratios and Percents
B2.2 understand the divisibility rules and use them to determine whether numbers are divisible by 2, 3, 4, 5, 6, 8, 9, and 10	3	Divisibility Rules
B2.3 use mental math strategies to calculate percents of whole numbers, including 1%, 5%, 10%, 15%, 25%, and 50%, and explain the strategies used	3	Mental Math
B2.4 represent and solve problems involving the addition and subtraction of whole numbers and decimal numbers, using estimation and algorithms	4	Addition and Subtraction
B2.5 add and subtract fractions with like and unlike denominators, using appropriate tools, in various contexts	3	Adding and Subtracting Fractions
B2.6 represent composite numbers as a product of their prime factors, including through the use of factor trees	1	Multiplication and Division with Fractions
B2.7 represent and solve problems involving the multiplication of three-digit whole numbers by decimal tenths, using algorithms	3	Multiplication with Decimals
B2.8 represent and solve problems involving the division of three-digit whole numbers by decimal tenths, using appropriate tools, strategies, and algorithms, and expressing remainders as appropriate	3	Dividing Whole Numbers by Decimal Tenths
B2.9 multiply whole numbers by proper fractions, using appropriate tools and strategies	2	Multiplication and Division with Fractions

B2.10 divide whole numbers by proper fractions, using appropriate tools and strategies	2	Multiplication and Division with Fractions
B2.11 represent and solve problems involving the division of decimal numbers up to thousandths by whole numbers up to 10, using appropriate tools and strategies	3	Dividing Decimals by Whole Numbers
B2.12 solve problems involving ratios, including percents and rates, using appropriate tools and strategies	4	Problems Involving Rations, Percents and Rates
C1. Patterns and Relationships		
C1.1 identify and describe repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and specify which growing patterns are linear	1	Describing Patterns
C1.2 create and translate repeating, growing, and shrinking patterns using various representations, including tables of values, graphs, and, for linear growing patterns, algebraic expressions and equations	3	Visualizing Patterns
C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns, and use algebraic representations of the pattern rules to solve for unknown values in linear growing patterns	1	Describing Patterns
C1.4 create and describe patterns to illustrate relationships among whole numbers and decimal numbers	1	Describing Patterns
C2. Equations and Inequalities		
C2.1 add monomials with a degree of 1 that involve whole numbers, using tools	1	Algebraic Expressions
C2.2 evaluate algebraic expressions that involve whole numbers and decimal tenths	1	Algebraic Expressions
C2.3 solve equations that involve multiple terms and whole numbers in various contexts, and verify solutions	2	Equations and Inequalities
C2.4 solve inequalities that involve two operations and whole numbers up to 100 and verify and graph the solutions	2	Equations and Inequalities

C3. Coding		
C3.1 solve problems and create computational representations of mathematical situations by writing and executing efficient code, including code that involves conditional statements and other control structures	1	Coding
C3.2 read and alter existing code, including code that involves conditional statements and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code	2	Coding
C4. Mathematical Modelling		
C4 apply the process of mathematical modelling to represent, analyse, make predictions, and provide insight into real-life situations	Embedded Throughout	
D1. Data Literacy		
D1.1 describe the difference between discrete and continuous data, and provide examples of each	1	Data Collection
D1.2 collect qualitative data and discrete and continuous quantitative data to answer questions of interest about a population, and organize the sets of data as appropriate, including using intervals	1	Data Collection
D1.3 select from among a variety of graphs, including histograms and broken-line graphs, the type of graph best suited to represent various sets of data; display the data in the graphs with proper sources, titles, and labels, and appropriate scales; and justify their choice of graphs	2	Data Visualization
D1.4 create an infographic about a data set, representing the data in appropriate ways, including in tables, histograms, and broken-line graphs, and incorporating any other relevant information that helps to tell a story about the data	1	Data Visualization
D1.5 determine the range as a measure of spread and the measures of central tendency for various data sets, and use this information to compare two or more data sets	1	Data Analysis
D1.6 analyse different sets of data presented in various ways, including in histograms and broken-line graphs and in misleading graphs, by asking and answering questions about the data, challenging preconceived notions, and drawing conclusions, then make convincing arguments and informed decisions	1	Data Analysis

D2. Probability		
D2.1 use fractions, decimals, and percents to express the probability of events happening, represent this probability on a probability line, and use it to make predictions and informed decisions	1	Probability
D2.2 determine and compare the theoretical and experimental probabilities of two independent events happening	2	Probability
E1. Geometric and Spatial Reasoning		
E1.1 create lists of the geometric properties of various types of quadrilaterals, including the properties of the diagonals, rotational symmetry, and line symmetry	2	Geometric Reasoning
E1.2 construct three-dimensional objects when given their top, front, and side views	1	3D Shapes and Surface Area
E1.3 plot and read coordinates in all four quadrants of a Cartesian plane, and describe the translations that move a point from one coordinate to another	2	Location and Movement
E1.4 describe and perform combinations of translations, reflections, and rotations up to 360° on a grid, and predict the results of these transformations	2	Location and Movement
E2. Measurement		
E2.1 measure length, area, mass, and capacity using the appropriate metric units, and solve problems that require converting smaller units to larger ones and vice versa	2	Measurement and Angles
	1	Area of 2D Shapes
E2.2 use a protractor to measure and construct angles up to 360°, and state the relationship between angles that are measured clockwise and those that are measured counterclockwise	1	Measurement and Angles
E2.3 use the properties of supplementary angles, complementary angles, opposite angles, and interior and exterior angles to solve for unknown angle measures	1	Measurement and Angles
E2.4 determine the areas of trapezoids, rhombuses, kites, and composite polygons by decomposing them into shapes with known areas	2	Area of 2D Shapes
E2.5 create and use nets to demonstrate the relationship between the faces of prisms and pyramids and their surface areas	1	3D Shapes and Surface Area
E2.6 determine the surface areas of prisms and pyramids by calculating the areas of their two-dimensional faces and adding them together	2	3D Shapes and Surface Area

F1. Money and Finances		
F1.1 describe the advantages and disadvantages of various methods of payment that can be used to purchase goods and services	1	Money Concepts
F1.2 identify different types of financial goals, including earning and saving goals, and outline some key steps in achieving them	1	Money Concepts
F1.3 identify and describe various factors that may help or interfere with reaching financial goals	1	Money Concepts
F1.4 explain the concept of interest rates, and identify types of interest rates and fees associated with different accounts and loans offered by various banks and other financial institutions	1	Money Concepts
F1.5 describe trading, lending, borrowing, and donating as different ways to distribute financial and other resources among individuals and organizations	1	Money Concepts

Education Perfect Mathematics Grades 7 Ontario Curriculum Alignment

This document outlines how our platform's content and assessments are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all strands and fostering key mathematical processes to support student success.

This alignment document shows the current content on the platform, which is scheduled to be replaced across the 2025-2026 school year by the content detailed in our new alignment.

<table>
<tr><th colspan="3">Education Perfect Mathematics Grade 7</th></tr>
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Quick corrections and built-in support within the platform help students positively manage challenges and emotions during tasks.
Self-paced, interactive lessons featuring engaging elements like gamification keep students motivated while reducing learning pressure.
Integrated tools allow students to easily track their learning progress, which builds self-awareness about their strengths and areas for growth.
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<tr><td colspan="3">B1. Number Sense</td></tr>
<tr><td>B1.1 represent and compare whole numbers up to and including one billion, including in expanded form using powers of ten, and describe various ways they are used in everyday life</td><td>1</td><td>Rational Numbers</td></tr>
<tr><td>B1.2 identify and represent perfect squares, and determine their square roots, in various contexts</td><td>1</td><td>Rational Numbers</td></tr>
</table>

B1.3 read, represent, compare, and order rational numbers, including positive and negative fractions and decimal numbers to thousandths, in various contexts	1	Rational Numbers
B1.4 use equivalent fractions to simplify fractions, when appropriate, in various contexts	1	Fractions, Decimals, and Percents
B1.5 generate fractions and decimal numbers between any two quantities	1	Fractions, Decimals, and Percents
B1.6 round decimal numbers to the nearest tenth, hundredth, or whole number, as applicable, in various contexts	1	Positive and Negative Integers, Fractions and Decimals
B1.7 convert between fractions, decimal numbers, and percents, in various contexts	1	Fractions, Decimals, and Percents
B2. Operations		
B2.1 use the properties and order of operations, and the relationships between operations, to solve problems involving whole numbers, decimal numbers, fractions, ratios, rates, and percents, including those requiring multiple steps or multiple operations	1	Operations with Rates, Ratios, Decimals and Parecents
B2.2 understand and recall commonly used percents, fractions, and decimal equivalents	1	Operations with Rates, Ratios, Decimals and Parecents
B2.3 use mental math strategies to increase and decrease a whole number by 1%, 5%, 10%, 25%, 50%, and 100%, and explain the strategies used	1	Operations with Rates, Ratios, Decimals and Parecents
B2.4 use objects, diagrams, and equations to represent, describe, and solve situations involving addition and subtraction of integers	1	Addition and Subtraction
B2.5 add and subtract fractions, including by creating equivalent fractions, in various contexts	1	Addition and Subtraction
B2.6 determine the greatest common factor for a variety of whole numbers up to 144 and the lowest common multiple for two and three whole numbers	1	Common Factors, Powers and Proportions
B2.7 evaluate and express repeated multiplication of whole numbers using exponential notation, in various contexts	1	Common Factors, Powers and Proportions

B2.8 multiply and divide fractions by fractions, using tools in various contexts	1	Multiplying and Dividing Fractions
B2.9 multiply and divide decimal numbers by decimal numbers, in various contexts	1	Multiplying and Dividing Decimals
B2.10 identify proportional and non-proportional situations and apply proportional reasoning to solve problems	1	Common Factors, Powers and Proportions
C1. Patterns and Relationships		
C1.1 identify and compare a variety of repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and compare linear growing patterns on the basis of their constant rates and initial values	1	Patterns
C1.2 create and translate repeating, growing, and shrinking patterns involving whole numbers and decimal numbers using various representations, including algebraic expressions and equations for linear growing patterns	1	Patterns
C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns involving whole numbers and decimal numbers, and use algebraic representations of the pattern rules to solve for unknown values in linear growing patterns	1	Not Assessed
C1.4 create and describe patterns to illustrate relationships among integers	1	Patterns
C2. Equations and Inequalities		
C2.1 add and subtract monomials with a degree of 1 that involve whole numbers, using tools	1	Expressions, Equations and Inequalities
C2.2 evaluate algebraic expressions that involve whole numbers and decimal numbers	1	Expressions, Equations and Inequalities
C2.3 solve equations that involve multiple terms, whole numbers, and decimal numbers in various contexts, and verify solutions	1	Expressions, Equations and Inequalities
C2.4 solve inequalities that involve multiple terms and whole numbers, and verify and graph the solutions	1	Expressions, Equations and Inequalities

C3. Coding		
C3.1 solve problems and create computational representations of mathematical situations by writing and executing efficient code, including code that involves events influenced by a defined count and/or subprogram and other control structures	1	Coding
C3.2 read and alter existing code, including code that involves events influenced by a defined count and/or subprogram and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code	1	Coding
C4. Mathematical Modelling		
C4 apply the process of mathematical modelling to represent, analyse, make predictions, and provide insight into real-life situations	Embedded Throughout	
D1. Data Literacy		
D1.1 explain why percentages are used to represent the distribution of a variable for a population or sample in large sets of data, and provide examples	1	Data Collection, Visualisation and Analysis
D1.2 collect qualitative data and discrete and continuous quantitative data to answer questions of interest, and organize the sets of data as appropriate, including using percentages	1	Data Collection, Visualisation and Analysis
D1.3 select from among a variety of graphs, including circle graphs, the type of graph best suited to represent various sets of data; display the data in the graphs with proper sources, titles, and labels, and appropriate scales; and justify their choice of graphs	1	Data Collection, Visualisation and Analysis
D1.4 create an infographic about a data set, representing the data in appropriate ways, including in tables and circle graphs, and incorporating any other relevant information that helps to tell a story about the data	1	Data Collection, Visualisation and Analysis
D1.5 determine the impact of adding or removing data from a data set on a measure of central tendency, and describe how these changes alter the shape and distribution of the data	1	Data Collection, Visualisation and Analysis
D1.6 analyse different sets of data presented in various ways, including in circle graphs and in misleading graphs, by asking and answering questions about the data, challenging preconceived notions, and drawing conclusions, then make convincing arguments and informed decisions	1	Data Collection, Visualisation and Analysis
D2. Probability		
D2.1 describe the difference between independent and dependent events, and explain how their probabilities differ, providing examples	1	Probability
D2.2 determine and compare the theoretical and experimental probabilities of two independent events happening and of two dependent events happening	1	Probability

E1. Geometric and Spatial Reasoning		
E1.1 describe and classify cylinders, pyramids, and prisms according to their geometric properties, including plane and rotational symmetry	1	Geometric Properties, Dilations and Transformations
E1.2 draw top, front, and side views, as well as perspective views, of objects and physical spaces, using appropriate scales	1	Geometric Properties, Dilations and Transformations
E1.3 perform dilations and describe the similarity between the image and the original shape	1	Geometric Properties, Dilations and Transformations
E1.4 describe and perform translations, reflections, and rotations on a Cartesian plane, and predict the results of these transformations	1	Geometric Properties, Dilations and Transformations
E2. Measurement		
E2.1 describe the differences and similarities between volume and capacity, and apply the relationship between millilitres (mL) and cubic centimetres (cm^3) to solve problems	1	Perimeter, Area, Volume and Capacity
E2.2 solve problems involving perimeter, area, and volume that require converting from one metric unit of measurement to another	1	Perimeter, Area, Volume and Capacity
E2.3 use the relationships between the radius, diameter, and circumference of a circle to explain the formula for finding the circumference and to solve related problems	1	Circles
E2.4 construct circles when given the radius, diameter, or circumference	1	Circles
E2.5 show the relationships between the radius, diameter, and area of a circle, and use these relationships to explain the formula for measuring the area of a circle and to solve related problems	1	Circles
E2.6 represent cylinders as nets and determine their surface area by adding the areas of their parts	1	Perimeter, Area, Volume and Capacity
E2.7 show that the volume of a prism or cylinder can be determined by multiplying the area of its base by its height, and apply this relationship to find the area of the base, volume, and height of prisms and cylinders when given two of the three measurements	1	Perimeter, Area, Volume and Capacity

F1. Money and Finances		
F1.1 identify and compare exchange rates, and convert foreign currencies to Canadian dollars and vice versa	1	Exchange Rates and Interest Rates
F1.2 identify and describe various reliable sources of information that can help with planning for and reaching a financial goal	1	Financial Decisions
F1.3 create, track, and adjust sample budgets designed to meet longer-term financial goals for various scenarios	1	Financial Decisions
F1.4 identify various societal and personal factors that may influence financial decision making, and describe the effects that each might have	1	Financial Decisions
F1.5 explain how interest rates can impact savings, investments, and the cost of borrowing to pay for goods and services over time	1	Exchange Rates and Interest Rates
F1.6 compare interest rates and fees for different accounts and loans offered by various financial institutions, and determine the best option for different scenarios	1	Exchange Rates and Interest Rates

Education Perfect Mathematics Grades 7 Ontario Curriculum Alignment

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B1.3 read, represent, compare, and order rational numbers, including positive and negative fractions and decimal numbers to thousandths, in various contexts	3	Positive and Negative Integers, Fractions and Decimals
B1.4 use equivalent fractions to simplify fractions, when appropriate, in various contexts	1	Fractions, Decimals, and Percents
B1.5 generate fractions and decimal numbers between any two quantities	1	Fractions, Decimals, and Percents
B1.6 round decimal numbers to the nearest tenth, hundredth, or whole number, as applicable, in various contexts	2	Positive and Negative Integers, Fractions and Decimals
B1.7 convert between fractions, decimal numbers, and percents, in various contexts	2	Fractions, Decimals, and Percents
B2. Operations		
B2.1 use the properties and order of operations, and the relationships between operations, to solve problems involving whole numbers, decimal numbers, fractions, ratios, rates, and percents, including those requiring multiple steps or multiple operations	2	Operations
B2.2 understand and recall commonly used percents, fractions, and decimal equivalents	1	Operations
B2.3 use mental math strategies to increase and decrease a whole number by 1%, 5%, 10%, 25%, 50%, and 100%, and explain the strategies used	3	Mental Math
B2.4 use objects, diagrams, and equations to represent, describe, and solve situations involving addition and subtraction of integers	2	Addition and Subtraction
B2.5 add and subtract fractions, including by creating equivalent fractions, in various contexts	2	Addition and Subtraction
B2.6 determine the greatest common factor for a variety of whole numbers up to 144 and the lowest common multiple for two and three whole numbers	3	Common Factors and Lowest Common Multiples
B2.7 evaluate and express repeated multiplication of whole numbers using exponential notation, in various contexts	1	Operations
B2.8 multiply and divide fractions by fractions, using tools in various contexts	4	Multiplying and Dividing Fractions

B2.9 multiply and divide decimal numbers by decimal numbers, in various contexts	4	Multiplying and Dividing Decimals
B2.10 identify proportional and non-proportional situations and apply proportional reasoning to solve problems	2	Proportional Situations
C1. Patterns and Relationships		
C1.1 identify and compare a variety of repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and compare linear growing patterns on the basis of their constant rates and initial values	1	Patterns
C1.2 create and translate repeating, growing, and shrinking patterns involving whole numbers and decimal numbers using various representations, including algebraic expressions and equations for linear growing patterns	2	Patterns
C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating, growing, and shrinking patterns involving whole numbers and decimal numbers, and use algebraic representations of the pattern rules to solve for unknown values in linear growing patterns	1	Not Assessed
C1.4 create and describe patterns to illustrate relationships among integers	1	Patterns
C2. Equations and Inequalities		
C2.1 add and subtract monomials with a degree of 1 that involve whole numbers, using tools	1	Expressions, Equations and Inequalities
C2.2 evaluate algebraic expressions that involve whole numbers and decimal numbers	1	Expressions, Equations and Inequalities
C2.3 solve equations that involve multiple terms, whole numbers, and decimal numbers in various contexts, and verify solutions	1	Expressions, Equations and Inequalities
C2.4 solve inequalities that involve multiple terms and whole numbers, and verify and graph the solutions	1	Expressions, Equations and Inequalities

C3. Coding		
C3.1 solve problems and create computational representations of mathematical situations by writing and executing efficient code, including code that involves events influenced by a defined count and/or subprogram and other control structures	2	Coding
C3.2 read and alter existing code, including code that involves events influenced by a defined count and/or subprogram and other control structures, and describe how changes to the code affect the outcomes and the efficiency of the code	1	Coding
C4. Mathematical Modelling		
C4 apply the process of mathematical modelling to represent, analyse, make predictions, and provide insight into real-life situations	Embedded Throughout	
D1. Data Literacy		
D1.1 explain why percentages are used to represent the distribution of a variable for a population or sample in large sets of data, and provide examples	1	Data Collection and Organization
D1.2 collect qualitative data and discrete and continuous quantitative data to answer questions of interest, and organize the sets of data as appropriate, including using percentages	2	Data Collection and Organization
D1.3 select from among a variety of graphs, including circle graphs, the type of graph best suited to represent various sets of data; display the data in the graphs with proper sources, titles, and labels, and appropriate scales; and justify their choice of graphs	2	Data Visualization
D1.4 create an infographic about a data set, representing the data in appropriate ways, including in tables and circle graphs, and incorporating any other relevant information that helps to tell a story about the data	1	Data Visualization
D1.5 determine the impact of adding or removing data from a data set on a measure of central tendency, and describe how these changes alter the shape and distribution of the data	1	Data Analysis
D1.6 analyse different sets of data presented in various ways, including in circle graphs and in misleading graphs, by asking and answering questions about the data, challenging preconceived notions, and drawing conclusions, then make convincing arguments and informed decisions	1	Data Analysis
D2. Probability		
D2.1 describe the difference between independent and dependent events, and explain how their probabilities differ, providing examples	1	Probability
D2.2 determine and compare the theoretical and experimental probabilities of two independent events happening and of two dependent events happening	2	Probability

E1. Geometric and Spatial Reasoning		
E1.1 describe and classify cylinders, pyramids, and prisms according to their geometric properties, including plane and rotational symmetry	1	Geometric Properties, Dilations and Transformations
E1.2 draw top, front, and side views, as well as perspective views, of objects and physical spaces, using appropriate scales	1	Geometric Properties, Dilations and Transformations
E1.3 perform dilations and describe the similarity between the image and the original shape	1	Geometric Properties, Dilations and Transformations
E1.4 describe and perform translations, reflections, and rotations on a Cartesian plane, and predict the results of these transformations	1	Geometric Properties, Dilations and Transformations
E2. Measurement		
E2.1 describe the differences and similarities between volume and capacity, and apply the relationship between millilitres (mL) and cubic centimetres (cm^3) to solve problems	1	Perimeter, Area, Volume and Capacity
E2.2 solve problems involving perimeter, area, and volume that require converting from one metric unit of measurement to another	1	Perimeter, Area, Volume and Capacity
E2.3 use the relationships between the radius, diameter, and circumference of a circle to explain the formula for finding the circumference and to solve related problems	2	Circles
E2.4 construct circles when given the radius, diameter, or circumference	1	Circles
E2.5 show the relationships between the radius, diameter, and area of a circle, and use these relationships to explain the formula for measuring the area of a circle and to solve related problems	2	Circles
E2.6 represent cylinders as nets and determine their surface area by adding the areas of their parts	2	Perimeter, Area, Volume and Capacity
E2.7 show that the volume of a prism or cylinder can be determined by multiplying the area of its base by its height, and apply this relationship to find the area of the base, volume, and height of prisms and cylinders when given two of the three measurements	1	Perimeter, Area, Volume and Capacity

F1. Money and Finances		
F1.1 identify and compare exchange rates, and convert foreign currencies to Canadian dollars and vice versa	2	Exchange Rates and Interest Rates
F1.2 identify and describe various reliable sources of information that can help with planning for and reaching a financial goal	1	Financial Decisions
F1.3 create, track, and adjust sample budgets designed to meet longer-term financial goals for various scenarios	1	Financial Decisions
F1.4 identify various societal and personal factors that may influence financial decision making, and describe the effects that each might have	1	Financial Decisions
F1.5 explain how interest rates can impact savings, investments, and the cost of borrowing to pay for goods and services over time	1	Exchange Rates and Interest Rates
F1.6 compare interest rates and fees for different accounts and loans offered by various financial institutions, and determine the best option for different scenarios	1	Exchange Rates and Interest Rates

Education Perfect a Mathematics Grades 8 Ontario Curriculum Alignment

This document outlines how our platform's content and assessments are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all strands and fostering key mathematical processes to support student success.

This alignment document shows the current content on the platform, which is scheduled to be replaced across the 2025-2026 school year by the content detailed in our new alignment.

Education Perfect Mathematics Grade 8		
Expectations	Number of Lessons	Topic Assessment
A1. Social-Emotional Learning (SEL) Skills and the Mathematical Processes		
A1.1 identify and manage emotions	Strand A is embedded throughout all of the content we develop in the following ways: • Quick corrections and built-in support within the platform help students positively manage challenges and emotions during tasks. • Self-paced, interactive lessons featuring engaging elements like gamification keep students motivated while reducing learning pressure. • Integrated tools allow students to easily track their learning progress, which builds self-awareness about their strengths and areas for growth. • Platform activities naturally incorporate problem-solving, helping students develop critical and creative thinking as they engage with math concepts. • Assessment features, including practice tests and flexible pacing, help reduce student anxiety around evaluations.	
A1.2 recognize sources of stress and cope with challenges		
A1.3 maintain positive motivation and perseverance		
A1.4 build relationships and communicate effectively		
A1.5 develop self-awareness and sense of identity		
A1.6 think critically and creatively		
B1. Number Sense		
B1.1 represent and compare very large and very small numbers, including through the use of scientific notation, and describe various ways they are used in everyday life	1	Represent, Compare and Order Numbers
B1.2 describe, compare, and order numbers in the real number system (rational and irrational numbers), separately and in combination, in various contexts	1	Represent, Compare and Order Numbers

B1.3 estimate and calculate square roots, in various contexts	1	Represent, Compare and Order Numbers
B1.4 use fractions, decimal numbers, and percents, including percents of more than 100% or less than 1%, interchangeably and flexibly to solve a variety of problems	1	Properties of Operations
B2. Operations		
B2.1 use the properties and order of operations, and the relationships between operations, to solve problems involving rational numbers, ratios, rates, and percents, including those requiring multiple steps or multiple operations	1	Properties of Operations
B2.2 understand and recall commonly used square numbers and their square roots	1	Properties of Operations
B2.3 use mental math strategies to multiply and divide whole numbers and decimal numbers up to thousandths by powers of ten, and explain the strategies used	1	Properties of Operations
B2.4 add and subtract integers, using appropriate strategies, in various contexts	1	Addition and Subtraction
B2.5 add and subtract fractions, using appropriate strategies, in various contexts	1	Addition and Subtraction
B2.6 multiply and divide fractions by fractions, as well as by whole numbers and mixed numbers, in various contexts	1	Multiplication and Division
B2.7 multiply and divide integers, using appropriate strategies, in various contexts	1	Multiplication and Division
B2.8 compare proportional situations and determine unknown values in proportional situations, and apply proportional reasoning to solve problems in various contexts	1	Multiplication and Division
C1. Patterns and Relationships		
C1.1 identify and compare a variety of repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and compare linear growing and shrinking patterns on the basis of their constant rates and initial values	1	Patterns
C1.2 create and translate repeating, growing, and shrinking patterns involving rational numbers using various representations, including algebraic expressions and equations for linear growing and shrinking patterns	1	Patterns

C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in growing and shrinking patterns involving rational numbers, and use algebraic representations of the pattern rules to solve for unknown values in linear growing and shrinking patterns	1	Patterns
C1.4 create and describe patterns to illustrate relationships among rational numbers	1	Patterns
C2. Equations and Inequalities		
C2.1 add and subtract monomials with a degree of 1, and add binomials with a degree of 1 that involve integers, using tools	1	Expressions, Equations and Inequalities
C2.2 evaluate algebraic expressions that involve rational numbers	1	Expressions, Equations and Inequalities
C2.3 solve equations that involve multiple terms, integers, and decimal numbers in various contexts, and verify solutions	1	Expressions, Equations and Inequalities
C2.4 solve inequalities that involve integers, and verify and graph the solutions	1	Expressions, Equations and Inequalities
C3. Coding		
C3.1 solve problems and create computational representations of mathematical situations by writing and executing code, including code that involves the analysis of data in order to inform and communicate decisions	1	Coding
C3.2 read and alter existing code involving the analysis of data in order to inform and communicate decisions, and describe how changes to the code affect the outcomes and the efficiency of the code	1	Coding
C4. Mathematical Modelling		
C4 apply the process of mathematical modelling to represent, analyse, make predictions, and provide insight into real-life situations	Embedded Throughout	

D1. Data Literacy		
D1.1 identify situations involving one-variable data and situations involving two-variable data, and explain when each type of data is needed	1	Data Collection, Visualization and Analysis
D1.2 collect continuous data to answer questions of interest involving two variables, and organize the data sets as appropriate in a table of values	1	Data Collection, Visualization and Analysis
D1.3 select from among a variety of graphs, including scatter plots, the type of graph best suited to represent various sets of data; display the data in the graphs with proper sources, titles, and labels, and appropriate scales; and justify their choice of graphs	1	Data Collection, Visualization and Analysis
D1.4 create an infographic about a data set, representing the data in appropriate ways, including in tables and scatter plots, and incorporating any other relevant information that helps to tell a story about the data	1	Data Collection, Visualization and Analysis
D1.5 use mathematical language, including the terms “strong”, “weak”, “none”, “positive”, and “negative”, to describe the relationship between two variables for various data sets with and without outliers	1	Data Collection, Visualization and Analysis
D1.6 analyse different sets of data presented in various ways, including in scatter plots and in misleading graphs, by asking and answering questions about the data, challenging preconceived notions, and drawing conclusions, then make convincing arguments and informed decisions	1	Data Collection, Visualization and Analysis
D2. Probability		
D2.1 solve various problems that involve probability, using appropriate tools and strategies, including Venn and tree diagrams	1	Probability
D2.2 determine and compare the theoretical and experimental probabilities of multiple independent events happening and of multiple dependent events happening	1	Probability
E1. Geometric and Spatial Reasoning		
E1.1 identify geometric properties of tessellating shapes and identify the transformations that occur in the tessellations	1	Transformations
E1.2 make objects and models using appropriate scales, given their top, front, and side views or their perspective views	1	Using Scales
E1.3 use scale drawings to calculate actual lengths and areas, and reproduce scale drawings at different ratios	1	Using Scales
E1.4 describe and perform translations, reflections, rotations, and dilations on a Cartesian plane, and predict the results of these transformations	1	Transformations

E2. Measurement		
E2.1 represent very large (mega, giga, tera) and very small (micro, nano, pico) metric units using models, base ten relationships, and exponential notation	1	Measurement
E2.2 solve problems involving angle properties, including the properties of intersecting and parallel lines and of polygons	1	Measurement
E2.3 solve problems involving the perimeter, circumference, area, volume, and surface area of composite two-dimensional shapes and three-dimensional objects, using appropriate formulas	1	Measurement
E2.4 describe the Pythagorean relationship using various geometric models, and apply the theorem to solve problems involving an unknown side length for a given right triangle	1	Measurement
F1. Money and Finances		
F1.1 describe some advantages and disadvantages of various methods of payment that can be used when dealing with multiple currencies and exchange rates	1	Payment and Spending Choices
F1.2 create a financial plan to reach a long-term financial goal, accounting for income, expenses, and tax implications	1	Financial Planning
F1.3 identify different ways to maintain a balanced budget, and use appropriate tools to track all income and spending, for several different scenarios	1	Financial Planning
F1.4 determine the growth of simple and compound interest at various rates using digital tools, and explain the impact interest has on long-term financial planning	1	Financial Planning
F1.5 compare various ways for consumers to get more value for their money when spending, including taking advantage of sales and customer loyalty and incentive programs, and determine the best choice for different scenarios	1	Payment and Spending Choices
F1.6 compare interest rates, annual fees, and rewards and other incentives offered by various credit card companies and consumer contracts to determine the best value and the best choice for different scenarios	1	Payment and Spending Choices

Education Perfect a Mathematics Grades 8 Ontario Curriculum Alignment

This document outlines how our platform's content and assessments are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all strands and fostering key mathematical processes to support student success.

This alignment document outlines the content scheduled for full release on the platform across the 2025-2026 school year.

Education Perfect Mathematics Grade 8		
Expectations	Number of Lessons	Topic Assessment
A1. Social-Emotional Learning (SEL) Skills and the Mathematical Processes		
A1.1 identify and manage emotions	Strand A is embedded throughout all of the content we develop in the following ways: • Quick corrections and built-in support within the platform help students positively manage challenges and emotions during tasks. • Self-paced, interactive lessons featuring engaging elements like gamification keep students motivated while reducing learning pressure. • Integrated tools allow students to easily track their learning progress, which builds self-awareness about their strengths and areas for growth. • Platform activities naturally incorporate problem-solving, helping students develop critical and creative thinking as they engage with math concepts. • Assessment features, including practice tests and flexible pacing, help reduce student anxiety around evaluations.	
A1.2 recognize sources of stress and cope with challenges		
A1.3 maintain positive motivation and perseverance		
A1.4 build relationships and communicate effectively		
A1.5 develop self-awareness and sense of identity		
A1.6 think critically and creatively		

B1. Number Sense		
B1.1 represent and compare very large and very small numbers, including through the use of scientific notation, and describe various ways they are used in everyday life	3	Large and Small Numbers
B1.2 describe, compare, and order numbers in the real number system (rational and irrational numbers), separately and in combination, in various contexts	2	Rational and Irrational Numbers
B1.3 estimate and calculate square roots, in various contexts	2	Rational and Irrational Numbers
B1.4 use fractions, decimal numbers, and percents, including percents of more than 100% or less than 1%, interchangeably and flexibly to solve a variety of problems	2	Fractions, Decimals, and Percents
B2. Operations		
B2.1 use the properties and order of operations, and the relationships between operations, to solve problems involving rational numbers, ratios, rates, and percents, including those requiring multiple steps or multiple operations	2	Operations
B2.2 understand and recall commonly used square numbers and their square roots	2	Math Facts and Mental Math
B2.3 use mental math strategies to multiply and divide whole numbers and decimal numbers up to thousandths by powers of ten, and explain the strategies used	1	Math Facts and Mental Math
B2.4 add and subtract integers, using appropriate strategies, in various contexts	1	Addition and Subtraction
B2.5 add and subtract fractions, using appropriate strategies, in various contexts	2	Addition and Subtraction
B2.6 multiply and divide fractions by fractions, as well as by whole numbers and mixed numbers, in various contexts	3	Multiplication and Division
B2.7 multiply and divide integers, using appropriate strategies, in various contexts	2	Multiplication and Division
B2.8 compare proportional situations and determine unknown values in proportional situations, and apply proportional reasoning to solve problems in various contexts	2	Propositional Situations

C1. Patterns and Relationships		
C1.1 identify and compare a variety of repeating, growing, and shrinking patterns, including patterns found in real-life contexts, and compare linear growing and shrinking patterns on the basis of their constant rates and initial values	1	Patterns
C1.2 create and translate repeating, growing, and shrinking patterns involving rational numbers using various representations, including algebraic expressions and equations for linear growing and shrinking patterns	2	Patterns
C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in growing and shrinking patterns involving rational numbers, and use algebraic representations of the pattern rules to solve for unknown values in linear growing and shrinking patterns	1	Patterns
C1.4 create and describe patterns to illustrate relationships among rational numbers	1	Patterns
C2. Equations and Inequalities		
C2.1 add and subtract monomials with a degree of 1, and add binomials with a degree of 1 that involve integers, using tools	2	Variables and Expressions
C2.2 evaluate algebraic expressions that involve rational numbers	1	Variables and Expressions
C2.3 solve equations that involve multiple terms, integers, and decimal numbers in various contexts, and verify solutions	1	Equations and Inequalities
C2.4 solve inequalities that involve integers, and verify and graph the solutions	2	Equations and Inequalities
C3. Coding		
C3.1 solve problems and create computational representations of mathematical situations by writing and executing code, including code that involves the analysis of data in order to inform and communicate decisions	2	Coding
C3.2 read and alter existing code involving the analysis of data in order to inform and communicate decisions, and describe how changes to the code affect the outcomes and the efficiency of the code	1	Coding
C4. Mathematical Modelling		
C4 apply the process of mathematical modelling to represent, analyse, make predictions, and provide insight into real-life situations	Embedded Throughout	

D1. Data Literacy		
D1.1 identify situations involving one-variable data and situations involving two-variable data, and explain when each type of data is needed	1	Data Collection and Visualization
D1.2 collect continuous data to answer questions of interest involving two variables, and organize the data sets as appropriate in a table of values	1	Data Collection and Visualization
D1.3 select from among a variety of graphs, including scatter plots, the type of graph best suited to represent various sets of data; display the data in the graphs with proper sources, titles, and labels, and appropriate scales; and justify their choice of graphs	1	Data Collection and Visualization
D1.4 create an infographic about a data set, representing the data in appropriate ways, including in tables and scatter plots, and incorporating any other relevant information that helps to tell a story about the data	1	Data Collection and Visualization
D1.5 use mathematical language, including the terms “strong”, “weak”, “none”, “positive”, and “negative”, to describe the relationship between two variables for various data sets with and without outliers	2	Data Analysis
D1.6 analyse different sets of data presented in various ways, including in scatter plots and in misleading graphs, by asking and answering questions about the data, challenging preconceived notions, and drawing conclusions, then make convincing arguments and informed decisions	1	Data Analysis
D2. Probability		
D2.1 solve various problems that involve probability, using appropriate tools and strategies, including Venn and tree diagrams	2	Probability
D2.2 determine and compare the theoretical and experimental probabilities of multiple independent events happening and of multiple dependent events happening	2	Probability
E1. Geometric and Spatial Reasoning		
E1.1 identify geometric properties of tessellating shapes and identify the transformations that occur in the tessellations	1	Transformations
E1.2 make objects and models using appropriate scales, given their top, front, and side views or their perspective views	1	Using Scales
E1.3 use scale drawings to calculate actual lengths and areas, and reproduce scale drawings at different ratios	2	Using Scales
E1.4 describe and perform translations, reflections, rotations, and dilations on a Cartesian plane, and predict the results of these transformations	2	Transformations

E2. Measurement		
E2.1 represent very large (mega, giga, tera) and very small (micro, nano, pico) metric units using models, base ten relationships, and exponential notation	1	Measurement, Lines, and Angles
E2.2 solve problems involving angle properties, including the properties of intersecting and parallel lines and of polygons	2	Measurement, Lines, and Angles
E2.3 solve problems involving the perimeter, circumference, area, volume, and surface area of composite two-dimensional shapes and three-dimensional objects, using appropriate formulas	2	Length, Area, and Volume
E2.4 describe the Pythagorean relationship using various geometric models, and apply the theorem to solve problems involving an unknown side length for a given right triangle	1	Length, Area, and Volume
F1. Money and Finances		
F1.1 describe some advantages and disadvantages of various methods of payment that can be used when dealing with multiple currencies and exchange rates	1	Payment and Spending Choices
F1.2 create a financial plan to reach a long-term financial goal, accounting for income, expenses, and tax implications	1	Financial Planning
F1.3 identify different ways to maintain a balanced budget, and use appropriate tools to track all income and spending, for several different scenarios	1	Financial Planning
F1.4 determine the growth of simple and compound interest at various rates using digital tools, and explain the impact interest has on long-term financial planning	1	Financial Planning
F1.5 compare various ways for consumers to get more value for their money when spending, including taking advantage of sales and customer loyalty and incentive programs, and determine the best choice for different scenarios	1	Payment and Spending Choices
F1.6 compare interest rates, annual fees, and rewards and other incentives offered by various credit card companies and consumer contracts to determine the best value and the best choice for different scenarios	1	Payment and Spending Choices

Education Perfect a Mathematics Grades 9 Ontario Curriculum Alignment

This document outlines how our platform's content and assessments are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all strands and fostering key mathematical processes to support student success.

This alignment document shows the current content on the platform, which is scheduled to be replaced across the 2025-2026 school year by the content detailed in our new alignment.

Education Perfect Mathematics Grade 9		
Expectations	Number of Lessons	Topic Assessment
AA1. Social-Emotional Learning Skills		
AA1 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	Strand AA1 is embedded throughout all of the content we develop in the following ways: • Quick corrections and built-in support within the platform help students positively manage challenges and emotions during tasks. • Self-paced, interactive lessons featuring engaging elements like gamification keep students motivated while reducing learning pressure. • Integrated tools allow students to easily track their learning progress, which builds self-awareness about their strengths and areas for growth. • Platform activities naturally incorporate problem-solving, helping students develop critical and creative thinking as they engage with math concepts. • Assessment features, including practice tests and flexible pacing, help reduce student anxiety around evaluations.	

A1. Mathematical Processes	
A1 apply the mathematical processes to develop a conceptual understanding of, and procedural fluency with, the mathematics they are learning	Strand A1 is embedded throughout all of the content we develop in the following ways: • Fostering conceptional understanding by using diverse representations, real-world problem solving, and scaffolded instructions and question types • Builds procedural fluency through practice, targeted revision and immediate feedback • Actively engage students in mathematical processes like problem-solving, reasoning and reflecting with our interactive tools and question design
A2. Making Connections	
A2 make connections between mathematics and various knowledge systems, their lived experiences, and various real-life applications of mathematics, including careers	Strand A2 is embedded throughout all of the content we develop in the following ways: • Integration of real-life applications by framing mathematical problems within authentic scenarios students might encounter • Show how mathematics connections to various knowledge systems by incorporating examples and problems that draw from science, technology, arts and social contexts, demonstrating the interdisciplinary nature of mathematical thinking • Content designed to highlight the practice use of mathematics • Offering culturally diverse examples and context where possible to help students connect mathematical concepts to their own backgrounds and the wider world

B1. Development of Numbers and Number Sets		
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	1	Not currently assessed
B1.2 describe how various subsets of a number system are defined, and describe similarities and differences between these subsets	1	Number Sets and Rational Numbers
B1.3 use patterns and number relationships to explain density, infinity, and limit as they relate to number sets	1	Number Sets and Rational Numbers

B2. 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	1	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	2	Powers
B3. Number Sense and Operations		
B3.1 apply an understanding of integers to describe location, direction, amount, and changes in any of these, in various contexts	1	Rational Numbers & Number Applications
B3.2 apply an understanding of unit fractions and their relationship to other fractional amounts, in various contexts, including the use of measuring tools	1	Rational Numbers & Number Applications
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	1	Rational Numbers & Number 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	1	Rational Numbers & Number Applications
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	1	Rational Numbers & Number Applications
C1. Algebraic Expressions and Equations		
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	1	Not currently assessed
C1.2 create algebraic expressions to generalize relationships expressed in words, numbers, and visual representations, in various contexts	1	Algebraic Expressions
C1.3 compare algebraic expressions using concrete, numerical, graphical, and algebraic methods to identify those that are equivalent, and justify their choices	1	Algebraic Expressions
C1.4 simplify algebraic expressions by applying properties of operations of numbers, using various representations and tools, in different contexts	1	Algebraic Expressions and Equations
C1.5 create and solve equations for various contexts, and verify their solutions	1	Algebraic Expressions and Equations

C2. Coding		
C2.1 use coding to demonstrate an understanding of algebraic concepts including variables, parameters, equations, and inequalities	1	Coding
C2.2 create code by decomposing situations into computational steps in order to represent mathematical concepts and relationships, and to solve problems	1	Coding
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	1	Coding
C3. Application of 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	1	Applications of Linear and Non-Linear Relations
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	1	Applications of Linear and Non-Linear Relations
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	1	Applications of Linear and Non-Linear Relations
C4. Characteristics of Relations		
C4.1 compare characteristics of graphs, tables of values, and equations of linear and non-linear relations	1	Characteristics 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	1	Transformation of Linear Relations
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	1	Transformation of Linear Relations
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	1	Characteristics of Linear and Non-Linear Relations

D1. Collection, Representation, and Analysis 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	1	Application, 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	1	Application, Representation and Analysis of Data
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	1	Application, Representation and Analysis of Data
D2. Mathematical Modelling		
D2.1 describe the value of mathematical modelling and how it is used in real life to inform decisions	1	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	1	Not currently assessed
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	1	Not currently assessed
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	1	Not currently assessed
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	1	Not currently assessed
E1. Geometric and Measurement Relationships		
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	1	Not currently assessed
E1.2 create and analyse designs involving geometric relationships and circle and triangle properties, using various tools	1	Geometric Relationships
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	1	Geometric Relationships

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	1	2D Shapes and 3D Objects
E1.5 solve problems involving the side-length relationship for right triangles in real-life situations, including problems that involve composite shapes	1	2D Shapes and 3D Objects
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	1	2D Shapes and 3D Objects
F1. 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	1	Financial Decisions
F1.2 identify financial situations that involve appreciation and depreciation, and use associated graphs to answer related questions	1	Financial Decisions
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	1	Financial Decisions
F1.4 modify budgets displayed in various ways to reflect specific changes in circumstances, and provide a rationale for the modifications	1	Financial Decisions

Education Perfect a Mathematics Grades 9 Ontario Curriculum Alignment

This document outlines how our platform's content and assessments are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all strands and fostering key mathematical processes to support student success.

This alignment document outlines the content scheduled for full release on the platform across the 2025-2026 school year.

Education Perfect Mathematics Grade 9		
Expectations	Number of Lessons	Topic Assessment
AA1. Social-Emotional Learning Skills		
AA1 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	Strand AA1 is embedded throughout all of the content we develop in the following ways: • Quick corrections and built-in support within the platform help students positively manage challenges and emotions during tasks. • Self-paced, interactive lessons featuring engaging elements like gamification keep students motivated while reducing learning pressure. • Integrated tools allow students to easily track their learning progress, which builds self-awareness about their strengths and areas for growth. • Platform activities naturally incorporate problem-solving, helping students develop critical and creative thinking as they engage with math concepts. • Assessment features, including practice tests and flexible pacing, help reduce student anxiety around evaluations.	

A1. Mathematical Processes	
A1 apply the mathematical processes to develop a conceptual understanding of, and procedural fluency with, the mathematics they are learning	Strand A1 is embedded throughout all of the content we develop in the following ways: • Fostering conceptional understanding by using diverse representations, real-world problem solving, and scaffolded instructions and question types • Builds procedural fluency through practice, targeted revision and immediate feedback • Actively engage students in mathematical processes like problem-solving, reasoning and reflecting with our interactive tools and question design
A2. Making Connections	
A2 make connections between mathematics and various knowledge systems, their lived experiences, and various real-life applications of mathematics, including careers	Strand A2 is embedded throughout all of the content we develop in the following ways: • Integration of real-life applications by framing mathematical problems within authentic scenarios students might encounter • Show how mathematics connections to various knowledge systems by incorporating examples and problems that draw from science, technology, arts and social contexts, demonstrating the interdisciplinary nature of mathematical thinking • Content designed to highlight the practice use of mathematics • Offering culturally diverse examples and context where possible to help students connect mathematical concepts to their own backgrounds and the wider world

B1. Development of Numbers and Number Sets		
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	1	Not assessed
B1.2 describe how various subsets of a number system are defined, and describe similarities and differences between these subsets	2	Number Sets
B1.3 use patterns and number relationships to explain density, infinity, and limit as they relate to number sets	2	Number Sets

B2. 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	1	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	4	Powers
B3. Number Sense and Operations		
B3.1 apply an understanding of integers to describe location, direction, amount, and changes in any of these, in various contexts	1	Rational Numbers
B3.2 apply an understanding of unit fractions and their relationship to other fractional amounts, in various contexts, including the use of measuring tools	1	Rational Numbers
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	1	Rational Numbers
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	3	Applications of Rational Numbers
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	1	Applications of Rational Numbers
C1. Algebraic Expressions and Equations		
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	1	Not assessed
C1.2 create algebraic expressions to generalize relationships expressed in words, numbers, and visual representations, in various contexts	3	Creating Algebraic Expressions
C1.3 compare algebraic expressions using concrete, numerical, graphical, and algebraic methods to identify those that are equivalent, and justify their choices	4	Comparing Algebraic Expressions
C1.4 simplify algebraic expressions by applying properties of operations of numbers, using various representations and tools, in different contexts	3	Simplifying Algebraic Expressions
C1.5 create and solve equations for various contexts, and verify their solutions	4	Creating and Solving Equations

C2. Coding		
C2.1 use coding to demonstrate an understanding of algebraic concepts including variables, parameters, equations, and inequalities	1	Coding
C2.2 create code by decomposing situations into computational steps in order to represent mathematical concepts and relationships, and to solve problems	2	Coding
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	1	Coding
C3. Application of 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	2	Linear and Non-Linear Relations
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	2	Linear and Non-Linear Relations
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	2	Comparing Two Linear Relations
C4. Characteristics of Relations		
C4.1 compare characteristics of graphs, tables of values, and equations of linear and non-linear relations	4	Graphs, Tables of Values, and Equations
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	2	Transformation of Linear Relations
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	2	Transformation of Linear Relations
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	3	Equations of Lines

D1. Collection, Representation, and Analysis 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	1	Single Variable 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	3	Single Variable Data
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	4	Data Analysis
D2. Mathematical Modelling		
D2.1 describe the value of mathematical modelling and how it is used in real life to inform decisions	2	Introduction to 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	1	Introduction to Mathematical Modelling
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	1	Mathematical Modelling
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	1	Mathematical Modelling
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	1	Mathematical Modelling
E1. Geometric and Measurement Relationships		
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	1	Not assessed
E1.2 create and analyse designs involving geometric relationships and circle and triangle properties, using various tools	3	Geometric Relationships
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	2	Geometric Relationships

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	2	2D Shapes and 3D Objects
E1.5 solve problems involving the side-length relationship for right triangles in real-life situations, including problems that involve composite shapes	1	2D Shapes and 3D Objects
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	1	2D Shapes and 3D Objects
F1. 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	1	Financial Decisions
F1.2 identify financial situations that involve appreciation and depreciation, and use associated graphs to answer related questions	2	Financial Decisions
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	1	Financial Decisions
F1.4 modify budgets displayed in various ways to reflect specific changes in circumstances, and provide a rationale for the modifications	1	Financial Decisions

Education Perfect
Mathematics
Grades 10 Academic Ontario Curriculum Alignment

This document outlines how our platform's content and assessments are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all strands and fostering key mathematical processes to support student success.

This alignment document shows the current content on the platform, which is scheduled to be replaced across the 2025-2026 school year by the content detailed in our new alignment.

Education Perfect Mathematics Grade 10 Academic		
Expectations	Number of Lessons	Topic Assessment
A. Quadratic Relations of the Form $y = ax^2 + bx + c$		
A1. Determine the Basic Properties of Quadratic Relations		
A1.1 collect data that can be represented as a quadratic relation, from experiments using appropriate equipment and technology (e.g., concrete materials, scientific probes, graphing calculators), or from secondary sources (e.g., the Internet, Statistics Canada); graph the data and draw a curve of best fit, if appropriate, with or without the use of technology	1	Properties of Quadratic Relations
A1.2 determine, through investigation with and without the use of technology, that a quadratic relation of the form $y = ax^2 + bx + c\,(a \neq 0)$ can be graphically represented as a parabola, and that the table of values yields a constant second difference	1	Properties of Quadratic Relations
A1.3 identify the key features of a graph of a parabola (i.e., the equation of the axis of symmetry, the coordinates of the vertex, the y-intercept, the zeros, and the maximum or minimum value), and use the appropriate terminology to describe them	1	Properties of Quadratic Relations
A1.4 compare, through investigation using technology, the features of the graph of $y = x^2$ and the graph of $y = 2^x$, and determine the meaning of a negative exponent and of zero as an exponent (e.g., by examining patterns in a table of values for $y = 2^x$; by applying the exponent rules for multiplication and division)	1	Properties of Quadratic Relations

A2. Relate Transformations of the Graph of $y = x^2$ to the Algebraic Representation $y = a(x - h)^2 + k$		
A2.1 identify, through investigation using technology, the effect on the graph of $y = x^2$ of transformations (i.e., translations, reflections in the x-axis, vertical stretches or compressions) by considering separately each parameter a, h, and k [i.e., investigate the effect on the graph of $y = x^2$ of a, h, and k in $y = x^2 + k$, $y = (x - h)^2$, and $y = ax^2$]	1	Transformations and Vertex Form
A2.2 explain the roles of a, h, and k in $y = a(x - h)^2 + k$, using the appropriate terminology to describe the transformations, and identify the vertex and the equation of the axis of symmetry	1	Transformations and Vertex Form
A2.3 sketch, by hand, the graph of $y = a(x - h)^2 + k$ by applying transformations to the graph of $y = x^2$	1	Transformations and Vertex Form
A2.4 determine the equation, in the form $y = a(x - h)^2 + k$, of a given graph of a parabola	1	Transformations and Vertex Form
A3. Solve Quadratic Equations and Interpret the Solutions with Respect to the Corresponding Relations		
A3.1 expand and simplify second-degree polynomial expressions [e.g., $(2x + 5)^2$, $(2x - y)(x + 3y)$], using a variety of tools (e.g., algebra tiles, diagrams, computer algebra systems, paper and pencil) and strategies (e.g., patterning)	1	Expand, SImplify and Factor
A3.2 factor polynomial expressions involving common factors, trinomials, and differences of squares [e.g., $2x^2 + 4x$, $2x - 2y + ax - ay$, $x^2 - x - 6$, $2a^2 + 11a + 5$, $4x^2 - 25$], using a variety of tools (e.g., concrete materials, computer algebra systems, paper and pencil) and strategies (e.g., patterning)	1	Expand, SImplify and Factor
A3.3 determine, through investigation, and describe the connection between the factors of a quadratic expression and the x-intercepts (i.e., the zeros) of the graph of the corresponding quadratic relation, expressed in the form $y = a(x - r)(x - s)$	1	Factored Form and Zeros
A3.4 interpret real and non-real roots of quadratic equations, through investigation using graphing technology, and relate the roots to the x-intercepts of the corresponding relations	1	Factored Form and Zeros Vertex Form and Standard Form
A3.5 express $y = ax^2 + bx + c$ in the form $y = a(x - h)^2$ by completing the square in situations involving no fractions, using a variety of tools (e.g. concrete materials, diagrams, paper and pencil)	1	Vertex Form and Standard Form

A3.6 sketch or graph a quadratic relation whose equation is given in the form $y = ac^2 + bx + c$, using a variety of methods (e.g., sketching $y = x^2 - 2x - 8$ using intercepts and symmetry; sketching $y = 3x^2 - 12x + 1$ by completing the square and applying transformations; graphing $h = -4.9t^2 + 50t + 1.5$ using technology)	1	Vertex Form and Standard Form
A3.7 explore the algebraic development of the quadratic formula (e.g., given the algebraic development, connect the steps to a numerical example; follow a demonstration of the algebraic development [student reproduction of the development of the general case is not required])	1	Vertex Form and Standard Form
A3.8 solve quadratic equations that have real roots, using a variety of methods (i.e., factoring, using the quadratic formula, graphing)	1	Vertex Form and Standard Form
A4. Solve Problems Involving Quadratic Relations		
A4.1 determine the zeros and the maximum or minimum value of a quadratic relation from its graph (i.e., using graphing calculators or graphing software) or from its defining equation (i.e.,by applying algebraic techniques);	1	Solving Problems Involving Quadratic Relations
A4.2 solve problems arising from a realistic situation represented by a graph or an equation of a quadratic relation, with and without the use of technology (e.g., given the graph or the equation of a quadratic relation representing the height of a ball over elapsed time, answer questions such as the following: What is the maximum height of the ball? After what length of time will the ball hit the ground? Over what time interval is the height of the ball greater than 3 m?).	1	Solving Problems Involving Quadratic Relations
B. Analytic Geometry		
B1. Model and Solve Problems Involving the Intersection of Two Straight Lines		
B1.1 solve systems of two linear equations involving two variables, using the algebraic method of substitution or elimination	1	Systems of Linear Equations
B1.2 solve problems that arise from realistic situations described in words or represented by linear systems of two equations involving two variables, by choosing an appropriate algebraic or graphical method	1	Systems of Linear Equations
B1.3 identify the relationship between the slopes of parallel and perpendicular lines, and use this relationship to solve related problems	1	Linear Equations and Slope
B1.4 develop the formula for the slope of a line (i.e., $m = \frac{y_2 - y_1}{x_2 - x_1}$), and use this formula to determine the equations of lines, given information about the lines (e.g., a graph of a line, a table of values, the coordinates of two points)	1	Linear Equations and Slope
B1.5 represent the equations of lines in different forms (e.g., $y = mx + b$, $Ax + By + C = 0$, $Ax + By = D$) and translate between these forms, as appropriate for the context.	1	Linear Equations and Slope

B2. Solve Problems Using Analytic Geometry Involving Properties of Lines and Line Segments		
B2.1 develop the formula for the midpoint of a line segment, and use this formula to solve problems (e.g., determine the coordinates of the midpoints of the sides of a triangle, given the coordinates of the vertices, and verify concretely or by using dynamic geometry software)	1	Properties of Lines and Line Segments
B2.2 develop the formula for the length of a line segment, and use this formula to solve problems (e.g., determine the lengths of the line segments joining the midpoints of the sides of a triangle, given the coordinates of the vertices of the triangle, and verify using dynamic geometry software)	1	Properties of Lines and Line Segments
B2.3 develop the equation for a circle with centre (0, 0) and radius r, by applying the formula for the length of a line segment	1	Properties of Lines and Line Segments
B2.4 determine the radius of a circle with centre (0, 0), given its equation; write the equation of a circle with centre (0, 0), given the radius; and sketch the circle, given the equation in the form $x^2 + y^2 = r^2$	1	Properties of Lines and Line Segments
B2.5 solve problems involving the slope, length, and midpoint of a line segment (e.g., determine the equation of the right bisector of a line segment, given the coordinates of the endpoints; determine the distance from a given point to a line whose equation is given, and verify using dynamic geometry software).	1	Properties of Lines and Line Segments
B3. Verify Geometric Properties of Triangles and Quadrilaterals Using Analytic Geometry		
B3.1 determine, through investigation (e.g., using dynamic geometry software, by paper folding), some characteristics and properties of geometric figures (e.g., medians in a triangle, similar figures constructed on the sides of a right triangle)	1	Geometric Properties
B3.2 verify, using algebraic techniques and analytic geometry, some characteristics of geometric figures (e.g., verify that two lines are perpendicular, given the coordinates of two points on each line; verify, by determining side length, that a triangle is equilateral, given the coordinates of the vertices)	1	Geometric Properties
B3.3 plan and implement a multi-step strategy that uses analytic geometry and algebraic techniques to verify a geometric property (e.g., given the coordinates of the vertices of a triangle, verify that the line segment joining the midpoints of two sides of the triangle is parallel to the third side and half its length, and check using dynamic geometry software; given the coordinates of the vertices of a rectangle, verify that the diagonals of the rectangle bisect each other)	1	Geometric Properties

C. Trigonometry		
C1. Use their Knowledge of Ratio and Proportion to Investigate Similar Triangles and Solve Problems Related to Similarity		
C1.1 verify, through investigation (e.g., using dynamic geometry software, concrete materials), the properties of similar triangles (e.g., given similar triangles, verify the equality of corresponding angles and the proportionality of corresponding sides)	1	Similar Triangles
C1.2 describe and compare the concepts of similarity and congruence	1	Similar Triangles
C1.3 solve problems involving similar triangles in realistic situations (e.g., shadows, reflections, scale models, surveying)	1	Similar Triangles
C2. Solve Problems Involving Right Triangles, using the Primary Trigonometric Ratios and the Pythagorean Theorem		
C2.1 determine, through investigation (e.g., using dynamic geometry software, concrete materials), the relationship between the ratio of two sides in a right triangle and the ratio of the two corresponding sides in a similar right triangle, and define the sine, cosine, and tangent ratios (e.g., $\sin A = \frac{opposite}{hypotenuse}$)	1	Primary Trigonometric Ratios and Pythagorean Theorem
C2.2 determine the measures of the sides and angles in right triangles, using the primary trigonometric ratios and the Pythagorean theorem	1	Primary Trigonometric Ratios and Pythagorean Theorem
C2.3 solve problems involving the measures of sides and angles in right triangles in real-life applications (e.g., in surveying, in navigating, in determining the height of an inaccessible object around the school), using the primary trigonometric ratios and the Pythagorean theorem	1	Primary Trigonometric Ratios and Pythagorean Theorem
C3. Solve Problems Involving Acute Triangles, using the Sine Law and the Cosine Law		
C3.1 explore the development of the sine law within acute triangles (e.g., use dynamic geometry software to determine that the ratio of the side lengths equals the ratio of the sines of the opposite angles; follow the algebraic development of the sine law and identify the application of solving systems of equations [student reproduction of the development of the formula is not required])	1	Sine Law and Cosine Law
C3.2 explore the development of the cosine law with acute triangles (e.g., use dynamic geometry software to verify the cosine law; follow the algebraic development of the cosine law and identify its relationship to the Pythagorean theorem and the cosine ratio [student reproduction of the development of the formula is not required])	1	Sine Law and Cosine Law

C3.3 determine the measures of sides and angles in acute triangles, using the sine law and the cosine law	1	Sine Law and Cosine Law
C3.4 solve problems involving the measures of sides and angles in acute triangles	1	Sine Law and Cosine Law

Education Perfect
Mathematics
Grades 10 Academic Ontario Curriculum Alignment

This document outlines how our platform's content and assessments are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all strands and fostering key mathematical processes to support student success.

This alignment document outlines the content scheduled for full release on the platform across the 2025-2026 school year.

Education Perfect Mathematics Grade 10 Academic		
Expectations	Number of Lessons	Topic Assessment
A. Quadratic Relations of the Form $y = ax^2 + bx + c$		
A1. Determine the Basic Properties of Quadratic Relations		
A1.1 collect data that can be represented as a quadratic relation, from experiments using appropriate equipment and technology (e.g., concrete materials, scientific probes, graphing calculators), or from secondary sources (e.g., the Internet, Statistics Canada); graph the data and draw a curve of best fit, if appropriate, with or without the use of technology	2	Graphing Data for Quadratic Relations
A1.2 determine, through investigation with and without the use of technology, that a quadratic relation of the form $y = ax^2 + bx + c\,(a \neq 0)$ can be graphically represented as a parabola, and that the table of values yields a constant second difference	2	Properties of Quadratic Relations
A1.3 identify the key features of a graph of a parabola (i.e., the equation of the axis of symmetry, the coordinates of the vertex, the y-intercept, the zeros, and the maximum or minimum value), and use the appropriate terminology to describe them	1	Properties of Quadratic Relations
A1.4 compare, through investigation using technology, the features of the graph of $y = x^2$ and the graph of $y = 2^x$, and determine the meaning of a negative exponent and of zero as an exponent (e.g., by examining patterns in a table of values for $y = 2^x$; by applying the exponent rules for multiplication and division)	2	Properties of Quadratic Relations

A2. Relate Transformations of the Graph of $y = x^2$ to the Algebraic Representation $y = a(x - h)^2 + k$		
A2.1 identify, through investigation using technology, the effect on the graph of $y = x^2$ of transformations (i.e., translations, reflections in the x-axis, vertical stretches or compressions) by considering separately each parameter a, h, and k [i.e., investigate the effect on the graph of $y = x^2$ of a, h, and k in $y = x^2 + k$, $y = (x - h)^2$, and $y = ax^2$]	2	Transformations of Quadratic Relations
A2.2 explain the roles of a, h, and k in $y = a(x - h)^2 + k$, using the appropriate terminology to describe the transformations, and identify the vertex and the equation of the axis of symmetry	1	Transformations of Quadratic Relations
	1	Vertex Form
A2.3 sketch, by hand, the graph of $y = a(x - h)^2 + k$ by applying transformations to the graph of $y = x^2$	1	Vertex Form
A2.4 determine the equation, in the form $y = a(x - h)^2 + k$, of a given graph of a parabola	1	Vertex Form
A3. Solve Quadratic Equations and Interpret the Solutions with Respect to the Corresponding Relations		
A3.1 expand and simplify second-degree polynomial expressions [e.g., $(2x + 5)^2$, $(2x - y)(x + 3y)$], using a variety of tools (e.g., algebra tiles, diagrams, computer algebra systems, paper and pencil) and strategies (e.g., patterning)	2	Multiplying Binomials
A3.2 factor polynomial expressions involving common factors, trinomials, and differences of squares [e.g., $2x^2 + 4x$, $2x - 2y + ax - ay$, $x^2 - x - 6$, $2a^2 + 11a + 5$, $4x^2 - 25$], using a variety of tools (e.g., concrete materials, computer algebra systems, paper and pencil) and strategies (e.g., patterning)	5	Factoring
A3.3 determine, through investigation, and describe the connection between the factors of a quadratic expression and the x-intercepts (i.e., the zeros) of the graph of the corresponding quadratic relation, expressed in the form $y = a(x - r)(x - s)$	2	Factored Form and x-intercepts (zeros/roots)
A3.4 interpret real and non-real roots of quadratic equations, through investigation using graphing technology, and relate the roots to the x-intercepts of the corresponding relations	1	Factored Form and x-intercepts (zeros/roots)
	1	Solving Quadratic Equations
A3.5 express $y = ax^2 + bx + c$ in the form $y = a(x - h)^2$ by completing the square in situations involving no fractions, using a variety of tools (e.g. concrete materials, diagrams, paper and pencil)	2	Completing the Square

A3.6 sketch or graph a quadratic relation whose equation is given in the form $y = ac^2 + bx + c$, using a variety of methods (e.g., sketching $y = x^2 - 2x - 8$ using intercepts and symmetry; sketching $y = 3x^2 - 12x + 1$ by completing the square and applying transformations; graphing $h = -4.9t^2 + 50t + 1.5$ using technology)	2	Graphing with Different Equations
A3.7 explore the algebraic development of the quadratic formula (e.g., given the algebraic development, connect the steps to a numerical example; follow a demonstration of the algebraic development [student reproduction of the development of the general case is not required])	1	Solving Quadratic Equations
A3.8 solve quadratic equations that have real roots, using a variety of methods (i.e., factoring, using the quadratic formula, graphing)	3	Solving Quadratic Equations
A4. Solve Problems Involving Quadratic Relations		
A4.1 determine the zeros and the maximum or minimum value of a quadratic relation from its graph (i.e., using graphing calculators or graphing software) or from its defining equation (i.e.,by applying algebraic techniques);	1	Solving Problems Involving Quadratic Relations
A4.2 solve problems arising from a realistic situation represented by a graph or an equation of a quadratic relation, with and without the use of technology (e.g., given the graph or the equation of a quadratic relation representing the height of a ball over elapsed time, answer questions such as the following: What is the maximum height of the ball? After what length of time will the ball hit the ground? Over what time interval is the height of the ball greater than 3 m?).	1	Solving Problems Involving Quadratic Relations
B. Analytic Geometry		
B1. Model and Solve Problems Involving the Intersection of Two Straight Lines		
B1.1 solve systems of two linear equations involving two variables, using the algebraic method of substitution or elimination	3	Systems of Linear Equations
B1.2 solve problems that arise from realistic situations described in words or represented by linear systems of two equations involving two variables, by choosing an appropriate algebraic or graphical method	2	Systems of Linear Equations
B1.3 identify the relationship between the slopes of parallel and perpendicular lines, and use this relationship to solve related problems	2	Linear Equations and Slope
B1.4 develop the formula for the slope of a line (i.e., $m = \frac{y_2 - y_1}{x_2 - x_1}$), and use this formula to determine the equations of lines, given information about the lines (e.g., a graph of a line, a table of values, the coordinates of two points)	2	Linear Equations and Slope
B1.5 represent the equations of lines in different forms (e.g., $y = mx + b$, $Ax + By + C = 0$, $Ax + By = D$) and translate between these forms, as appropriate for the context.	1	Linear Equations and Slope

B2. Solve Problems Using Analytic Geometry Involving Properties of Lines and Line Segments		
B2.1 develop the formula for the midpoint of a line segment, and use this formula to solve problems (e.g., determine the coordinates of the midpoints of the sides of a triangle, given the coordinates of the vertices, and verify concretely or by using dynamic geometry software)	1	Properties of Lines and Line Segments
B2.2 develop the formula for the length of a line segment, and use this formula to solve problems (e.g., determine the lengths of the line segments joining the midpoints of the sides of a triangle, given the coordinates of the vertices of the triangle, and verify using dynamic geometry software)	1	Properties of Lines and Line Segments
B2.3 develop the equation for a circle with centre (0, 0) and radius r, by applying the formula for the length of a line segment	1	Properties of Circles
B2.4 determine the radius of a circle with centre (0, 0), given its equation; write the equation of a circle with centre (0, 0), given the radius; and sketch the circle, given the equation in the form $x^2 + y^2 = r^2$	1	Properties of Circles
B2.5 solve problems involving the slope, length, and midpoint of a line segment (e.g., determine the equation of the right bisector of a line segment, given the coordinates of the endpoints; determine the distance from a given point to a line whose equation is given, and verify using dynamic geometry software).	1	Properties of Lines and Line Segments
B3. Verify Geometric Properties of Triangles and Quadrilaterals Using Analytic Geometry		
B3.1 determine, through investigation (e.g., using dynamic geometry software, by paper folding), some characteristics and properties of geometric figures (e.g., medians in a triangle, similar figures constructed on the sides of a right triangle)	2	Geometric Properties
B3.2 verify, using algebraic techniques and analytic geometry, some characteristics of geometric figures (e.g., verify that two lines are perpendicular, given the coordinates of two points on each line; verify, by determining side length, that a triangle is equilateral, given the coordinates of the vertices)	1	Geometric Properties
B3.3 plan and implement a multi-step strategy that uses analytic geometry and algebraic techniques to verify a geometric property (e.g., given the coordinates of the vertices of a triangle, verify that the line segment joining the midpoints of two sides of the triangle is parallel to the third side and half its length, and check using dynamic geometry software; given the coordinates of the vertices of a rectangle, verify that the diagonals of the rectangle bisect each other)	1	Geometric Properties

C. Trigonometry		
C1. Use their Knowledge of Ratio and Proportion to Investigate Similar Triangles and Solve Problems Related to Similarity		
C1.1 verify, through investigation (e.g., using dynamic geometry software, concrete materials), the properties of similar triangles (e.g., given similar triangles, verify the equality of corresponding angles and the proportionality of corresponding sides)	1	Similar Triangles
C1.2 describe and compare the concepts of similarity and congruence	1	Similar Triangles
C1.3 solve problems involving similar triangles in realistic situations (e.g., shadows, reflections, scale models, surveying)	1	Similar Triangles
C2. Solve Problems Involving Right Triangles, using the Primary Trigonometric Ratios and the Pythagorean Theorem		
C2.1 determine, through investigation (e.g., using dynamic geometry software, concrete materials), the relationship between the ratio of two sides in a right triangle and the ratio of the two corresponding sides in a similar right triangle, and define the sine, cosine, and tangent ratios (e.g., $\sin A = \frac{opposite}{hypotenuse}$)	2	Primary Trigonometric Ratios and Three Squares Theorem
C2.2 determine the measures of the sides and angles in right triangles, using the primary trigonometric ratios and the Pythagorean theorem	2	Primary Trigonometric Ratios and Three Squares Theorem
C2.3 solve problems involving the measures of sides and angles in right triangles in real-life applications (e.g., in surveying, in navigating, in determining the height of an inaccessible object around the school), using the primary trigonometric ratios and the Pythagorean theorem	1	Primary Trigonometric Ratios and Three Squares Theorem

C3. Solve Problems Involving Acute Triangles, using the Sine Law and the Cosine Law		
C3.1 explore the development of the sine law within acute triangles (e.g., use dynamic geometry software to determine that the ratio of the side lengths equals the ratio of the sines of the opposite angles; follow the algebraic development of the sine law and identify the application of solving systems of equations [student reproduction of the development of the formula is not required])	1	Sine Law and Cosine Law
C3.2 explore the development of the cosine law with acute triangles (e.g., use dynamic geometry software to verify the cosine law; follow the algebraic development of the cosine law and identify its relationship to the Pythagorean theorem and the cosine ratio [student reproduction of the development of the formula is not required])	1	Sine Law and Cosine Law
C3.3 determine the measures of sides and angles in acute triangles, using the sine law and the cosine law	2	Sine Law and Cosine Law
C3.4 solve problems involving the measures of sides and angles in acute triangles	1	Sine Law and Cosine Law

Education Perfect
Mathematics
Grades 10 Applied Ontario Curriculum Alignment

This document outlines how our platform's content and assessments are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all strands and fostering key mathematical processes to support student success.

This alignment document shows the current content on the platform, which is scheduled to be replaced across the 2025-2026 school year by the content detailed in our new alignment.

Education Perfect Mathematics Grade 10 Applied		
Expectations	Number of Lessons	Topic Assessment
A. Measurement and Trigonometry		
A1. Use their Knowledge of Ratio and Proportion to Investigate Similar Triangles and Solve Problems Related to Similarity		
A1.1 verify, through investigation (e.g., using dynamic geometry software, concrete materials), properties of similar triangles (e.g., given similar triangles, verify the equality of corresponding angles and the proportionality of corresponding sides)	1	Similar Triangles
A1.2 determine the lengths of sides of similar triangles, using proportional reasoning	1	Similar Triangles
A1.3 solve problems involving similar triangles in realistic situations (e.g., shadows, reflections, scale models, surveying)	1	Similar Triangles
A2. Solve Problems Involving Right Triangles, using the Primary Trigonometric Ratios and the Pythagorean Theorem		
A2.1 determine, through investigation (e.g., using dynamic geometry software, concrete materials), the relationship between the ratio of two sides in a right triangle and the ratio of the two corresponding sides in a similar right triangle, and define the sine, cosine, and tangent ratios (e.g., $\sin A = \frac{opposite}{hypotenuse}$)	1	Right Triangles
A2.2 determine the measures of the sides and angles in right triangles, using the primary opposite hypotenuse trigonometric ratios and the Pythagorean theorem	1	Right Triangles

A2.3 solve problems involving the measures of sides and angles in right triangles in real-life applications (e.g., in surveying, in navigation, in determining the height of an inaccessible object around the school), using the primary trigonometric ratios and the Pythagorean theorem	1	Right Triangles
A2.4 describe, through participation in an activity, the application of trigonometry in an occupation (e.g., research and report on how trigonometry is applied in astronomy; attend a career fair that includes a surveyor, and describe how a surveyor applies trigonometry to calculate distances; job shadow a carpenter for a few hours, and describe how a carpenter uses trigonometry)	1	Right Triangles
A3. Solve Problems involving the Surface Areas and Volumes of Three-Dimensional Figures, and use the Imperial and Metric Systems of Measurement		
A3.1 use the imperial system when solving measurement problems (e.g., problems involving dimensions of lumber, areas of carpets, and volumes of soil or concrete)	1	Measurement
A3.2 perform everyday conversions between the imperial system and the metric system (e.g., millilitres to cups, centimetres to inches) and within these systems (e.g., cubic metres to cubic centimetres, square feet to square yards), as necessary to solve problems involving measurement	1	Measurement
A3.3 determine, through investigation, the relationship for calculating the surface area of a pyramid (e.g., use the net of a squarebased pyramid to determine that the surface area is the area of the square base plus the areas of the four congruent triangles)	1	Surface Area and Volume
A3.4 solve problems involving the surface areas of prisms, pyramids, and cylinders, and the volumes of prisms, pyramids, cylinders, cones, and spheres, including problems involving combinations of these figures, using the metric system or the imperial system, as appropriate	1	Surface Area and Volume
A3.5 develop the formula for the volume of a sphere, using concrete materials and the volume relationships between cylinders, cones, and spheres	1	Surface Area and Volume
B. Modelling Linear Relations		
B1. Manipulate and Solve Algebraic Equations, as needed to Solve Problems		
B1.1 solve first-degree equations involving one variable, including equations with fractional coefficients (e.g. using the balance analogy, computer algebra systems, paper and pencil)	1	Solving Equations
B1.2 determine the value of a variable in the first degree, using a formula (i.e., by isolating the variable and then substituting known values; by substituting known values and then solving for the variable) (e.g., in analytic geometry, in measurement)	1	Solving Equations

B1.3 express the equation of a line in the form $y = mx + b$, given the form $Ax + By + C = 0$	1	Graph of a Line
B2. Graph a Line and Write the Equation of a Line from Given Information		
B2.1 connect the rate of change of a linear relation to the slope of the line, and define the slope as the ratio $m = \frac{rise}{run}$	1	Equation of a Line and Slope
B2.2 identify, through investigation, $y = mx + b$ as a common form for the equation of a straight line, and identify the special cases $x = a, y = b$	1	Equation of a Line and Slope
B2.3 identify, through investigation with technology, the geometric significance of m and b in the equation $y = mx + b$	1	Equation of a Line and Slope
B2.4 identify, through investigation, properties of the slopes of lines and line segments (e.g., direction, positive or negative rate of change, steepness, parallelism), using graphing technology to facilitate investigations, where appropriate	1	Equation of a Line and Slope
B2.5 graph lines by hand, using a variety of techniques (e.g., graph $y = \frac{2}{3}x - 4$ using the y-intercept and slope; graph $2x + 3y = 6$ using the x- and y-intercepts)	1	Graph of a Line
B2.6 determine the equation of a line, given its graph, the slope and y-intercept, the slope and a point on the line, or two points on the line	1	Graph of a Line
B3. Solve Systems of Two Linear Equations, and Solve Related Problems that arise from Realistic Situations		
B3.1 determine graphically the point of intersection of two linear relations (e.g., using graph paper, using technology)	1	Solving Systems of Equations
B3.2 solve systems of two linear equations involving two variables with integral coefficients, using the algebraic method of substitution or elimination	1	Solving Systems of Equations
B3.3 solve problems that arise from realistic situations described in words or represented by given linear systems of two equations involving two variables, by choosing an appropriate algebraic or graphical method	1	Solving Systems of Equations
C. Quadratic Relations of the Form $y = ax^2 + bx + c$		
C1. Manipulate Algebraic Expressions, as needed to Understand Quadratic Relations		
C1.1 expand and simplify second-degree polynomial expressions involving one variable that consist of the product of two binomials [e.g., $(2x + 3)(x + 4)$] or the square of a binomial [e.g., $(x + 3)^2$], using a variety of tools (e.g., algebra tiles, diagrams, computer algebra systems, paper and pencil) and strategies (e.g. patterning)	1	Expand, Simplify and Factor

C1.2 factor binomials (e.g., $4x^2 + 8x$) and trinomials (e.g., $3x^2 + 9x - 15$) involving one variable up to degree two, by determining a common factor using a variety of tools (e.g., algebra tiles, computer algebra systems, paper and pencil) and strategies (e.g., patterning)	1	Expand, Simplify and Factor
C1.3 factor simple trinomials of the form $x^2 + bx + c$ (e.g., $x^2 + 7x + 10$, $x^2 + 2x - 8$), using a variety of tools (e.g., algebra tiles, computer algebra systems, paper and pencil) and strategies (e.g., patterning)	1	Expand, Simplify and Factor
C1.4 factor the difference os squares of the form $x^2 - a^2$ (e.g., $x^2 - 16$)	1	Expand, Simplify and Factor
C2. Identify Characteristics of Quadratic Relations		
C2.1 collect data that can be represented as a quadratic relation, from experiments using appropriate equipment and technology (e.g., concrete materials, scientific probes, graphing calculators), or from secondary sources (e.g., the Internet, Statistics Canada); graph the data and draw a curve of best fit, if appropriate, with or without the use of technology	1	Characteristics of Quadratic Relations
C2.2 determine, through investigation using technology, that a quadratic relation of the form $y = ax^2 + bx + c\ (a \neq 0)$ can be graphically represented as a parabola, and determine that the table of values yields a constant second difference	1	Characteristics of Quadratic Relations
C2.3 identify the key features of a graph of a parabola (i.e., the equation of the axis of symmetry, the coordinates of the vertex, the y-intercept, the zeros, and the maximum of minimum value), using a given graph or a graph generated with technology from its equation, and use the appropriate terminology to describe the features	1	Characteristics of Quadratic Relations
C2.4 compare, through investigation using technology, the graphical representations of a quadratic relation in the form $y = x^2 + bx + c$ and the same relation in the factored form $y = (x - r)(x - s)$ (i.e., the graphs are the same), and describe the connections between each algebraic representation and the graph [e.g., the y-intercept is c in the form $y = x^2 + bx + c$, the x-intercepts are r and s in the form $y = (x - r)(x - s)$]	1	Characteristics of Quadratic Relations
C3. Solve Problems by Interpreting Graphs of Quadratic Relations		
C3.1 solve problems involving a quadratic relation by interpreting a given graph or a graph generated with technology from its equation (e.g., given an equation representing the height of a ball over elapsed time, use a graphing calculator or graphing software to graph the relation, and answer questions such as the following: What is the maximum height of the ball? After what length of time will the ball hit the ground? Over what time interval is the height of the ball greater than 3 m?)	1	Interpreting Graphs of Quadratic Relations
C3.2 solve problems by interpreting the significance of the key features of graphs obtained by collecting experimental data involving quadratic relations	1	Interpreting Graphs of Quadratic Relations

Education Perfect
Mathematics
Grades 10 Applied Ontario Curriculum Alignment

This document outlines how our platform's content and assessments are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all strands and fostering key mathematical processes to support student success.

This alignment document outlines the content scheduled for full release on the platform across the 2025-2026 school year.

Education Perfect Mathematics Grade 10 Applied		
Expectations	Number of Lessons	Topic Assessment
A. Measurement and Trigonometry		
A1. Use their Knowledge of Ratio and Proportion to Investigate Similar Triangles and Solve Problems Related to Similarity		
A1.1 verify, through investigation (e.g., using dynamic geometry software, concrete materials), properties of similar triangles (e.g., given similar triangles, verify the equality of corresponding angles and the proportionality of corresponding sides)	1	Similar Triangles
A1.2 determine the lengths of sides of similar triangles, using proportional reasoning	1	Similar Triangles
A1.3 solve problems involving similar triangles in realistic situations (e.g., shadows, reflections, scale models, surveying)	1	Similar Triangles
A2. Solve Problems Involving Right Triangles, using the Primary Trigonometric Ratios and the Pythagorean Theorem		
A2.1 determine, through investigation (e.g., using dynamic geometry software, concrete materials), the relationship between the ratio of two sides in a right triangle and the ratio of the two corresponding sides in a similar right triangle, and define the sine, cosine, and tangent ratios (e.g., $\sin A = \frac{opposite}{hypotenuse}$)	2	Right Triangles
A2.2 determine the measures of the sides and angles in right triangles, using the primary opposite hypotenuse trigonometric ratios and the Pythagorean theorem	2	Right Triangles

A2.3 solve problems involving the measures of sides and angles in right triangles in real-life applications (e.g., in surveying, in navigation, in determining the height of an inaccessible object around the school), using the primary trigonometric ratios and the Pythagorean theorem	2	Applications of Right Triangles
A2.4 describe, through participation in an activity, the application of trigonometry in an occupation (e.g., research and report on how trigonometry is applied in astronomy; attend a career fair that includes a surveyor, and describe how a surveyor applies trigonometry to calculate distances; job shadow a carpenter for a few hours, and describe how a carpenter uses trigonometry)	1	Applications of Right Triangles
A3. Solve Problems involving the Surface Areas and Volumes of Three-Dimensional Figures, and use the Imperial and Metric Systems of Measurement		
A3.1 use the imperial system when solving measurement problems (e.g., problems involving dimensions of lumber, areas of carpets, and volumes of soil or concrete)	1	Measurement
A3.2 perform everyday conversions between the imperial system and the metric system (e.g., millilitres to cups, centimetres to inches) and within these systems (e.g., cubic metres to cubic centimetres, square feet to square yards), as necessary to solve problems involving measurement	2	Measurement
A3.3 determine, through investigation, the relationship for calculating the surface area of a pyramid (e.g., use the net of a squarebased pyramid to determine that the surface area is the area of the square base plus the areas of the four congruent triangles)	1	Surface Area
A3.4 solve problems involving the surface areas of prisms, pyramids, and cylinders, and the volumes of prisms, pyramids, cylinders, cones, and spheres, including problems involving combinations of these figures, using the metric system or the imperial system, as appropriate	5	Surface Area
	3	Volume
A3.5 develop the formula for the volume of a sphere, using concrete materials and the volume relationships between cylinders, cones, and spheres	1	Volume
B. Modelling Linear Relations		
B1. Manipulate and Solve Algebraic Equations, as needed to Solve Problems		
B1.1 solve first-degree equations involving one variable, including equations with fractional coefficients (e.g. using the balance analogy, computer algebra systems, paper and pencil)	2	Solving First-degree Equations
B1.2 determine the value of a variable in the first degree, using a formula (i.e., by isolating the variable and then substituting known values; by substituting known values and then solving for the variable) (e.g., in analytic geometry, in measurement)	4	Strategies for Solving a Variable

B1.3 express the equation of a line in the form $y = mx + b$, given the form $Ax + By + C = 0$	2	Standard Form of a Line
B2. Graph a Line and Write the Equation of a Line from Given Information		
B2.1 connect the rate of change of a linear relation to the slope of the line, and define the slope as the ratio $m = \frac{rise}{run}$	2	Slope of a Line
B2.2 identify, through investigation, $y = mx + b$ as a common form for the equation of a straight line, and identify the special cases $x = a, y = b$	3	Equation of a Line
B2.3 identify, through investigation with technology, the geometric significance of m and b in the equation $y = mx + b$	3	Properties of a Line
B2.4 identify, through investigation, properties of the slopes of lines and line segments (e.g., direction, positive or negative rate of change, steepness, parallelism), using graphing technology to facilitate investigations, where appropriate	1	Slope of a Line
B2.5 graph lines by hand, using a variety of techniques (e.g., graph $y = \frac{2}{3}x - 4$ using the y-intercept and slope; graph $2x + 3y = 6$ using the x- and y-intercepts)	4	Graphing a Line
B2.6 determine the equation of a line, given its graph, the slope and y-intercept, the slope and a point on the line, or two points on the line	4	Writing an Equation of a LIne
B3. Solve Systems of Two Linear Equations, and Solve Related Problems that arise from Realistic Situations		
B3.1 determine graphically the point of intersection of two linear relations (e.g., using graph paper, using technology)	2	Solving Systems of Equations by Graphing
B3.2 solve systems of two linear equations involving two variables with integral coefficients, using the algebraic method of substitution or elimination	3	Solving Systems of Equations Algebraically
B3.3 solve problems that arise from realistic situations described in words or represented by given linear systems of two equations involving two variables, by choosing an appropriate algebraic or graphical method	2	Application of Solving Systems of Equations
C. Quadratic Relations of the Form $y = ax^2 + bx + c$		
C1. Manipulate Algebraic Expressions, as needed to Understand Quadratic Relations		
C1.1 expand and simplify second-degree polynomial expressions involving one variable that consist of the product of two binomials [e.g., $(2x + 3)(x + 4)$] or the square of a binomial [e.g., $(x + 3)^2$], using a variety of tools (e.g., algebra tiles, diagrams, computer algebra systems, paper and pencil) and strategies (e.g. patterning)	2	Multiplying Binomials

C1.2 factor binomials (e.g., $4x^2 + 8x$) and trinomials (e.g., $3x^2 + 9x - 15$) involving one variable up to degree two, by determining a common factor using a variety of tools (e.g., algebra tiles, computer algebra systems, paper and pencil) and strategies (e.g., patterning)	1	Factoring
C1.3 factor simple trinomials of the form $x^2 + bx + c$ (e.g., $x^2 + 7x + 10$, $x^2 + 2x - 8$), using a variety of tools (e.g., algebra tiles, computer algebra systems, paper and pencil) and strategies (e.g., patterning)	2	Factoring
C1.4 factor the difference os squares of the form $x^2 - a^2$ (e.g., $x^2 - 16$)	3	Factoring
C2. Identify Characteristics of Quadratic Relations		
C2.1 collect data that can be represented as a quadratic relation, from experiments using appropriate equipment and technology (e.g., concrete materials, scientific probes, graphing calculators), or from secondary sources (e.g., the Internet, Statistics Canada); graph the data and draw a curve of best fit, if appropriate, with or without the use of technology	2	Graphing Data for Quadratic Relations
C2.2 determine, through investigation using technology, that a quadratic relation of the form $y = ax^2 + bx + c$ $(a \neq 0)$ can be graphically represented as a parabola, and determine that the table of values yields a constant second difference	2	Characterists of Quadratic Relations
C2.3 identify the key features of a graph of a parabola (i.e., the equation of the axis of symmetry, the coordinates of the vertex, the y-intercept, the zeros, and the maximum of minimum value), using a given graph or a graph generated with technology from its equation, and use the appropriate terminology to describe the features	1	Characterists of Quadratic Relations
C2.4 compare, through investigation using technology, the graphical representations of a quadratic relation in the form $y = x^2 + bx + c$ and the same relation in the factored form $y = (x - r)(x - s)$ (i.e., the graphs are the same), and describe the connections between each algebraic representation and the graph [e.g., the y-intercept is c in the form $y = x^2 + bx + c$, the x-intercepts are r and s in the form $y = (x - r)(x - s)$]	2	Characterists of Quadratic Relations
C3. Solve Problems by Interpreting Graphs of Quadratic Relations		
C3.1 solve problems involving a quadratic relation by interpreting a given graph or a graph generated with technology from its equation (e.g., given an equation representing the height of a ball over elapsed time, use a graphing calculator or graphing software to graph the relation, and answer questions such as the following: What is the maximum height of the ball? After what length of time will the ball hit the ground? Over what time interval is the height of the ball greater than 3 m?)	2	Interpreting Graphs of Quadratic Relations
C3.2 solve problems by interpreting the significance of the key features of graphs obtained by collecting experimental data involving quadratic relations	2	Interpreting Graphs of Quadratic Relations

Education Perfect
Mathematics | MCR3U
Grades 11 Ontario Curriculum Alignment

This document outlines how our platform's content and questions sets are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all courses and fostering key mathematical processes to support student success.

This alignment document shows the content scheduled to be released throughout the 2025-2026 school year.

Education Perfect Mathematics MCR3U Functions, University Preparation		
Expectations	Number of Question Sets	Topic
A. Characteristics of Functions		
Representing Functions		
A1.1 explain the meaning of the term function, and distinguish a function from a relation that is not a function, through investigation of linear and quadratic relations using a variety of representations (i.e., tables of values, mapping diagrams, graphs, function machines, equations) and strategies (e.g., identifying a one-to-one or many-to-one mapping; using the vertical-line test)	1	Introduction to Functions
A1.2 represent linear and quadratic functions using function notation, given their equations, tables of values, or graphs, and substitute into and evaluate functions [e.g., evaluate $f\left(\frac{1}{2}\right)$, given $f(x) = 2x^2 + 3x - 1$]	1	Introduction to Functions
A1.3 explain the meanings of the terms domain and range, through investigation using numeric, graphical, and algebraic representations of the functions $f(x) = x$, $f(x) = x^2$, $f(x) = \sqrt{x}$, and $f(x) = \frac{1}{x}$; describe the domain and range of a function appropriately (e.g., for $y = x^2 + 1$, the domain is the set of real numbers, and the range is $y \geq 1$); and explain any restrictions on the domain and range in contexts arising from real-world applications.	1	Introduction to Functions
A1.4 relate the process of determining the inverse of a function to their understanding of reverse processes (e.g., applying inverse operations)	1	Inverse Functions
A1.5 determine the numeric or graphical representation of the inverse of a linear or quadratic function, given the numeric, graphical, or algebraic representation of the function, and make connections, through investigation using a variety of tools (e.g., graphing technology, Mira, tracing paper), between the graph of a function and the graph of its inverse (e.g., the graph of the inverse is the reflection of the graph of the function in the line $y = x$)	1	Inverse Functions

A1.6 determine, through investigation, the relationship between the domain and range of a function and the domain and range of the inverse relation, and determine whether or not the inverse relation is a function	1	Inverse Functions
A1.7 determine, using function notation when appropriate, the algebraic representation of the inverse of a linear or quadratic function, given the algebraic representation of the function [e.g., $f(x) = (x - 2)^2 - 5$], and make connections, through investigation using a variety of tools (e.g., graphing technology, Mira, tracing paper), between the algebraic representations of a function and its inverse (e.g., the inverse of a linear function involves applying the inverse operations in the reverse order)	1	Inverse Functions
A1.8 determine, through investigation using technology, the roles of the parameters a, k, d, and c in functions of the form $y = af(k(x - d)) + c$, and describe these roles in terms of transformations on the graphs of $f(x) = x$, $f(x) = x^2$, $f(x) = \sqrt{x}$, and $f(x) = \frac{1}{x}$ (i.e., translations; reflections in the axes; vertical and horizontal stretches and compressions to and from the x- and y-axes)	1	Transformations of Functions
A1.9 sketch graphs of $y = af(k(x - d)) + c$ by applying one or more transformations to the graphs of $f(x) = x$), $f(x) = x^2$, $f(x) = \sqrt{x}$, and $f(x) = \frac{1}{x}$, and state the domain and range of the transformed functions	1	Transformations of Functions
Solving Problems Involving Quadratic Functions		
A2.1 determine the number of zeros (i.e., x-intercepts) of a quadratic function, using a variety of strategies (e.g., inspecting graphs; factoring; calculating the discriminant)	4	Investigating Zeros of Quadratic Functions
A2.2 determine the maximum or minimum value of a quadratic function whose equation is given in the form $f(x) = ax^2 + bx + c$, using an algebraic method (e.g., completing the square; factoring to determine the zeros and averaging the zeros)	2	Investigating Zeros of Quadratic Functions
A2.3 solve problems involving quadratic functions arising from real-world applications and represented using function notation	1	Investigating Zeros of Quadratic Functions
A2.4 determine, through investigation, the transformational relationship among the family of quadratic functions that have the same zeros, and determine the algebraic representation of a quadratic function, given the real roots of the corresponding quadratic equation and a point on the function	1	Investigating Zeros of Quadratic Functions
A2.5 solve problems involving the intersection of a linear function and a quadratic function graphically and algebraically (e.g., determine the time when two identical cylindrical water tanks contain equal volumes of water, if one tank is being filled at a constant rate and the other is being emptied through a hole in the bottom)	2	Linear-Quadratic Systems

Determining Equivalent Algebraic Expressions		
A3.1 simplify polynomial expressions by adding, subtracting, and multiplying	2	Simplifying Polynomial and Radical Expressions
A3.2 verify, through investigation with and without technology, that $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$, $a \geq 0$, $b \geq 0$, and use this relationship to simplify radicals (e.g., $\sqrt{24}$) and radical expressions obtained by adding, subtracting, and multiplying [e.g., $(2 + \sqrt{6})(3 - \sqrt{12})$]	2	Simplifying Polynomial and Radical Expressions
A3.3 simplify rational expressions by adding, subtracting, multiplying, and dividing, and state the restrictions on the variable values	2	Rational and Equivalent Expressions
A3.4 determine if two given algebraic expressions are equivalent (i.e., by simplifying; by substituting values)	1	Rational and Equivalent Expressions
B. Exponential Functions		
Representing Exponential Functions		
B1.1 graph, with and without technology, an exponential relation, given its equation in the form $y = a^x (a > 0,\ a \neq 1)$, define this relation as the function $f(x) = a^x$, and explain why it is a function	1	Exponents and Exponential Functions
B1.2 determine, through investigation using a variety of tools (e.g., calculator, paper and pencil, graphing technology) and strategies (e.g., patterning; finding values from a graph; interpreting the exponent laws), the value of a power with a rational exponent (i.e., $x^{\frac{m}{n}}$, where $x > 0$ and m and n are integers)	1	Exponents and Exponential Functions
B1.3 simplify algebraic expressions containing integer and rational exponents [e.g., $(x^3) \div \left(x^{\frac{1}{2}}\right)$, $\left(x^6 y^3\right)^{\frac{1}{3}}$], and evaluate numeric expressions containing integer and rational exponents and rational bases [e.g., 2^{-3}, $(-6)^3$, $4^{\frac{1}{2}}$, 1.01^{120}]	2	Exponents and Exponential Functions
B1.4 determine, through investigation, and describe key properties relating to domain and range, intercepts, increasing/decreasing intervals, and asymptotes (e.g., the domain is the set of real numbers; the range is the set of positive real numbers; the function either increases or decreases throughout its domain) for exponential functions represented in a variety of ways [e.g., tables of values, mapping diagrams, graphs, equations of the form $f(x) = a^x (a > 0,\ a \neq 1)$, function machines]	1	Exponents and Exponential Functions

Connecting Graphs and Equations of Exponential Functions		
B2.1 distinguish exponential functions from linear and quadratic functions by making comparisons in a variety of ways (e.g., comparing rates of change using finite differences in tables of values; identifying a constant ratio in a table of values; inspecting graphs; comparing equations)	1	Transformations of Exponential Functions
B2.2 determine, through investigation using technology, the roles of the parameters a, k, d, and c in functions of the form $y = af(k(x - d)) + c$, and describe these roles in terms of transformations on the graph of $f(x) = a^x (a > 0,\ a \neq 1)$(i.e., translations; reflections in the axes; vertical and horizontal stretches and compressions to and from the x- and y-axes)	2	Exponents and Exponential Functions
B2.3 sketch graphs of $y = af(k(x - d)) + c$ by applying one or more transformations x to the graph of $f(x) = a^x (a > 0, a \neq 1)$, and state the domain and range of the transformed functions	1	Exponents and Exponential Functions
B2.4 determine, through investigation using technology, that the equation of a given exponential function can be expressed using different bases [e.g., $f(x) = 9^x$ can be expressed as $f(x) = 3^{2x}$], and explain the connections between the equivalent forms in a variety of ways (e.g., comparing graphs; using transformations; using the exponent laws)	1	Equations of Exponential Functions
B2.5 represent an exponential function with an equation, given its graph or its properties	1	Equations of Exponential Functions
Solving Problems Involving Exponential Functions		
B3.1 collect data that can be modelled as an exponential function, through investigation with and without technology, from primary sources, using a variety of tools (e.g., concrete materials such as number cubes, coins; measurement tools such as electronic probes), or from secondary sources (e.g., websites such as Statistics Canada, E-STAT), and graph the data	1	Modelling with Exponential Functions
B3.2 identify exponential functions, including those that arise from real-world applications involving growth and decay (e.g., radioactive decay, population growth, cooling rates, pressure in a leaking tire), given various representations (i.e., tables of values, graphs, equations), and explain any restrictions that the context places on the domain and range (e.g., ambient temperature limits the range for a cooling curve)	1	Modelling with Exponential Functions
B3.3 solve problems using given graphs or equations of exponential functions arising from a variety of real-world applications (e.g., radioactive decay, population growth, height of a bouncing ball, compound interest) by interpreting the graphs or by substituting values for the exponent into the equations	1	Modelling with Exponential Functions

C. Discrete Functions

Representing Sequences

C1.1 make connections between sequences and discrete functions, represent sequences using function notation, and distinguish between a discrete function and a continuous function [e.g., $f(x) = 2x$, where the domain is the set of natural numbers, is a discrete linear function and its graph is a set of equally spaced points; $f(x) = 2x$, where the domain is the set of real numbers, is a continuous linear function and its graph is a straight line]	1	Foundations of Sequences
C1.2 determine and describe (e.g., in words; using flow charts) a recursive procedure for generating a sequence, given the initial terms (e.g., 1, 3, 6, 10, 15, 21, ...), and represent sequences as discrete functions in a variety of ways (e.g., tables of values, graphs)	1	v
C1.3 connect the formula for the nth term of a sequence to the representation in function notation, and write terms of a sequence given one of these representations or a recursion formula	2	Foundations of Sequences
C1.4 represent a sequence algebraically using a recursion formula, function notation, or the formula for the nth term [e.g., represent $2, 4, 8, 16, 32, 64$... as $t_1 = 2$; $t_n = 2t_{n-1}$, as $f(n) = 2^n$, or as $t_n = 2^n$ $t_n = 2^n$, or represent $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}$, ... as $t_1 = \frac{1}{2}$; $t_n = t_{n-1} + \frac{1}{n(n+1)}$, as $f(n) = \frac{n}{n+1}$, or as $t_n = \frac{n}{n+1}$, where n is a natural number], and describe the information that can be obtained by inspecting each representation (e.g., function notation or the formula for the nth term may show the type of function; a recursion formula shows the relationship between terms)	1	Foundations of Sequences
C1.5 determine, through investigation, recursive patterns in the Fibonacci sequence, in related sequences, and in Pascal's triangle, and represent the patterns in a variety of ways (e.g., tables of values, algebraic notation)	1	Special Sequences and Patterns
C1.6 determine, through investigation, and describe the relationship between Pascal's triangle and the expansion of binomials, and apply the relationship to expand binomials raised to whole-number exponents [e.g. $(1 + x)^4$, $(2x - 1)^5$, $(2x - y)^6$, $(x^2 + 1)^5$]	1	Special Sequences and Patterns

Investigating Arithmetic and Geometric Sequences and Series		
C2.1 identify sequences as arithmetic, geometric, or neither, given a numeric or algebraic representation	1	Arithmetic & Geometric Sequences and Series
C2.2 determine the formula for the general term of an arithmetic sequence [i.e. $t_n = a + (n-1)d$] or geometric sequence (i.e. $t_n = ar^{n-1}$), through investigation using a variety of tools (e.g., linking cubes, algebra tiles, diagrams, calculators) and strategies (e.g., patterning; connecting the steps in a numerical example to the steps in the algebraic development), and apply the formula to calculate any term in a sequence	2	Arithmetic & Geometric Sequences and Series
C2.3 determine the formula for the sum of an arithmetic or geometric series, through investigation using a variety of tools (e.g., linking cubes, algebra tiles, diagrams, calculators) and strategies (e.g., patterning; connecting the steps in a numerical example to the steps in the algebraic development), and apply the formula to calculate the sum of a given number of consecutive terms	1	Arithmetic & Geometric Sequences and Series
C2.4 solve problems involving arithmetic and geometric sequences and series, including those arising from real-world applications	1	Arithmetic & Geometric Sequences and Series
Solving Problems Involving Financial Applications		
C3.1 make and describe connections between simple interest, arithmetic sequences, and linear growth, through investigation with technology (e.g., use a spreadsheet or graphing calculator to make simple interest calculations, determine first differences in the amounts over time, and graph amount versus time)	1	Simple and Compound Interest
C3.2 make and describe connections between compound interest, geometric sequences, and exponential growth, through investigation with technology (e.g., use a spreadsheet to make compound interest calculations, determine finite differences in the amounts over time, and graph amount versus time)	1	Simple and Compound Interest
C3.3 solve problems, using a scientific calculator, that involve the calculation of the amount, A (also referred to as future value, FV), the principal, P (also referred to as present value, PV), or the interest rate per compounding period, i, using the compound interest formula in the form $A = P(1+i)^n$ [or $FV = PV(1+i)^n$]	1	Simple and Compound Interest
C3.4 determine, through investigation using technology (e.g., scientific calculator, the TVM Solver on a graphing calculator, online tools), the number of compounding periods, n, using the compound interest formula in the form $A = P(1+i)^n$ [or $FV = PV(1+i)^n$; describe strategies (e.g., guessing and checking; using the power of a power rule for exponents; using graphs) for calculating this number; and solve related problems	1	Simple and Compound Interest

C3.5 explain the meaning of the term annuity, and determine the relationships between ordinary simple annuities (i.e., annuities in which payments are made at the end of each period, and compounding and payment periods are the same), geometric series, and exponential growth, through investigation with technology (e.g., use a spreadsheet to determine and graph the future value of an ordinary simple annuity for varying numbers of compounding periods; investigate how the contributions of each payment to the future value of an ordinary simple annuity are related to the terms of a geometric series)	1	Introduction to Annuities
C3.6 determine, through investigation using technology (e.g., the TVM Solver on a graphing calculator, online tools), the effects of changing the conditions (i.e., the payments, the frequency of the payments, the interest rate, the compounding period) of ordinary simple annuities (e.g., long-term savings plans, loans)	1	Introduction to Annuities
C3.7 solve problems, using technology (e.g., scientific calculator, spreadsheet, graphing calculator), that involve the amount, the present value, and the regular payment of an ordinary simple annuity (e.g., calculate the total interest paid over the life of a loan, using a spreadsheet, and compare the total interest with the original principal of the loan)	1	Introduction to Annuities
D. Trigonometric Functions		
Determining and Applying Trigonometric Ratios		
D1.1 determine the exact values of the sine, cosine, and tangent of the special angles: 0°, 30°, 45°, 60°, and 90°	1	Trigonometric Ratios and Identities
D1.2 determine the values of the sine, cosine, and tangent of angles from 0° to 360°, through investigation using a variety of tools (e.g., dynamic geometry software, graphing tools) and strategies (e.g., applying the unit circle; examining angles related to special angles)	1	Trigonometric Ratios and Identities
D1.3 determine the measures of two angles from 0° to 360° for which the value of a given trigonometric ratio is the same	1	Trigonometric Ratios and Identities
D1.4 define the secant, cosecant, and cotangent ratios for angles in a right triangle in terms of the sides of the triangle (e.g., $sec\ A = \frac{hypotenuse}{adjacent}$), and relate these ratios to the cosine, sine, and tangent ratios (e.g., $sec\ A = \frac{1}{\cos A}$)	1	Trigonometric Ratios and Identities
D1.5 prove simple trigonometric identities, using the Pythagorean identity $sin^2 x + cos^2 x = 1$; the quotient identity $tan\ x = \frac{\sin x}{\cos x}$; and the reciprocal identities $sec\ x = \frac{1}{\cos x}$, $csc\ x = \frac{1}{\sin x}$, and $cot\ x = \frac{1}{\tan x}$	1	Trigonometric Ratios and Identities

D1.6 pose problems involving right triangles and oblique triangles in two-dimensional settings, and solve these and other such problems using the primary trigonometric ratios, the cosine law, and the sine law (including the ambiguous case)	2	Solving 2D & 3D Triangle Problems
D1.7 pose problems involving right triangles and oblique triangles in three-dimensional settings, and solve these and other such problems using the primary trigonometric ratios, the cosine law, and the sine law	1	Solving 2D & 3D Triangle Problems
Connecting Graphs and Equations of Sinusoidal Functions		
D2.1 describe key properties (e.g., cycle, amplitude, period) of periodic functions arising from real-world applications (e.g., natural gas consumption in Ontario, tides in the Bay of Fundy), given a numeric or graphical representation	1	Periodic Functions
D2.2 predict, by extrapolating, the future behaviour of a relationship modelled using a numeric or graphical representation of a periodic function (e.g., predicting hours of daylight on a particular date from previous measurements; predicting natural gas consumption in Ontario from previous consumption)	1	Periodic Functions
D2.3 make connections between the sine ratio and the sine function and between the cosine ratio and the cosine function by graphing the relationship between angles from 0° to 360° and the corresponding sine ratios or cosine ratios, with or without technology (e.g., by generating a table of values using a calculator; by unwrapping the unit circle), defining this relationship as the function $f(x) = sin\, x$ or $f(x) = cos\, x$, and explaining why the relationship is a function	1	Periodic Functions
D2.4 sketch the graphs of $f(x) = sin\, x$ and $f(x) = cos\, x$ for angle measures expressed in degrees, and determine and describe their key properties (i.e., cycle, domain, range, intercepts, amplitude, period, maximum and minimum values, increasing/decreasing intervals)	1	Periodic Functions
D2.5 determine, through investigation using technology, the roles of the parameters a, k, d, and c in functions of the form $y = af(k(x - d)) + c$, where $f(x) = sin\, x$ or $f(x) = cos\, x$ with angles expressed in degrees, and describe these roles in terms of transformations on the graphs of $f(x) = sin\, x$ and $f(x) = cos\, x$ (i.e., translations; reflections in the axes; vertical and horizontal stretches and compressions to and from the x- and y-axes)	2	Transformations of Sinusoidal Functions
D2.6 determine the amplitude, period, phase shift, domain, and range of sinusoidal functions whose equations are given in the form $f(x) = a\, sin(k(x - d)) + c$ or $f(x) = a\, cos(k(x - d)) + c$	1	Transformations of Sinusoidal Functions
D2.7 sketch graphs of $y = af(k(x - d)) + c$ by applying one or more transformations to the graphs of $f(x) = sin\, x$ and $f(x) = cos\, x$, and state the domain and range of the transformed functions	1	Transformations of Sinusoidal Functions
D2.8 represent a sinusoidal function with an equation, given its graph or its properties	1	Transformations of Sinusoidal Functions

Solving Problems Involving Sinusoidal Functions		
D3.1 collect data that can be modelled as a sinusoidal function (e.g., voltage in an AC circuit, sound waves), through investigation with and without technology, from primary sources, using a variety of tools (e.g., concrete materials, measurement tools such as motion sensors), or from secondary sources (e.g., websites such as Statistics Canada, E-STAT), and graph the data	1	Modeling and Solving Sinusoidal Applications
D3.2 identify periodic and sinusoidal functions, including those that arise from real-world applications involving periodic phenomena, given various representations (i.e., tables of values, graphs, equations), and explain any restrictions that the context places on the domain and range	1	Modeling and Solving Sinusoidal Applications
D3.3 determine, through investigation, how sinusoidal functions can be used to model periodic phenomena that do not involve angles	1	Modeling and Solving Sinusoidal Applications
D3.4 predict the effects on a mathematical model (i.e., graph, equation) of an application involving periodic phenomena when the conditions in the application are varied (e.g., varying the conditions, such as speed and direction, when walking in a circle in front of a motion sensor)	1	Modeling and Solving Sinusoidal Applications
D3.5 pose problems based on applications involving a sinusoidal function, and solve these and other such problems by using a given graph or a graph generated with technology from a table of values or from its equation	1	Modeling and Solving Sinusoidal Applications

Education Perfect
Mathematics | MCF3M
Grades 11 Ontario Curriculum Alignment

This document outlines how our platform's content and questions sets are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all courses and fostering key mathematical processes to support student success.

This alignment document shows the content scheduled to be released throughout the 2025-2026 school year.

Education Perfect Mathematics MCF3M Functions and Applications, University/College Preparation		
Expectations	Number of Question Sets	Topic
A. Quadratic Functions		
Solving Quadratic Equations		
A1.1 pose problems involving quadratic relations arising from real-world applications and represented by tables of values and graphs, and solve these and other such problems (e.g., ""From the graph of the height of a ball versus time, can you tell me how high the ball was thrown and the time when it hit the ground?"")	1	Using Graphs to Solve Problems
A1.2 represent situations (e.g., the area of a picture frame of variable width) using quadratic expressions in one variable, and expand and simplify quadratic expressions in one variable [e.g., $2x(x + 4) - (x + 3)^2$]	1	Using Graphs to Solve Problems
A1.3 factor quadratic expressions in one variable, including those for which $a \neq 1$ (e.g., $3x^2 + 13x - 10$), differences of squares (e.g., $4x^2 - 25$), and perfect square trinomials (e.g., $9x^2 + 24x + 16$) by selecting and applying an appropriate strategy	3	Factoring Quadratic Expressions
A1.4 solve quadratic equations by selecting and applying a factoring strategy	1	Factoring Quadratic Expressions
A1.5 determine, through investigation, and describe the connection between the factors used in solving a quadratic equation and the x-intercepts of the graph of the corresponding quadratic relation	1	Factoring Quadratic Expressions

A1.6 explore the algebraic development of the quadratic formula (e.g., given the algebraic development, connect the steps to a numeric example; follow a demonstration of the algebraic development, with technology, such as computer algebra systems, or without technology [student reproduction of the development of the general case is not required]), and apply the formula to solve quadratic equations, using technology	1	Solving Quadratic Equations
A1.7 relate the real roots of a quadratic equation to the x-intercepts of the corresponding graph, and connect the number of real roots to the value of the discriminant (e.g., there are no real roots and no x-intercepts if $b^2 - 4ac < 0$)	1	Solving Quadratic Equations
A1.8 determine the real roots of a variety of quadratic equations (e.g., $100x^2 = 115x + 35$), and describe the advantages and disadvantages of each strategy (i.e., graphing; factoring; using the quadratic formula)	2	Solving Quadratic Equations
Connecting Graphs and Equations of Quadratic Functions		
A2.1 explain the meaning of the term function, and distinguish a function from a relation that is not a function, through investigation of linear and quadratic relations using a variety of representations (i.e., tables of values, mapping diagrams, graphs, function machines, equations) and strategies (e.g., using the vertical-line test)	2	Foundations of Functions
A2.2 substitute into and evaluate linear and quadratic functions represented using function notation [e.g., evaluate $f\left(\frac{1}{2}\right)$ given $f(x) = 2x^2 + 3x - 1$], including functions arising from real-world applications	1	Foundations of Functions
A2.3 explain the meanings of the terms domain and range, through investigation using numeric, graphical, and algebraic representations of linear and quadratic functions, and describe the domain and range of a function appropriately (e.g., for $y = x^1 + 1$ the domain is the set of real numbers, and the range is $y \geq 1$)	2	Domain and Range
A2.4 explain any restrictions on the domain and the range of a quadratic function in contexts arising from real-world applications	1	Domain and Range
A2.5 determine, through investigation using technology, the roles of a, h, and k in quadratic functions of the form $f(x) = a(x - h)^2 + k$ and describe these roles in terms of transformations on the graph of $f(x) = x^2$ (i.e., translations; reflections in the x-axis; vertical stretches and compressions to and from the x-axis)	2	Transformations of Quadratic Functions
A2.6 sketch graphs of $g(x) = a(x - h)^2 + k$ by applying one or more transformations to the graph of $f(x) = x^2$	1	Transformations of Quadratic Functions
A2.7 express the equation of a quadratic function in the standard form $f(x) = ax^2 + bx + c$, given the vertex form $f(x) = a(x - h)^2 + k$, and verify, using graphing technology, that these forms are equivalent representations	1	Forms of Quadratic Equations

A2.8 express the equation of a quadratic function in the vertex form $f(x) = a(x - h)^2 + k$ given the standard form $f(x) = ax^2 + bx + c$, by completing the square (e.g., using algebra tiles or diagrams; algebraically), including cases where $\frac{b}{a}$ is a simple rational number (e.g., $\frac{1}{2}$, 0.75), and verify, using graphing technology, that these forms are equivalent representations	2	Forms of Quadratic Equations
A2.9 sketch graphs of quadratic functions in the factored form $f(x) = a(x - r)(x - s)$ by using the x-intercepts to determine the vertex	1	Forms of Quadratic Equations
A2.10 describe the information (e.g., maximum, intercepts) that can be obtained by inspecting the standard form $f(x) = ax^2 + bx + c$, the vertex form $f(x) = a(x - h)^2 + k$, and the factored form $f(x) = a(x - r)(x - s)$ of a quadratic function	1	Features of Quadratic Functions
A2.11 sketch the graph of a quadratic function whose equation is given in the standard form $f(x) = ax^2 + bx + c$ by using a suitable strategy (e.g., completing the square and finding the vertex; factoring, if possible, to locate the x-intercepts), and identify the key features of the graph (e.g., the vertex, the x- and y-intercepts, the equation of the axis of symmetry, the intervals where the function is positive or negative, the intervals where the function is increasing or decreasing)	2	Features of Quadratic Functions
Solving Problems Involving Quadratic Functions		
A3.1 collect data that can be modelled as a quadratic function, through investigation with and without technology, from primary sources, using a variety of tools (e.g., concrete materials; measurement tools such as measuring tapes, electronic probes, motion sensors), or from secondary sources (e.g., websites such as Statistics Canada, E-STAT), and graph the data	1	Modelling Quadratic Relationships
A3.2 determine, through investigation using a variety of strategies (e.g., applying properties of quadratic functions such as the x-intercepts and the vertex; using transformations), the equation of the quadratic function that best models a suitable data set graphed on a scatter plot, and compare this equation to the equation of a curve of best fit generated with technology (e.g., graphing software, graphing calculator)	2	Modelling Quadratic Relationships
A3.3 solve problems arising from real-world applications, given the algebraic representation of a quadratic function (e.g., given the equation of a quadratic function representing the height of a ball over elapsed time, answer questions that involve the maximum height of the ball, the length of time needed for the ball to touch the ground, and the time interval when the ball is higher than a given measurement)	1	Modelling Quadratic Relationships

B. Exponential Functions		
Connecting Graphs and Equations of Exponential Functions		
B1.1 determine, through investigation using a variety of tools (e.g., calculator, paper and pencil, graphing technology) and strategies (e.g., patterning; finding values from a graph; interpreting the exponent laws), the value of a power with a rational exponent (i.e., $x^{\frac{m}{n}}$) where $x > 0$ and m and n are integers)	2	Evaluating Powers
B1.2 evaluate, with and without technology, numerical expressions containing integer and rational exponents and rational bases [e.g. 2^{-3}, $(-6)^3$, $4^{\frac{1}{2}}$, 1.01^{120}]	2	Evaluating Powers
B1.3 graph, with and without technology, an exponential relation, given its equation in the form $y = a^x$ $(a > 0,\ a \neq 1)$, define this relation as the function $f(x) = a^x$, and explain why it is a function	1	Properties of Exponential Functions
B1.4 determine, through investigation, and describe key properties relating to domain and range, intercepts, increasing/decreasing intervals, and asymptotes (e.g., the domain is the set of real numbers; the range is the set of positive real numbers; the function either increases or decreases throughout its domain) for exponential functions represented in a variety of ways [e.g., tables of values, mapping diagrams, graphs, equations of the form $f(x) = a^x$ $(a > 0,\ a \neq 1)$, function machines]	2	Properties of Exponential Functions
B1.5 determine, through investigation (e.g., by patterning with and without a calculator), the exponent rules for multiplying and dividing numeric expressions involving exponents [e.g., $\left(\frac{1}{2}\right)^3 \times \left(\frac{1}{2}\right)^2$], and the exponent rule for simplifying numerical expressions involving a power of a power [e.g., $\left(5^3\right)^2$], and use the rules to simplify numerical expressions containing integer exponents [e.g., $(2^3)(2^5) = 2^8$]	2	Exponent Laws
B1.6 distinguish exponential functions from linear and quadratic functions by making comparisons in a variety of ways (e.g., comparing rates of change using finite differences in tables of values; identifying a constant ratio in a table of values; inspecting graphs; comparing equations), within the same context when possible (e.g., simple interest and compound interest, population growth)	2	Comparing Exponential, Linear, and Quadratic Functions
Solving Problems Involving Exponential Functions		
B2.1 collect data that can be modelled as an exponential function, through investigation with and without technology, from primary sources, using a variety of tools (e.g., concrete materials such as number cubes, coins; measurement tools such as electronic probes), or from secondary sources (e.g., websites such as Statistics Canada, E-STAT), and graph the data	1	Applications of Exponential Functions
B2.2 identify exponential functions, including those that arise from real-world	2	Applications of

applications involving growth and decay (e.g., radioactive decay, population growth, cooling rates, pressure in a leaking tire), given various representations (i.e., tables of values, graphs, equations), and explain any restrictions that the context places on the domain and range (e.g., ambient temperature limits the range for a cooling curve)		Exponential Functions
B2.3 solve problems using given graphs or equations of exponential functions arising from a variety of real-world applications (e.g., radioactive decay, population growth, height of a bouncing ball, compound interest) by interpreting the graphs or by substituting values for the exponent into the equations	1	Applications of Exponential Functions
Solving Financial Problems Involving Exponential Functions		
B3.1 compare, using a table of values and graphs, the simple and compound interest earned for a given principal (i.e., investment) and a fixed interest rate over time	1	Foundations of Compound Interest
B3.2 solve problems, using a scientific calculator, that involve the calculation of the amount, A (also referred to as future value, FV), and the principal, P (also referred to as present value, PV), using the compound interest formula in the form $A = P(1 + i)^n$ [or $FV = PV(1 + i)^n$]	2	Foundations of Compound Interest
B3.3 determine, through investigation (e.g., using spreadsheets and graphs), that compound interest is an example of exponential growth [e.g., the formulas for compound interest, $A = P(1 + i)^n$, and present value, $PV = A(1 + i)^{-n}$, are exponential functions, where the number of compounding periods, n, varies]	1	Analyzing Compound Interest and Solving Unknowns
B3.4 solve problems, using a TVM Solver on a graphing calculator or on a website, that involve the calculation of the interest rate per compounding period, i, or the number of compounding periods, n, in the compound interest formula $A = P(1 + i)^n$ [or $FV = PV(1 + i)^n$]	2	Analyzing Compound Interest and Solving Unknowns
B3.5 explain the meaning of the term annuity, through investigation of numeric and graphical representations using technology	1	Annuities and Their Conditions
B3.6 determine, through investigation using technology (e.g., the TVM Solver on a graphing calculator, online tools), the effects of changing the conditions (i.e., the payments, the frequency of the payments, the interest rate, the compounding period) of ordinary simple annuities (i.e., annuities in which payments are made at the end of each period, and the compounding period and the payment period are the same) (e.g., long-term savings plans, loans)	2	Annuities and Their Conditions
B3.7 solve problems, using technology (e.g., scientific calculator, spreadsheet, graphing calculator), that involve the amount, the present value, and the regular payment of an ordinary simple annuity (e.g., calculate the total interest paid over the life of a loan, using a spreadsheet, and compare the total interest with the original principal of the loan)	4	Solving Annuity Problems
C. Trigonometric Functions		

Applying the Sine Law and the Cosine Law in Acute Triangles		
C1.1 solve problems, including those that arise from real-world applications (e.g., surveying, navigation), by determining the measures of the sides and angles of right triangles using the primary trigonometric ratios	1	Right Triangle Trigonometry
C1.2 solve problems involving two right triangles in two dimensions	1	Right Triangle Trigonometry
C1.3 verify, through investigation using technology (e.g., dynamic geometry software, spreadsheet), the sine law and the cosine law (e.g., compare, using dynamic geometry software, the ratios $\frac{a}{\sin A}$, $\frac{b}{\sin B}$, and $\frac{c}{\sin C}$ in triangle ABC while dragging one of the vertices)	1	Applying Sine Law and Cosine Law
C1.4 describe conditions that guide when it is appropriate to use the sine law or the cosine law, and use these laws to calculate sides and angles in acute triangles	2	Applying Sine Law and Cosine Law
C1.5 solve problems that require the use of the sine law or the cosine law in acute triangles, including problems arising from real-world applications (e.g., surveying, navigation, building construction)	1	Applying Sine Law and Cosine Law
Connecting Graphs and Equations of Sine Functions		
C2.1 describe key properties (e.g., cycle, amplitude, period) of periodic functions arising from real-world applications (e.g., natural gas consumption in Ontario, tides in the Bay of Fundy), given a numeric or graphical representation	2	Introduction to Periodic Functions
C2.2 predict, by extrapolating, the future behaviour of a relationship modelled using a numeric or graphical representation of a periodic function (e.g., predicting hours of daylight on a particular date from previous measurements; predicting natural gas consumption in Ontario from previous consumption)	1	Introduction to Periodic Functions
C2.3 make connections between the sine ratio and the sine function by graphing the relationship between angles from 0° to 360° and the corresponding sine ratios, with or without technology (e.g., by generating a table of values using a calculator; by unwrapping the unit circle), defining this relationship as the function $f(x) = \sin x$ and explaining why the relationship is a function	1	Sine Graph Basics
C2.4 sketch the graph of $f(x) = \sin x$ for angle measures expressed in degrees, and determine and describe its key properties (i.e., cycle, domain, range, intercepts, amplitude, period, maximum and minimum values, increasing/decreasing intervals)	2	Sine Graph Basics
C2.5 make connections, through investigation with technology, between changes in a real-world situation that can be modelled using a periodic	1	Transformations of Sine Functions

function and transformations of the corresponding graph (e.g., investigate the connection between variables for a swimmer swimming lengths of a pool and transformations of the graph of distance from the starting point versus time)		
C2.6 determine, through investigation using technology, the roles of the parameters a, c, and d in functions in the form $f(x) = a \sin x$, $f(x) = \sin x + c$, and $f(x) = \sin(x - d)$, and describe these roles in terms of transformations on the graph of $f(x) = \sin x$ with angles expressed in degrees (i.e., translations; reflections in the x-axis; vertical stretches and compressions to and from the x-axis)	2	Transformations of Sine Functions
C2.7 sketch graphs of $f(x) = a \sin x$, $f(x) = \sin x + c$, and $f(x) = \sin(x - d)$ by applying transformations to the graph of $f(x) = \sin x$, and state the domain and range of the transformed functions	2	Transformations of Sine Functions
Solving Problems Involving Sine Functions		
C3.1 collect data that can be modelled as a sine function (e.g., voltage in an AC circuit, sound waves), through investigation with and without technology, from primary sources, using a variety of tools (e.g., concrete materials, measurement tools such as motion sensors), or from secondary sources (e.g., websites such as Statistics Canada, E-STAT), and graph the data	1	Real-World Sinusoidal Models
C3.2 identify periodic and sinusoidal functions, including those that arise from real-world applications involving periodic phenomena, given various representations (i.e., tables of values, graphs, equations), and explain any restrictions that the context places on the domain and range	2	Real-World Sinusoidal Models
C3.3 pose problems based on applications involving a sine function, and solve these and other such problems by using a given graph or a graph generated with technology from a table of values or from its equation	1	Real-World Sinusoidal Models

Education Perfect
Mathematics | MBF3C
Grades 11 Ontario Curriculum Alignment

This document outlines how our platform's content and questions sets are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all courses and fostering key mathematical processes to support student success.

This alignment document shows the content scheduled to be released throughout the 2025-2026 school year.

Education Perfect Mathematics MBF3C Foundations for College Mathematics, College Preparation		
Expectations	Number of Question Sets	Topic
A. Mathematical Models		
Connecting Graphs and Equations of Quadratic Relations		
A1.1 pose problems involving quadratic relations arising from real-world applications and represented by tables of values and graphs, and solve these and other such problems (e.g., ""From the graph of the height of a ball versus time, can you tell me how high the ball was thrown and the time when it hit the ground?"")	1	Graphing and Analyzing Quadratic Relations
A1.2 determine and interpret meaningful values of the variables, given a graph of a quadratic relation arising from a real-world application	1	Graphing and Analyzing Quadratic Relations
A1.3 determine, through investigation using technology, the roles of a, h, and k in quadratic relations of the form $y = a(x - h)^2 + k$, and describe these roles in terms of transformations on the graph of $y = x^2$ (i.e., translations; reflections in the x-axis; vertical stretches and compressions to and from the x-axis)	2	Graphing and Analyzing Quadratic Relations
A1.4 sketch graphs of quadratic relations represented by the equation $y = a(x - h)^2 + k$ (e.g., using the vertex and at least one point on each side of the vertex; applying one or more transformations to the graph of $y = x^2$)	1	Graphing and Analyzing Quadratic Relations
A1.5 expand and simplify quadratic expressions in one variable involving multiplying binomials [e.g., $\left(\frac{1}{2}x + 1\right)(3x - 2)$] or squaring a binomial [e.g., $5(3x - 1)^2$], using a variety of tools (e.g., paper and pencil, algebra tiles, computer algebra systems)	1	Factoring and Expanding Quadratic Expression

A1.6 express the equation of a quadratic relation in the standard form $y = ax^2 + bx + c$, given the vertex form $y = a(x - h)^2 + k$, and verify, using graphing technology, that these forms are equivalent representations	1	Connecting Forms and Solving Quadratic Relation Problems
A1.7 factor trinomials of the form $ax^2 + bx + c$, where $a = 1$ or where a is the common factor, by various methods	2	Factoring and Expanding Quadratic Expression
A1.8 determine, through investigation, and describe the connection between the factors of a quadratic expression and the x-intercepts of the graph of the corresponding quadratic relation	1	Factoring and Expanding Quadratic Expression
A1.9 solve problems, using an appropriate strategy (i.e., factoring, graphing), given equations of quadratic relations, including those that arise from real-world applications (e.g., break-even point)	1	Connecting Forms and Solving Quadratic Relation Problems
Connecting Graphs and Equations of Exponential Relations		
A2.1 determine, through investigation using a variety of tools and strategies (e.g., graphing with technology; looking for patterns in tables of values), and describe the meaning of negative exponents and of zero as an exponent	1	Exponent Laws and Expressions
A2.2 evaluate, with and without technology, numeric expressions containing integer exponents and rational bases (e.g., 2^{-3}, 6^3, 3456^0, 1.03^{10})	1	Exponent Laws and Expressions
A2.3 determine, through investigation (e.g., by patterning with and without a calculator), the exponent rules for multiplying and dividing numerical expressions involving exponents [e.g. $\left(\frac{1}{2}\right)^3 \times \left(\frac{1}{2}\right)^2$], and the exponent rule for simplifying numerical expressions involving a power of a power [e.g., $\left(5^3\right)^2$]	2	Exponent Laws and Expressions
A2.4 graph simple exponential relations, using paper and pencil, given their equations [e.g., $y = 2^x$, $y = 10^x$, $y = \left(\frac{1}{2}\right)^x$]	1	Representing and Comparing Relations
A2.5 make and describe connections between representations of an exponential relation (i.e., numeric in a table of values; graphical; algebraic)	1	Representing and Comparing Relations
A2.6 distinguish exponential relations from linear and quadratic relations by making comparisons in a variety of ways (e.g., comparing rates of change using finite differences in tables of values; inspecting graphs; comparing equations), within the same context when possible (e.g., simple interest and compound interest, population growth)	2	Representing and Comparing Relations

Solving Problems Involving Exponential Relations		
A3.1 collect data that can be modelled as an exponential relation, through investigation with and without technology, from primary sources, using a variety of tools (e.g., concrete materials such as number cubes, coins; measurement tools such as electronic probes), or from secondary sources (e.g., websites such as Statistics Canada, E-STAT), and graph the data	1	Solving Problems Involving Exponential Relations
A3.2 describe some characteristics of exponential relations arising from real-world applications (e.g., bacterial growth, drug absorption) by using tables of values (e.g., to show a constant ratio, or multiplicative growth or decay) and graphs (e.g., to show, with technology, that there is no maximum or minimum value)	1	Solving Problems Involving Exponential Relations
A3.3 pose problems involving exponential relations arising from a variety of real-world applications (e.g., population growth, radioactive decay, compound interest), and solve these and other such problems by using a given graph or a graph generated with technology from a given table of values or a given equation	1	Solving Problems Involving Exponential Relations
A3.4 solve problems using given equations of exponential relations arising from a variety of real-world applications (e.g., radioactive decay, population growth, height of a bouncing ball, compound interest) by substituting values for the exponent into the equations	1	Solving Problems Involving Exponential Relations
B. Personal Finance		
Solving Problems Involving Compound Interest		
B1.1 determine, through investigation using technology, the compound interest for a given investment, using repeated calculations of simple interest, and compare, using a table of values and graphs, the simple and compound interest earned for a given principal (i.e., investment) and a fixed interest rate over time	1	Foundations of Compound Interest
B1.2 determine, through investigation (e.g., using spreadsheets and graphs), and describe the relationship between compound interest and exponential growth	1	Foundations of Compound Interest
B1.3 solve problems, using a scientific calculator, that involve the calculation of the amount, A (also referred to as future value, FV), and the principal, P (also referred to as present value, PV), using the compound interest formula in the form $A = P(1 + i)^n$ [or $FV = PV(1 + i)^n$]	2	Foundations of Compound Interest
B1.4 calculate the total interest earned on an investment or paid on a loan by determining the difference between the amount and the principal [e.g., using $I = A - P$ (or $I = FV - PV$)]	1	Foundations of Compound Interest

B1.5 solve problems, using a TVM Solver on a graphing calculator or on a website, that involve the calculation of the interest rate per compounding period, i, or the number of compounding periods, n, in the compound interest formula $A = P(1 + i)^n$ [or $FV = PV(1 + i)^n$]	2	Analyzing Compound Interest Scenarios
B1.6 determine, through investigation using technology (e.g., a TVM Solver on a graphing calculator or on a website), the effect on the future value of a compound interest investment or loan of changing the total length of time, the interest rate, or the compounding period	1	Analyzing Compound Interest Scenarios
Comparing Financial Services		
B2.1 gather, interpret, and compare information about the various savings alternatives commonly available from financial institutions (e.g., savings and chequing accounts, term investments), the related costs (e.g., cost of cheques, monthly statement fees, early withdrawal penalties), and possible ways of reducing the costs (e.g., maintaining a minimum balance in a savings account; paying a monthly flat fee for a package of services)	1	Comparing Financial Services
B2.2 gather and interpret information about investment alternatives (e.g., stocks, mutual funds, real estate, GICs, savings accounts), and compare the alternatives by considering the risk and the rate of return.	1	Comparing Financial Services
B2.3 gather, interpret, and compare information about the costs (e.g., user fees, annual fees, service charges, interest charges on overdue balances) and incentives (e.g., loyalty rewards; philanthropic incentives, such as support for Olympic athletes or a Red Cross disaster relief fund) associated with various credit cards and debit cards	1	Comparing Financial Services
B2.4 gather, interpret, and compare information about current credit card interest rates and regulations, and determine, through investigation using technology, the effects of delayed payments on a credit card balance	1	Comparing Financial Services
B2.5 solve problems involving applications of the compound interest formula to determine the cost of making a purchase on credit.	1	Comparing Financial Services
Owning and Operating a Vehicle		
B3.1 gather and interpret information about the procedures and costs involved in insuring a vehicle (e.g., car, motorcycle, snowmobile) and the factors affecting insurance rates (e.g., gender, age, driving record, model of vehicle, use of vehicle), and compare the insurance costs for different categories of drivers and for different vehicles	1	Owning and Operating a Vehicle
B3.2 gather, interpret, and compare information about the procedures and costs (e.g., monthly payments, insurance, depreciation, maintenance, miscellaneous expenses) involved in buying or leasing a new vehicle or buying a used vehicle	1	Owning and Operating a Vehicle

B3.3 solve problems, using technology (e.g., calculator, spreadsheet), that involve the fixed costs (e.g., licence fee, insurance) and variable costs (e.g., maintenance, fuel) of owning and operating a vehicle.	1	Owning and Operating a Vehicle
C. Geometry and Trigonometry		
Representing Two-Dimensional Shapes and Three-Dimensional Figures		
C1.1 recognize and describe real-world applications of geometric shapes and figures, through investigation (e.g., by importing digital photos into dynamic geometry software), in a variety of contexts (e.g., product design, architecture, fashion), and explain these applications (e.g., one reason that sewer covers are round is to prevent them from falling into the sewer during removal and replacement)	1	Representing and Designing 3D Figures
C1.2 represent three-dimensional objects, using concrete materials and design or drawing software, in a variety of ways (e.g., orthographic projections [i.e., front, side, and top views], perspective isometric drawings, scale models)	1	Representing and Designing 3D Figures
C1.3 create nets, plans, and patterns from physical models arising from a variety of real-world applications (e.g., fashion design, interior decorating, building construction), by applying the metric and imperial systems and using design or drawing software	1	Representing and Designing 3D Figures
C1.4 solve design problems that satisfy given constraints (e.g., design a rectangular berm that would contain all the oil that could leak from a cylindrical storage tank of a given height and radius), using physical models (e.g., built from popsicle sticks, cardboard, duct tape) or drawings (e.g., made using design or drawing software), and state any assumptions made	1	Representing and Designing 3D Figures
Applying the Sine Law and the Cosine Law in Acute Triangles		
C2.1 solve problems, including those that arise from real-world applications (e.g., surveying, navigation), by determining the measures of the sides and angles of right triangles using the primary trigonometric ratios	1	Solving Triangles with Trigonometry
	1	Applying Trigonometric Laws
C2.2 verify, through investigation using technology (e.g., dynamic geometry software, spreadsheet), the sine law and the cosine law (e.g., compare, using dynamic geometry software, the ratios $\frac{a}{\sin A}$, $\frac{b}{\sin B}$, and $\frac{c}{\sin C}$ in triangle ABC while dragging one of the vertices);	1	Solving Triangles with Trigonometry
C2.3 describe conditions that guide when it is appropriate to use the sine law or the cosine law, and use these laws to calculate sides and angles in acute triangles	2	Solving Triangles with Trigonometry
	1	Applying Trigonometric Laws

C2.4 solve problems that arise from real-world applications involving metric and imperial measurements and that require the use of the sine law or the cosine law in acute triangles	1	Applying Trigonometric Laws
D. Data Management		
Working with One-Variable Data		
D1.1 identify situations involving one-variable data (i.e., data about the frequency of a given occurrence), and design questionnaires (e.g., for a store to determine which CDs to stock, for a radio station to choose which music to play) or experiments (e.g., counting, taking measurements) for gathering one-variable data, giving consideration to ethics, privacy, the need for honest responses, and possible sources of bias	1	Introduction to One Variable Data
D1.2 collect one-variable data from secondary sources (e.g., Internet databases), and organize and store the data using a variety of tools (e.g., spreadsheets, dynamic statistical software)	1	Introduction to One Variable Data
D1.3 explain the distinction between the terms population and sample, describe the characteristics of a good sample, and explain why sampling is necessary (e.g., time, cost, or physical constraints)	1	Data Sampling
D1.4 describe and compare sampling techniques (e.g., random, stratified, clustered, convenience, voluntary); collect one-variable data from primary sources, using appropriate sampling techniques in a variety of real-world situations; and organize and store the data	1	Data Sampling
	1	Collecting and Representing Data
D1.5 identify different types of one-variable data (i.e., categorical, discrete, continuous), and represent the data, with and without technology, in appropriate graphical forms (e.g., histograms, bar graphs, circle graphs, pictographs)	1	Collecting and Representing Data
D1.6 identify and describe properties associated with common distributions of data (e.g., normal, bimodal, skewed)	1	Analyzing One-Variable Data
D1.7 calculate, using formulas and/or technology (e.g., dynamic statistical software, spreadsheet, graphing calculator), and interpret measures of central tendency (i.e., mean, median, mode) and measures of spread (i.e., range, standard deviation)	1	Analyzing One-Variable Data
D1.8 explain the appropriate use of measures of central tendency (i.e., mean, median, mode) and measures of spread (i.e., range, standard deviation)	1	Analyzing One-Variable Data
D1.9 compare two or more sets of one-variable data, using measures of central tendency and measures of spread	1	Analyzing One-Variable Data
D1.10 solve problems by interpreting and analysing one-variable data collected from secondary sources	1	Analyzing One-Variable Data

Applying Probability		
D2.1 identify examples of the use of probability in the media and various ways in which probability is represented (e.g., as a fraction, as a percent, as a decimal in the range 0 to 1)	1	Foundations of Probability
D2.2 determine the theoretical probability of an event (i.e., the ratio of the number of favourable outcomes to the total number of possible outcomes, where all outcomes are equally likely), and represent the probability in a variety of ways (e.g., as a fraction, as a percent, as a decimal in the range 0 to 1)	1	Foundations of Probability
D2.3 perform a probability experiment (e.g., tossing a coin several times), represent the results using a frequency distribution, and use the distribution to determine the experimental probability of an event	1	Foundations of Probability
D2.4 compare, through investigation, the theoretical probability of an event with the experimental probability, and explain why they might differ	1	Interpreting and Applying Probability
D2.5 determine, through investigation using class-generated data and technology-based simulation models (e.g., using a random-number generator on a spreadsheet or on a graphing calculator), the tendency of experimental probability to approach theoretical probability as the number of trials in an experiment increases (e.g., ""If I simulate tossing a coin 1000 times using technology, the experimental probability that I calculate for tossing tails is likely to be closer to the theoretical probability than if I simulate tossing the coin only 10 times"")	1	Interpreting and Applying Probability
D2.6 interpret information involving the use of probability and statistics in the media, and make connections between probability and statistics (e.g., statistics can be used to generate probabilities)	1	Interpreting and Applying Probability

Education Perfect
Mathematics | MEL3E
Grades 11 Ontario Curriculum Alignment

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Education Perfect Mathematics MEL3E Mathematics for Work and Everyday Life, Workplace Preparation		
Expectations	Number of Question Sets	Topic
A. Earning and Purchasing		
Earning		
A1.1 gather, interpret, and compare information about the components of total earnings (e.g., salary, benefits, vacation pay, profit-sharing) in different occupations	1	Understanding Your Paycheque
A1.2 gather, interpret, and describe information about different remuneration methods (e.g., hourly rate, overtime rate, job or project rate, commission, salary, gratuities) and remuneration schedules (e.g., weekly, biweekly, semi-monthly, monthly)	1	Understanding Your Paycheque
A1.3 describe the effects of different remuneration methods and schedules on decisions related to personal spending habits (e.g., the timing of a major purchase, the scheduling of mortgage payments and other bill payments)	1	Pay Decisions & Impact
A1.4 solve problems, using technology (e.g., calculator , spreadsheet), and make decisions involving different remuneration methods and schedules	2	Pay Decisions & Impact
Describing Purchasing Power		
A2.1 gather, interpret, and describe information about government payroll deductions (i.e., CPP, EI, income tax) and other payroll deductions (e.g., contributions to pension plans other than CPP; union dues; charitable donations; benefit-plan contributions)	1	Understanding Your Net Pay

A2.2 estimate and compare, using current secondary data (e.g., federal tax tables), the percent of total earnings deducted through government payroll deductions for various benchmarks (e.g., $15000, $20 000, $25 000)	1	Understanding Your Net Pay
A2.3 describe the relationship between gross pay, net pay, and payroll deductions (i.e., net pay is gross pay less government payroll deductions and any other payroll deductions), and estimate net pay in various situations	2	Understanding Your Net Pay
A2.4 describe and compare the purchasing power and living standards associated with relevant occupations of interest	1	Understanding Your Net Pay
Purchasing		
A3.1 identify and describe various incentives in making purchasing decisions (e.g., 20% off; $\frac{1}{3}$ off; buy 3 get 1 free; loyalty rewards; coupons; 0% financing)	1	Smart Shopping
A3.2 estimate the sale price before taxes when making a purchase (e.g., estimate 25% off of $38.99 as 25% or $\frac{1}{4}$ off of $40, giving a discount of about $10 and a sale price of approximately $30; alternatively, estimate the same sale price as about $\frac{3}{4}$ of $40)	1	Smart Shopping
A3.3 describe and compare a variety of strategies for estimating sales tax (e.g., estimate the sales tax on most purchases in Ontario by estimating 10% of the purchase price and adding about a third of this estimate, rather than estimating the PST and GST separately), and use a chosen strategy to estimate the after-tax cost of common items	1	Smart Shopping
A3.4 calculate discounts, sale prices, and after-tax costs, using technology	2	Sales, Discounts and Tax
A3.5 identify forms of taxation built into the cost of an item or service (e.g., gasoline tax, tire tax)	1	Sales, Discounts and Tax
A3.6 estimate the change from an amount offered to pay a charge	1	Making Change
A3.7 make the correct change from an amount offered to pay a charge, using currency manipulatives	1	Making Change
A3.8 compare the unit prices of related items to help determine the best buy	1	Smart Shopping
A3.9 describe and compare, for different types of transactions, the extra costs that may be associated with making purchases (e.g., interest costs, exchange rates, shipping and handling costs, customs duty, insurance)	1	Making Informed Purchasing Decisions

A3.10 make and justify a decision regarding the purchase of an item, using various criteria (e.g., extra costs, such as shipping costs and transaction fees; quality and quantity of the item; shelf life of the item; method of purchase, such as online versus local) under various circumstances (e.g., not having access to a vehicle; living in a remote community; having limited storage space)	1	Making Informed Purchasing Decisions
B. Saving, Investing, and Borrowing		
Comparing Financial Services		
B1.1 gather, interpret, and compare information about the various savings alternatives commonly available from financial institutions (e.g., savings and chequing accounts, term investments), the related costs (e.g., cost of cheques, monthly statement fees, early withdrawal penalties), and possible ways of reducing the costs (e.g., maintaining a minimum balance in a savings account; paying a monthly flat fee for a package of services)	1	Comparing Financial Services
B1.2 gather, interpret, and compare information about the costs (e.g., user fees, annual fees, service charges, interest charges on overdue balances) and incentives (e.g., loyalty rewards; philanthropic incentives, such as support for Olympic athletes or a Red Cross disaster relief fund) associated with various credit cards and debit cards	1	Comparing Financial Services
B1.3 read and interpret transaction codes and entries from various financial statements (e.g., bank statement, credit card statement, passbook, automated banking machine printout, online banking statement, account activity report), and explain ways of using the information to manage personal finances	1	Comparing Financial Services
Saving and Investing		
B2.1 determine, through investigation using technology (e.g., calculator, spreadsheet), the effect on simple interest of changes in the principal, interest rate, or time, and solve problems involving applications of simple interest	1	Simple and Compound Interest
B2.2 determine, through investigation using technology, the compound interest for a given investment, using repeated calculations of simple interest for no more than 6 compounding periods	1	Simple and Compound Interest
B2.3 describe the relationship between simple interest and compound interest in various ways (i.e., orally, in writing, using tables and graphs)	1	Simple and Compound Interest
B2.4 determine, through investigation using technology (e.g., a TVM Solver on a graphing calculator or on a website), the effect on the future value of a compound interest investment of changing the total length of time, the interest rate, or the compounding period	1	Simple and Compound Interest

B2.5 solve problems, using technology, that involve applications of compound interest to saving and investing	1	Simple and Compound Interest
Borrowing		
B3.1 gather, interpret, and compare information about the effects of carrying an outstanding balance on a credit card at current interest rates	1	Understanding Loan Options & Costs
B3.2 gather, interpret, and compare information describing the features (e.g., interest rates, flexibility) and conditions (e.g., eligibility, required collateral) of various personal loans (e.g., student loan, car loan, ""no interest"" deferred-payment loan, loan to consolidate debt, loan drawn on a line of credit, payday or bridging loan)	1	Understanding Loan Options & Costs
B3.3 calculate, using technology (e.g., calculator, spreadsheet), the total interest paid over the life of a personal loan, given the principal, the length of the loan, and the periodic payments, and use the calculations to justify the choice of a personal loan	1	Understanding Loan Options & Costs
B3.4 determine, using a variety of tools (e.g., spreadsheet template, online amortization tables), the effect of the length of time taken to repay a loan on the principal and interest components of a personal loan repayment	1	Loan Repayment Strategies
B3.5 compare, using a variety of tools (e.g., spreadsheet template, online amortization tables), the effects of various payment periods (e.g., monthly, biweekly) on the length of time taken to repay a loan and on the total interest paid	1	Loan Repayment Strategies
B3.6 gather and interpret information about credit ratings, and describe the factors used to determine credit ratings and the consequences of a good or bad rating	1	Loan Repayment Strategies
B3.7 make and justify a decision to borrow, using various criteria (e.g., income, cost of borrowing, availability of an item, need for an item) under various circumstances (e.g., having a large existing debt, wanting to pursue an education or training opportunity, needing transportation to a new job, wanting to set up a business)	1	Loan Repayment Strategies
C. Transportation and Travel		
Owning and Operating a Vehicle		
C1.1 gather and interpret information about the procedures (e.g., in the graduated licensing system) and costs (e.g., driver training; licensing fees) involved in obtaining an Ontario driver's licence, and the privileges and restrictions associated with having a driver's licence	1	Vehicle Acquisition & Initial Costs
C1.2 gather and describe information about the procedures involved in buying or leasing a new vehicle or buying a used vehicle	1	Vehicle Acquisition & Initial Costs

C1.3 gather and interpret information about the procedures and costs involved in insuring a vehicle (e.g., car, motorcycle, snowmobile) and the factors affecting insurance rates (e.g., gender, age, driving record, model of vehicle, use of vehicle), and compare the insurance costs for different categories of drivers and for different vehicles	1	Vehicle Acquisition & Initial Costs
C1.4 gather and interpret information about the costs (e.g., monthly payments, insurance, depreciation, maintenance, miscellaneous expenses) of purchasing or leasing a new vehicle or purchasing a used vehicle, and describe the conditions that favour each alternative	1	Vehicle Acquisition & Initial Costs
C1.5 describe ways of failing to operate a vehicle responsibly (e.g., lack of maintenance, careless driving) and possible financial and non-financial consequences (e.g., legal costs, fines, higher insurance rates, demerit points, loss of driving privileges)	1	Vehicle Costs & Responsibilities
C1.6 identify and describe costs (e.g., gas consumption, depreciation, insurance, maintenance) and benefits (e.g., convenience, increased profit) of owning and operating a vehicle for business	1	Vehicle Costs & Responsibilities
C1.7 solve problems, using technology (e.g., calculator, spreadsheet), that involve the fixed costs (e.g., licence fee, insurance) and variable costs (e.g., maintenance, fuel) of owning and operating a vehicle	1	Vehicle Costs & Responsibilities
Travelling by Automobile		
C2.1 determine distances represented on maps (e.g., provincial road map, local street map, Web-based maps), using given scales	1	Travelling by Automobile
C2.2 plan and justify, orally or in writing, a route for a trip by automobile on the basis of a variety of factors (e.g., distances involved, the purpose of the trip, the time of year, the time of day, probable road conditions, personal priorities)	1	Travelling by Automobile
C2.3 report, orally or in writing, on the estimated costs (e.g., gasoline, accommodation, food, entertainment, tolls, car rental) involved in a trip by automobile, using information from available sources (e.g., automobile association travel books, travel guides, the Internet)	1	Travelling by Automobile
C2.4 solve problems involving the cost of travelling by automobile for personal or business purposes	1	Travelling by Automobile

Comparing Modes of Transportation		
C3.1 gather, interpret, and describe information about the impact (e.g., monetary, health, environmental) of daily travel (e.g., to work and/or school), using available means (e.g., car, taxi, motorcycle, public transportation, bicycle, walking)	1	Travel Choices & Impact
C3.2 gather, interpret, and compare information about the costs (e.g., insurance, extra charges based on distance travelled) and conditions (e.g., one-way or return, drop-off time and location, age of the driver, required type of driver's licence) involved in renting a car, truck, or trailer, and use the information to justify a choice of rental vehicle	1	Travel Choices & Impact
C3.3 gather, interpret, and describe information regarding routes, schedules, and fares for travel by airplane, train, or bus	1	Travel Choices & Impact
C3.4 solve problems involving the comparison of information concerning transportation by airplane, train, bus, and automobile in terms of various factors (e.g., cost, time, convenience)	1	Travel Choices & Impact

Education Perfect
Mathematics | MHF4U
Grades 12 Ontario Curriculum Alignment

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This alignment document shows the content scheduled to be released throughout the 2025-2026 school year.

Education Perfect Mathematics MHF4U Advanced Functions, University Preparation		
Expectations	Number of Question Sets	Topic
A. Exponential and Logarithmic Functions		
Evaluating Logarithmic Expressions		
A1.1 recognize the logarithm of a number to a given base as the exponent to which the base must be raised to get the number, recognize the operation of finding the logarithm to be the inverse operation (i.e., the undoing or reversing) of exponentiation, and evaluate simple logarithmic expressions	1	Foundations of Logarithms
A1.2 determine, with technology, the approximate logarithm of a number to any base, including base 10 (e.g., by reasoning that $log_3 29$ is between 3 and 4 and using systematic trial to determine that $log_3 29$ is approximately 3.07)	1	Foundations of Logarithms
A1.3 make connections between related logarithmic and exponential equations (e.g., $log_5 125 = 3$ can also be expressed as $5^3 = 125$), and solve simple exponential equations by rewriting them in logarithmic form (e.g., solving $3^x = 10$ by rewriting the equation as $log_3 10 = x$)	1	Foundations of Logarithms
A1.4 make connections between the laws of exponents and the laws of logarithms [e.g., use the statement $10^{a+b} = 10^a 10^b$ to deduce that $log_{10} x + log_{10} y = log_{10}(xy)$], verify the laws of logarithms with or without technology (e.g., use patterning to verify the quotient law for logarithms by evaluating expressions such as $log_{10} 1000 - log_{10} 100$ and then rewriting the answer as a logarithmic term to the same base), and use the laws of logarithms to simplify and evaluate numerical expressions	2	Laws of Logarithms

Connecting Graphs and Equations of Logarithmic Functions		
A2.1 determine, through investigation with technology (e.g., graphing calculator, spreadsheet) and without technology, key features (i.e., vertical and horizontal asymptotes, domain and range, intercepts, increasing/decreasing behaviour) of the graphs of logarithmic functions of the form $f(x) = log_b x$, and make connections between the algebraic and graphical representations of these logarithmic functions	1	Visualizing Logarithms
A2.2 recognize the relationship between an exponential function and the corresponding logarithmic function to be that of a function and its inverse, deduce that the graph of a logarithmic function is the reflection of the graph of the corresponding exponential function in the line $y = x$, and verify the deduction using technology	1	Visualizing Logarithms
A2.3 determine, through investigation using technology, the roles of the parameters d and c in functions of the form $y = log_{10}(x - d) + c$ and the roles of the parameters a and k in functions of the form $y = a\, log_{10}(kx)$, and describe these roles in terms of transformations on the graph of $f(x) = log_{10} x$ (i.e., vertical and horizontal translations; reflections in the axes; vertical and horizontal stretches and compressions to and from the x-and y-axes)	2	Visualizing Logarithms
A2.4 pose problems based on real-world applications of exponential and logarithmic functions (e.g., exponential growth and decay, the Richter scale, the pH scale, the decibel scale), and solve these and other such problems by using a given graph or a graph generated with technology from a table of values or from its equation	1	Visualizing Logarithms
Solving Exponential and Logarithmic Equations		
A3.1 recognize equivalent algebraic expressions involving logarithms and exponents, and simplify expressions of these types	1	Solving Logarithmic Equations
A3.2 solve exponential equations in one variable by determining a common base (e.g., solve $4^x = 8^{x+3}$ by expressing each side as a power of 2) and by using logarithms (e.g., solve $4^x = 8^{x+3}$ by taking the logarithm base 2 of both sides), recognizing that logarithms base 10 are commonly used (e.g., solving $3^x = 7$ by taking the logarithm base 10 of both sides)	1	Solving Logarithmic Equations
A3.3 solve simple logarithmic equations in one variable algebraically [e.g., $log_3(5x + 6) = 2$, $log_{10}(x + 1) = 1$]	1	Solving Logarithmic Equations
A3.4 solve problems involving exponential and logarithmic equations algebraically, including problems arising from real-world applications	1	Solving Logarithmic Equations

B. Trigonometric Functions		
Understanding and Applying Radian Measure		
B1.1 recognize the radian as an alternative unit to the degree for angle measurement, define the radian measure of an angle as the length of the arc that subtends this angle at the centre of a unit circle, and develop and apply the relationship between radian and degree measure	1	Radian Measure and Trigonometric Ratios
B1.2 represent radian measure in terms of π (e.g., $\frac{\pi}{3}$ radians, 2π radians) and as a rational number (e.g., 1.05 radians, 6.28 radians)	1	Radian Measure and Trigonometric Ratios
B1.3 determine, with technology, the primary trigonometric ratios (i.e., sine, cosine, tangent) and the reciprocal trigonometric ratios (i.e., cosecant, secant, cotangent) of angles expressed in radian measure	1	Radian Measure and Trigonometric Ratios
B1.4 determine, without technology, the exact values of the primary trigonometric ratios and the reciprocal trigonometric ratios for the special angles 0, $\frac{\pi}{6}$, $\frac{\pi}{4}$, $\frac{\pi}{3}$, $\frac{\pi}{2}$, and their multiples less than or equal to 2π	1	Radian Measure and Trigonometric Ratios
Connecting Graphs and Equations of Trigonometric Functions		
B2.1 sketch the graphs of $f(x) = sin\, x$ and $f(x) = cos\, x$ for angle measures expressed in radians, and determine and describe some key properties (e.g., period of 2π, amplitude of 1) in terms of radians	1	Trigonometric Graphs and Properties
B2.2 make connections between the tangent ratio and the tangent function by using technology to graph the relationship between angles in radians and their tangent ratios and defining this relationship as the function $f(x) = tan\, x$, and describe key properties of the tangent function	1	Trigonometric Graphs and Properties
B2.3 graph, with technology and using the primary trigonometric functions, the reciprocal trigonometric functions (i.e., cosecant, secant, cotangent) for angle measures expressed in radians, determine and describe key properties of the reciprocal functions (e.g., state the domain, range, and period, and identify and explain the occurrence of asymptotes), and recognize notations used to represent the reciprocal functions [e.g., the reciprocal of $f(x) = sin\, x$ can be represented using $csc\, x$, $\frac{1}{f(x)}$, or $\frac{1}{sin\, x}$, but not using $f^{-1}(x)$ or $sin^{-1}x$, which represent the inverse function]	1	Trigonometric Graphs and Properties
B2.4 determine the amplitude, period, and phase shift of sinusoidal functions whose equations are given in the form $f(x) = a\, sin(k(x - d)) + c$ or $f(x) = a\, cos(k(x - d)) + c$, with angles expressed in radians	1	Sinusoidal Functions
B2.5 sketch graphs of $y = a\, sin(k(x - d)) + c$ and $y = a\, cos(k(x - d)) + c$ by applying transformations to the graphs of $f(x) = sin\, x$ and $f(x) = cos\, x$ with angles expressed in radians, and state the period, amplitude, and phase shift of the transformed functions	1	Sinusoidal Functions

B2.6 represent a sinusoidal function with an equation, given its graph or its properties, with angles expressed in radians	1	Sinusoidal Functions
B2.7 pose problems based on applications involving a trigonometric function with domain expressed in radians (e.g., seasonal changes in temperature, heights of tides, hours of daylight, displacements for oscillating springs), and solve these and other such problems by using a given graph or a graph generated with or without technology from a table of values or from its equation	1	Sinusoidal Functions
Solving Trigonometric Equations		
B3.1 recognize equivalent trigonometric expressions [e.g., by using the angles in a right triangle to recognize that $sin\, x$ and $cos\left(\frac{\pi}{2} - x\right)$ are equivalent; by using transformations to recognize that $cos\left(x + \frac{\pi}{2}\right)$ and $-\ sin\, x$ are equivalent], and verify equivalence using graphing technology	1	Trigonometric Identities and Equations
B3.2 explore the algebraic development of the compound angle formulas (e.g., verify the formulas in numerical examples, using technology; follow a demonstration of the algebraic development [student reproduction of the development of the general case is not required]), and use the formulas to determine exact values of trigonometric ratios [e.g., determining the exact value of $sin\left(\frac{\pi}{12}\right)$ by first rewriting it in terms of special angles as $sin\left(\frac{\pi}{4} - \frac{\pi}{6}\right)$]	1	Trigonometric Identities and Equations
B3.3 recognize that trigonometric identities are equations that are true for every value in the domain (i.e., a counter-example can be used to show that an equation is not an identity), prove trigonometric identities through the application of reasoning skills, using a variety of relationships (e.g., $tan\, x = \frac{sin\, x}{cos\, x}$; $sin^2 x + cos^2 x = 1$; the reciprocal identities; the compound angle formulas), and verify identities using technology	1	Trigonometric Identities and Equations
B3.4 solve linear and quadratic trigonometric equations, with and without graphing technology, for the domain of real values from 0 to 2π, and solve related problems	1	Trigonometric Identities and Equations
C. Polynomial and Rational Functions		
Connecting Graphs and Equations of Polynomial Functions		
C1.1 recognize a polynomial expression (i.e., a series of terms where each term is the product of a constant and a power of x with a nonnegative integral exponent, such as $x^3 - 5x^2 + 2x - 1$); recognize the equation of a polynomial function, give reasons why it is a function, and identify linear and quadratic functions as examples of polynomial functions	2	Identifying and Comparing Polynomial Functions

C1.2 compare, through investigation using graphing technology, the numeric, graphical, and algebraic representations of polynomial (i.e., linear, quadratic, cubic, quartic) functions (e.g., compare finite differences in tables of values; investigate the effect of the degree of a polynomial function on the shape of its graph and the maximum number of x-intercepts; investigate the effect of varying the sign of the leading coefficient on the end behaviour of the function for very large positive or negative x-values)	2	Identifying and Comparing Polynomial Functions
C1.3 describe key features of the graphs of polynomial functions (e.g., the domain and range, the shape of the graphs, the end behaviour of the functions for very large positive or negative x-values)	1	Identifying and Comparing Polynomial Functions
C1.4 distinguish polynomial functions from sinusoidal and exponential functions [e.g., $f(x) = \sin x,\ g(x) = 2^x$], and compare and contrast the graphs of various polynomial functions with the graphs of other types of functions	2	Differentiating and Constructing Polynomial Functions
C1.5 make connections, through investigation using graphing technology (e.g., dynamic geometry software), between a polynomial function given in factored form [e.g., $f(x) = 2(x - 3)(x + 2)(x - 1)$] and the x-intercepts of its graph, and sketch the graph of a polynomial function given in factored form using its key features (e.g., by determining intercepts and end behaviour; by locating positive and negative regions using test values between and on either side of the x-intercepts)	1	Differentiating and Constructing Polynomial Functions
C1.6 determine, through investigation using technology, the roles of the parameters a, k, d, and c in functions of the form $y = af(k(x - d)) + c$, and describe these roles in terms of transformations on the graphs of $f(x) = x^3$ and $f(x) = x^4$ (i.e., vertical and horizontal translations; reflections in the axes; vertical and horizontal stretches and compressions to and from the x-and y -axes)	1	Differentiating and Constructing Polynomial Functions
C1.7 determine an equation of a polynomial function that satisfies a given set of conditions (e.g., degree of the polynomial, intercepts, points on the function), using methods appropriate to the situation (e.g., using the x -intercepts of the function; using a trial-and-error process with a graphing calculator or graphing software; using finite differences), and recognize that there may be more than one polynomial function that can satisfy a given set of conditions (e.g., an infinite number of polynomial functions satisfy the condition that they have three given x-intercepts)	1	Differentiating and Constructing Polynomial Functions
C1.8 determine the equation of the family of polynomial functions with a given set of zeros and of the member of the family that passes through another given point [e.g., a family of polynomial functions of degree 3 with zeros $5,\ -3$, and -2 is defined by the equation $f(x) = k(x - 5)(x + 3)(x + 2)$, where k is a real number, $k \neq 0$; the member of the family that passes through $(-1, 24)$ is $f(x) = -2(x - 5)(x + 3)(x + 2)$]	1	Polynomial Function Properties

C1.9 determine, through investigation, and compare the properties of even and odd polynomial functions [e.g., symmetry about the y-axis or the origin; the power of each term; the number of x-intercepts; $f(x) = f(-x)$ or $f(-x) = -f(x)$], and determine whether a given polynomial function is even, odd, or neither	1	Polynomial Function Properties
Connecting Graphs and Equations of Rational Functions		
C2.1 determine, through investigation with and without technology, key features (i.e., vertical and horizontal asymptotes, domain and range, intercepts, positive/negative intervals, increasing/decreasing intervals) of the graphs of rational functions that are the reciprocals of linear and quadratic functions, and make connections between the algebraic and graphical representations of these rational functions [e.g., make connections between $f(x) = \frac{1}{x^2-4}$] and its graph by using graphing technology and by reasoning that there are vertical asymptotes at $x = 2$ and $x = -2$ and a horizontal asymptote at $y = 0$ and that the function maintains the same sign as $f(x) = x^2 - 4$]	1	Introduction to Rational Functions and Graphing
C2.2 determine, through investigation with and without technology, key features (i.e., vertical and horizontal asymptotes, domain and range, intercepts, positive/negative intervals, increasing/decreasing intervals) of the graphs of rational functions that have linear expressions in the numerator and denominator [e.g., $f(x) = \frac{2x}{x-3}$, $h(x) = \frac{x-2}{3x+4}$], and make connections between the algebraic and graphical representations of these rational functions	1	Introduction to Rational Functions and Graphing
C2.3 sketch the graph of a simple rational function using its key features, given the algebraic representation of the function	1	Introduction to Rational Functions and Graphing
Solving Polynomial and Rational Equations		
C3.1 make connections, through investigation using technology (e.g., computer algebra systems), between the polynomial function $f(x)$, the divisor $x - a$, the remainder from the division $\frac{f(x)}{x-a}$, and $f(a)$ to verify the remainder theorem and the factor theorem	1	Solving Polynomial Equations
C3.2 factor polynomial expressions in one variable, of degree no higher than four, by selecting and applying strategies (i.e., common factoring, difference of squares, trinomial factoring, factoring by grouping, remainder theorem, factor theorem)	1	Solving Polynomial Equations

C3.3 determine, through investigation using technology (e.g., graphing calculator, computer algebra systems), the connection between the real roots of a polynomial equation and the x-intercepts of the graph of the corresponding polynomial function, and describe this connection [e.g., the real roots of the equation $x^4 - 13x^2 + 36 = 0$ are the x-intercepts of the graph of $f(x) = x^4 - 13x^2 + 36$]	1	Solving Polynomial Equations
C3.4 solve polynomial equations in one variable, of degree no higher than four (e.g., $2x^3 - 3x^2 + 8x - 12 = 0$), by selecting and applying strategies (i.e., common factoring, difference of squares, trinomial factoring, factoring by grouping, remainder theorem, factor theorem), and verify solutions using technology (e.g., using computer algebra systems to determine the roots; using graphing technology to determine the x-intercepts of the graph of the corresponding polynomial function)	1	Solving Polynomial Equations
C3.5 determine, through investigation using technology (e.g., graphing calculator, computer algebra systems), the connection between the real roots of a rational equation and the x-intercepts of the graph of the corresponding rational function, and describe this connection [e.g., the real root of the equation $\frac{x-2}{x-3} = 0$ is 2, which is the x-intercept of the function $f(x) = \frac{x-2}{x-3}$; the equation $\frac{1}{x-3} = 0$ has no real roots, and the function $f(x) = \frac{1}{x-3}$ does not intersect the x-axis]	1	Solving Rational Equations
C3.6 solve simple rational equations in one variable algebraically, and verify solutions using technology (e.g., using computer algebra systems to determine the roots; using graphing technology to determine the x-intercepts of the graph of the corresponding rational function)	1	Solving Rational Equations
C3.7 solve problems involving applications of polynomial and simple rational functions and equations [e.g., problems involving the factor theorem or remainder theorem, such as determining the values of k for which the function $f(x) = x^3 + 6x^2 + kx - 4$ gives the same remainder when divided by $x - 1$ and $x + 2$]	1	Solving Rational Equations
Solving Inequalities		
C4.1 explain, for polynomial and simple rational functions, the difference between the solution to an equation in one variable and the solution to an inequality in one variable, and demonstrate that given solutions satisfy an inequality (e.g., demonstrate numerically and graphically that the solution to $\frac{1}{x+1} < 5$ is $x < -1$ or $x > -\frac{4}{5}$);	1	Understanding and Solving Inequalities
C4.2 determine solutions to polynomial inequalities in one variable [e.g., solve $f(x) \geq 0$, where $f(x) = x^3 - x^2 + 3x - 9$] and to simple rational inequalities in one variable by graphing the corresponding functions, using graphing technology, and identifying intervals for which x satisfies the inequalities	1	Understanding and Solving Inequalities

C4.3 solve linear inequalities and factorable polynomial inequalities in one variable (e.g., $x^3 + x^2 > 0$) in a variety of ways (e.g., by determining intervals using x-intercepts and evaluating the corresponding function for a single x -value within each interval; by factoring the polynomial and identifying the conditions for which the product satisfies the inequality), and represent the solutions on a number line or algebraically (e.g., for the inequality $x^4 - 5x^2 + 4 < 0$, the solution represented algebraically is $-2 < x < -1$ or $1 < x < 2$)	2	Understanding and Solving Inequalities
D. Characteristics of Functions		
Understanding Rates of Change		
D1.1 gather, interpret, and describe information about real-world applications of rates of change, and recognize different ways of representing rates of change (e.g., in words, numerically, graphically, algebraically)	1	Foundations of Rates of Change
D1.2 recognize that the rate of change for a function is a comparison of changes in the dependent variable to changes in the independent variable, and distinguish situations in which the rate of change is zero, constant, or changing by examining applications, including those arising from real-world situations (e.g., rate of change of the area of a circle as the radius increases, inflation rates, the rising trend in graduation rates among Aboriginal youth, speed of a cruising aircraft, speed of a cyclist climbing a hill, infection rates)	1	Foundations of Rates of Change
D1.3 sketch a graph that represents a relationship involving rate of change, as described in words, and verify with technology (e.g., motion sensor) when possible	1	Foundations of Rates of Change
D1.4 calculate and interpret average rates of change of functions (e.g., linear, quadratic, exponential, sinusoidal) arising from real-world applications (e.g., in the natural, physical, and social sciences), given various representations of the functions (e.g., tables of values, graphs, equations)	1	Foundations of Rates of Change
D1.5 recognize examples of instantaneous rates of change arising from real-world situations, and make connections between instantaneous rates of change and average rates of change (e.g., an average rate of change can be used to approximate an instantaneous rate of change)	1	Foundations of Rates of Change
D1.6 determine, through investigation using various representations of relationships (e.g., tables of values, graphs, equations), approximate instantaneous rates of change arising from real-world applications (e.g., in the natural, physical, and social sciences) by using average rates of change and reducing the interval over which the average rate of change is determined	1	Instantaneous Rates of Change

D1.7 make connections, through investigation, between the slope of a secant on the graph of a function (e.g., quadratic, exponential, sinusoidal) and the average rate of change of the function over an interval, and between the slope of the tangent to a point on the graph of a function and the instantaneous rate of change of the function at that point	1	Instantaneous Rates of Change
D1.8 determine, through investigation using a variety of tools and strategies (e.g., using a table of values to calculate slopes of secants or graphing secants and measuring their slopes with technology), the approximate slope of the tangent to a given point on the graph of a function (e.g., quadratic, exponential, sinusoidal) by using the slopes of secants through the given point (e.g., investigating the slopes of secants that approach the tangent at that point more and more closely), and make connections to average and instantaneous rates of change	1	Instantaneous Rates of Change
D1.9 solve problems involving average and instantaneous rates of change, including problems arising from real-world applications, by using numerical and graphical methods (e.g., by using graphing technology to graph a tangent and measure its slope)	1	Instantaneous Rates of Change
Combining Functions		
D2.1 determine, through investigation using graphing technology, key features (e.g., domain, range, maximum/minimum points, number of zeros) of the graphs of functions created by adding, subtracting, multiplying, or dividing functions [e.g., $f(x) = 2^{-x}sin\,4x,\ g(x) = x^2 + 2^x,\ h(x) = \frac{sin\,x}{cos\,x}$], and describe factors that affect these properties	1	Combining Functions with Basic Operations
D2.2 recognize real-world applications of combinations of functions (e.g., the motion of a damped pendulum can be represented by a function that is the product of a trigonometric function and an exponential function; the frequencies of tones associated with the numbers on a telephone involve the addition of two trigonometric functions), and solve related problems graphically	1	Combining Functions with Basic Operations
D2.3 determine, through investigation, and explain some properties (i.e., odd, even, or neither; increasing/decreasing behaviours) of functions formed by adding, subtracting, multiplying, and dividing general functions [e.g., $f(x) + g(x),\ f(x)g(x)$]	1	Combining Functions with Basic Operations
D2.4 determine the composition of two functions [i.e., $f(g(x))$] numerically (i.e., by using a table of values) and graphically, with technology, for functions represented in a variety of ways (e.g., function machines, graphs, equations), and interpret the composition of two functions in real-world applications	1	Composition of Functions

D2.5 determine algebraically the composition of two functions [i.e., $f(g(x))$], verify that $f(g(x))$ is not always equal to $g(f(x))$ [e.g., by determining $f(g(x))$ and $g(f(x))$, given $f(x) = x + 1$ and $g(x) = 2x$], and state the domain [i.e., by defining $f(g(x))$ for those x-values for which $g(x)$ is defined and for which it is included in the domain of $f(x)$] and the range of the composition of two functions	1	Composition of Functions
D2.6 solve problems involving the composition of two functions, including problems arising from real-world applications	1	Composition of Functions
D2.7 demonstrate, by giving examples for functions represented in a variety of ways (e.g., function machines, graphs, equations), the property that the composition of a function and its inverse function maps a number onto itself [i.e., $f^{-1}(f(x)) = x$ and $f(f^{-1}(x)) = x$ demonstrate that the inverse function is the reverse process of the original function and that it undoes what the function does]	1	Composition of Functions
D2.8 make connections, through investigation using technology, between transformations (i.e., vertical and horizontal translations; reflections in the axes; vertical and horizontal stretches and compressions to and from the x-and y-axes) of simple functions $f(x)$ [e.g., $f(x) = x^3 + 20$, $f(x) = \sin x$, $f(x) = \log x$] and the composition of these functions with a linear function of the form $g(x) = A(x + B)$	1	Composition of Functions
Using Function Models to Solve Problems		
D3.1 compare, through investigation using a variety of tools and strategies (e.g., graphing with technology; comparing algebraic representations; comparing finite differences in tables of values) the characteristics (e.g., key features of the graphs, forms of the equations) of various functions (i.e., polynomial, rational, trigonometric, exponential, logarithmic)	1	Problem Solving with Function Models
D3.2 solve graphically and numerically equations and inequalities whose solutions are not accessible by standard algebraic techniques	1	Problem Solving with Function Models
D3.3 solve problems, using a variety of tools and strategies, including problems arising from real-world applications, by reasoning with functions and by applying concepts and procedures involving functions (e.g., by constructing a function model from data, using the model to determine mathematical results, and interpreting and communicating the results within the context of the problem)	1	Problem Solving with Function Models

Education Perfect
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Grades 12 Ontario Curriculum Alignment

This document outlines how our platform's content and questions sets are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all courses and fostering key mathematical processes to support student success.

This alignment document shows the content scheduled to be released throughout the 2025-2026 school year.

Education Perfect Mathematics MCV4U Calculus and Vectors, University Preparation		
Expectations	Number of Question Sets	Topic
A. Rate of Change		
Investigating Instantaneous Rate of Change at a Point		
A1.1 describe examples of real-world applications of rates of change, represented in a variety of ways (e.g., in words, numerically, graphically, algebraically)	1	Understanding Rates of Change and Limits
A1.2 describe connections between the average rate of change of a function that is smooth (i.e., continuous with no corners) over an interval and the slope of the corresponding secant, and between the instantaneous rate of change of a smooth function at a point and the slope of the tangent at that point	2	Understanding Rates of Change and Limits
A1.3 make connections, with or without graphing technology, between an approximate value of the instantaneous rate of change at a given point on the graph of a smooth function and average rates of change over intervals containing the point (i.e., by using secants through the given point on a smooth curve to approach the tangent at that point, and determining the slopes of the approaching secants to approximate the slope of the tangent)	1	Understanding Rates of Change and Limits
A1.4 recognize, through investigation with or without technology, graphical and numerical examples of limits, and explain the reasoning involved (e.g., the value of a function approaching an asymptote, the value of the ratio of successive terms in the Fibonacci sequence)	1	Understanding Rates of Change and Limits
	1	Calculating Limits and the First Principles of Derivatives

A1.5 make connections, for a function that is smooth over the interval $a \leq x \leq a + h$, between the average rate of change of the function over this interval and the value of the expression $\frac{f(a+h)-f(a)}{h}$, and between the instantaneous rate of change of the function at $x = a$ and the value of the limit $\lim_{h \to 0} \frac{f(a+h)-f(a)}{h}$	3	Calculating Limits and the First Principles of Derivatives
A1.6 compare, through investigation, the calculation of instantaneous rates of change at a point $(a, f(a))$ for polynomial functions [e.g., $f(x) = x^2$, $f(x) = x^3$], with and without simplifying the expression $\frac{f(a+h)-f(a)}{h}$ before substituting values of h that approach zero [e.g., for $f(x) = x^2$ at $x = 3$, by determining $\frac{f(3+1)-f(3)}{1} = 7$, $\frac{f(3+0.1)-f(3)}{0.1} = 6.1$, $\frac{f(3+0.001)-f(3)}{0.01} = 6.01$, and $\frac{f(3+0.001)-f(3)}{0.001} = 6.001$, and by first simplifying $\frac{f(3+h)-f(3)}{h}$ as $\frac{(3+h)^2-3^2}{h} = 6 + h$ and then substituting the same values of h to give the same results]	1	Calculating Limits and the First Principles of Derivatives
Investigating the Concept of the Derivative Function		
A2.1 determine numerically and graphically the intervals over which the instantaneous rate of change is positive, negative, or zero for a function that is smooth over these intervals (e.g., by using graphing technology to examine the table of values and the slopes of tangents for a function whose equation is given; by examining a given graph), and describe the behaviour of the instantaneous rate of change at and between local maxima and minima	1	The Graphical Nature of the Derivative
A2.2 generate, through investigation using technology, a table of values showing the instantaneous rate of change of a polynomial function, $f(x)$, for various values of x (e.g., construct a tangent to the function, measure its slope, and create a slider or animation to move the point of tangency), graph the ordered pairs, recognize that the graph represents a function called the derivative, $f'(x)$ or $\frac{dy}{dx}$, and make connections between the graphs of $f(x)$ and $f'(x)$ or y and $\frac{dy}{dx}$ [e.g., when $f(x)$ is linear, $f'(x)$ is constant; when $f(x)$ is quadratic, $f'(x)$ is linear; when $f(x)$ is cubic, $f'(x)$ is quadratic]	2	The Graphical Nature of the Derivative
A2.3 determine the derivatives of polynomial functions by simplifying the algebraic expression $\frac{f(x+h)-f(x)}{h}$ and then taking the limit of the simplified expression as h approaches zero [i.e., determining $\lim_{h \to 0} \frac{f(x+h)-f(x)}{h}$]	1	Derivatives of Polynomial and Trigonometric Functions

A2.4 determine, through investigation using technology, the graph of the derivative $f'(x)$ or $\frac{dy}{dx}$ of a given sinusoidal function [i.e., $f(x) = \sin x,\ f(x) = \cos x$] (e.g., by generating a table of values showing the instantaneous rate of change of the function for various values of x and graphing the ordered pairs; by using dynamic geometry software to verify graphically that when $f(x) = \sin x,\ f'(x) = \cos x$, and when $f(x) = \cos x,\ f'(x) = -\sin x$; by using a motion sensor to compare the displacement and velocity of a pendulum)	2	Derivatives of Polynomial and Trigonometric Functions
A2.5 determine, through investigation using technology, the graph of the derivative $f'(x)$ or $\frac{dy}{dx}$ of a given exponential function [i.e., $f(x) = a^x (a > 0,\ a \neq 1)$] [e.g., by generating a table of values showing the instantaneous rate of change of the function for various values of x and graphing the ordered pairs; by using dynamic geometry software to verify that when $f(x) = a^x,\ f'(x) = kf(x)$] and make connections between the graphs of $f(x)$ and $f'(x)$ or y and $\frac{dy}{dx}$ [e.g., $f(x)$ and $f'(x)$ are both exponential; the ratio $\frac{f'(x)}{f(x)}$ is constant, or $f'(x) = kf(x)$; $f'(x)$ is a vertical stretch from the x-axis of $f(x)$]	1	Derivatives of Exponential and Logarithmic Functions
A2.6 determine, through investigation using technology, the exponential function $f(x) = a^x (a > 0,\ a \neq 1)$ for which $f'(x) = f(x)$ (e.g., by using graphing technology to create a slider that varies the value of a in order to determine the exponential function whose graph is the same as the graph of its derivative), identify the number e to be the value of a for which $f'(x) = f(x)$ [i.e., given $f(x) = e^x,\ f'(x) = e^x$], and recognize that for the exponential function $f(x) = e^x$ the slope of the tangent at any point on the function is equal to the value of the function at that point	1	Derivatives of Exponential and Logarithmic Functions
A2.7 recognize that the natural logarithmic function $f(x) = \log_e x$, also written as $f(x) = \ln x$, is the inverse of the exponential function $f(x) = e^x$ and make connections between $f(x) = \ln x$ and $f(x) = e^x$ [e.g., $f(x) = \ln x$ reverses what $f(x) = e^x$ does; their graphs are reflections of each other in the line $y = x$; the composition of the two functions, $e^{\ln x}$ or $\ln e^x$, maps x onto itself, that is, $e^{\ln x} = x$ and $\ln e^x = x$]	2	Derivatives of Exponential and Logarithmic Functions

A2.8 verify, using technology (e.g., calculator, graphing technology), that the derivative of the exponential function $f(x) = a^x$ is $f'(x) = a^x \ln a$ for various values of a [e.g., verifying numerically for $f(x) = 2^x$ that $f'(x) = 2^x \ln 2$ by using a calculator to show that $\lim_{h \to 0} \frac{(2^h - 1)}{h}$ is $\ln 2$ or by graphing $f(x) = 2^x$, determining the value of the slope and the value of the function for specific x-values, and comparing the ratio $\frac{f'(x)}{f(x)}$ with $\ln 2$]	1	Derivatives of Exponential and Logarithmic Functions
Investigating the Properties of Derivatives		
A3.1 verify the power rule for functions of the form $f(x) = x^n$, where n is a natural number [e.g., by determining the equations of the derivatives of the functions $f(x) = x$, $f(x) = x^2$, $f(x) = x^3$, and $f(x) = x^4$ algebraically using $\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ and graphically using slopes of tangents]	1	Verifying and Applying Basic Derivative Rules
A3.2 verify the constant, constant multiple, sum, and difference rules graphically and numerically [e.g., by using the function $g(x) = kf(x)$ and comparing the graphs of $g'(x)$ and $kf'(x)$; by using a table of values to verify that $f'(x) + g'(x) = (f + g)'(x)$, given $f(x) = x$ and $g(x) = 3x$] and read and interpret proofs involving $\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ of the constant, constant multiple, sum, and difference rules (student reproduction of the development of the general case is not required)	1	Verifying and Applying Basic Derivative Rules
A3.3 determine algebraically the derivatives of polynomial functions, and use these derivatives to determine the instantaneous rate of change at a point and to determine point(s) at which a given rate of change occurs	1	Verifying and Applying Basic Derivative Rules
A3.4 verify that the power rule applies to functions of the form $f(x) = x^n$, where n is a rational number [e.g., by comparing values of the slopes of tangents to the function $f(x) = x^{\frac{1}{2}}$ with values of the derivative function determined using the power rule, and verify algebraically the chain rule using monomial functions [e.g., by determining the same derivative for $f(x) = \left(5x^3\right)^{\frac{1}{3}}$ by using the chain rule and by differentiating the simplified form, $f(x) = 5^{\frac{1}{3}}x$] and the product rule using polynomial functions [e.g., by determining the same derivative for $f(x) = (3x + 2)(2x^2 - 1)$ by using the product rule and by differentiating the expanded form $f(x) = 6x^3 + 4x^2 - 3x - 2$]	1	Verifying and Applying Basic Derivative Rules

A3.5 solve problems, using the product and chain rules, involving the derivatives of polynomial functions, sinusoidal functions, exponential functions, rational functions [e.g., by expressing $f(x) = \frac{x^2+1}{x-1}$ as the product $f(x) = (x^2 + 1)(x - 1)^{-1}$, radical functions [e.g., by expressing $f(x) = \sqrt{x^2 + 5}$ as the power $f(x) = (x^2 + 5)^{\frac{1}{2}}$], and other simple combinations of functions [e.g., $f(x) = x \sin x$, $f(x) = \frac{\sin x}{\cos x}$]	3	A3 Derivatives of Combined Functions
B. Derivatives and Their Applications		
Connecting Graphs and Equations of Functions and Their Derivatives		
B1.1 sketch the graph of a derivative function, given the graph of a function that is continuous over an interval, and recognize points of inflection of the given function (i.e., points at which the concavity changes)	1	Analyzing Graphical Behaviour
B1.2 recognize the second derivative as the rate of change of the rate of change (i.e., the rate of change of the slope of the tangent), and sketch the graphs of the first and second derivatives, given the graph of a smooth function	1	Analyzing Graphical Behaviour
B1.3 determine algebraically the equation of the second derivative $f''(x)$ of a polynomial or simple rational function $f(x)$ and make connections, through investigation using technology, between the key features of the graph of the function (e.g., increasing/decreasing intervals, local maxima and minima, points of inflection, intervals of concavity) and corresponding features of the graphs of its first and second derivatives (e.g., for an increasing interval of the function, the first derivative is positive; for a point of inflection of the function, the slopes of tangents change their behaviour from increasing to decreasing or from decreasing to increasing, the first derivative has a maximum or minimum, and the second derivative is zero)	1	Analyzing Graphical Behaviour
B1.4 describe key features of a polynomial function, given information about its first and/or second derivatives (e.g., the graph of a derivative, the sign of a derivative over specific intervals, the x -intercepts of a derivative), sketch two or more possible graphs of the function that are consistent with the given information, and explain why an infinite number of graphs is possible	2	Curve Sketching and Extrema
B1.5 sketch the graph of a polynomial function, given its equation, by using a variety of strategies (e.g., using the sign of the first derivative; using the sign of the second derivative; identifying even or odd functions) to determine its key features (e.g., increasing/decreasing intervals, intercepts, local maxima and minima, points of inflection, intervals of concavity), and verify using technology	1	Curve Sketching and Extrema

Solving Problems Using Mathematical Models and Derivatives		
B2.1 make connections between the concept of motion (i.e., displacement, velocity, acceleration) and the concept of the derivative in a variety of ways (e.g., verbally, numerically, graphically, algebraically)	1	Applications and Modelling with Derivatives
B2.2 make connections between the graphical or algebraic representations of derivatives and real-world applications (e.g., population and rates of population change, prices and inflation rates, volume and rates of flow, height and growth rates).	1	Applications and Modelling with Derivatives
B2.3 solve problems, using the derivative, that involve instantaneous rates of change, including problems arising from real-world applications (e.g., population growth, radioactive decay, temperature changes, hours of daylight, heights of tides), given the equation of a function* **The emphasis of this expectation is on the application of the derivative rules and not on the simplification of resulting complex algebraic expressions.*	1	Applications and Modelling with Derivatives
B2.4 solve optimization problems involving polynomial, simple rational, and exponential functions drawn from a variety of applications, including those arising from real-world situations	1	Applications and Modelling with Derivatives
B2.5 solve problems arising from real-world applications by applying a mathematical model and the concepts and procedures associated with the derivative to determine mathematical results, and interpret and communicate the results	1	Applications and Modelling with Derivatives
C. Geometry and Algebra of Vectors		
Representing Vectors Geometrically and Algebraically		
C1.1 recognize a vector as a quantity with both magnitude and direction, and identify, gather, and interpret information about real-world applications of vectors (e.g., displacement, forces involved in structural design, simple animation of computer graphics, velocity determined using GPS)	1	Introduction to Vectors
C1.2 represent a vector in two-space geometrically as a directed line segment, with directions expressed in different ways (e.g., 320°; N 40° W), and algebraically (e.g., using Cartesian coordinates; using polar coordinates), and recognize vectors with the same magnitude and direction but different positions as equal vectors	1	Introduction to Vectors

C1.3 determine, using trigonometric relationships [e.g., $x = r\,cos\theta$, $y = r\,sin\theta$, $\theta = tan^{-1}\left(\frac{y}{x}\right)$ or $tan^{-1}\left(\frac{y}{x}\right)+180°$, $r = \sqrt{x^2 + y^2}$], the Cartesian representation of a vector in two-space given as a directed line segment, or the representation as a directed line segment of a vector in two-space given in Cartesian form [e.g., representing the vector (8, 6) as a directed line segment]	1	Introduction to Vectors
C1.4 recognize that points and vectors in three-space can both be represented using Cartesian coordinates, and determine the distance between two points and the magnitude of a vector using their Cartesian representations	2	Introduction to Vectors
Operating with Vectors		
C2.1 perform the operations of addition, subtraction, and scalar multiplication on vectors represented as directed line segments in two-space, and on vectors represented in Cartesian form in two-space and three-space	4	Fundamentals of Vector Operations
C2.2 determine, through investigation with and without technology, some properties (e.g., commutative, associative, and distributive properties) of the operations of addition, subtraction, and scalar multiplication of vectors	2	Vector Properties
C2.3 solve problems involving the addition, subtraction, and scalar multiplication of vectors, including problems arising from real-world applications	3	Applications of Vector Operations
C2.4 perform the operation of dot product on two vectors represented as directed line segments (i.e., using $\vec{a} \bullet \vec{b} = \lvert\vec{a}\rvert\lvert\vec{b}\rvert\,cos\theta$) and in Cartesian form (i.e., using $\vec{a} \bullet \vec{b} = a_1b_1 + a_2b_2$ or $\vec{a} \bullet \vec{b} = a_1b_1 + a_2b_2 + a_3b_3$) in two-space and three-space, and describe applications of the dot product (e.g., determining the angle between two vectors; determining the projection of one vector onto another)	2	The Dot Product
C2.5 determine, through investigation, properties of the dot product (e.g., investigate whether it is commutative, distributive, or associative; investigate the dot product of a vector with itself and the dot product of orthogonal vectors)	1	The Dot Product

C2.6 perform the operation of cross product on two vectors represented in Cartesian form in three-space [i.e., using $a \rightarrow \times b \rightarrow = (a_2b_3 - a_3b_2,\ a_3b_1 - a_1b_3,\ a_1b_2 - a_2b_1)$], determine the magnitude of the cross product (i.e., using $\lvert a \rightarrow \times b \rightarrow \rvert = \lvert a \rightarrow \rvert \lvert b \rightarrow \rvert sin\theta$), and describe applications of the cross product (e.g., determining a vector orthogonal to two given vectors; determining the turning effect [or torque] when a force is applied to a wrench at different angles)	1	The Cross Product
C2.7 determine, through investigation, properties of the cross product (e.g., investigate whether it is commutative, distributive, or associative; investigate the cross product of collinear vectors)	1	The Cross Product
C2.8 solve problems involving dot product and cross product (e.g., determining projections, the area of a parallelogram, the volume of a parallelepiped), including problems arising from real-world applications (e.g., determining work, torque, ground speed, velocity, force)	3	Applications of the Dot and Cross Product
Describing Lines and Planes using Scalar, Vector, and Parametric Equations		
C3.1 recognize that the solution points (x, y) in two-space of a single linear equation in two variables form a line and that the solution points (x, y) in two-space of a system of two linear equations in two variables determine the point of intersection of two lines, if the lines are not coincident or parallel	1	Algebraic and Geometric Representations in R^3
C3.2 determine, through investigation with technology (i.e., 3-D graphing software) and without technology, that the solution points (x, y, z) in three-space of a single linear equation in three variables form a plane and that the solution points (x, y, z) in three-space of a system of two linear equations in three variables form the line of intersection of two planes, if the planes are not coincident or parallel	2	Algebraic and Geometric Representations in R^3
	1	Intersections of Lines and Planes
C3.3 determine, through investigation using a variety of tools and strategies (e.g., modelling with cardboard sheets and drinking straws; sketching on isometric graph paper), different geometric configurations of combinations of up to three lines and/or planes in three-space (e.g., two skew lines, three parallel planes, two intersecting planes, an intersecting line and plane); organize the configurations based on whether they intersect and, if so, how they intersect (i.e., in a point, in a line, in a plane)	2	Intersections of Lines and Planes

Describing Lines and Planes using Scalar, Vector, and Parametric Equations		
C4.1 recognize a scalar equation for a line in two-space to be an equation of the form $Ax + By + C = 0$, represent a line in two-space using a vector equation (i.e., $r \rightarrow = r_0 \rightarrow + tm \rightarrow$) and parametric equations, and make connections between a scalar equation, a vector equation, and parametric equations of a line in two-space	3	Equations of Lines in R^2
C4.2 recognize that a line in three-space cannot be represented by a scalar equation, and represent a line in three-space using the scalar equations of two intersecting planes and using vector and parametric equations (e.g., given a direction vector and a point on the line, or given two points on the line)	3	Equations of Lines in R^3
C4.3 recognize a normal to a plane geometrically (i.e., as a vector perpendicular to the plane) and algebraically [e.g., one normal to the plane $3x + 5y - 2z = 6$ is $(3, 5, -2)$], and determine, through investigation, some geometric properties of the plane (e.g., the direction of any normal to a plane is constant; all scalar multiples of a normal to a plane are also normals to that plane; three non-collinear points determine a plane; the resultant, or sum, of any two vectors in a plane also lies in the plane)	1	Equations of Planes in R^3
C4.4 recognize a scalar equation for a plane in three-space to be an equation of the form $Ax + By + Cz + D = 0$ whose solution points make up the plane, determine the intersection of three planes represented using scalar equations by solving a system of three linear equations in three unknowns algebraically (e.g., by using elimination or substitution), and make connections between the algebraic solution and the geometric configuration of the three planes	2	Applications of Lines and Planes in R^3
C4.5 determine, using properties of a plane, the scalar, vector, and parametric equations of a plane	2	Equations of Planes in R^3
C4.6 determine the equation of a plane in its scalar, vector, or parametric form, given another of these forms	1	Equations of Planes in R^3
C4.7 solve problems relating to lines and planes in three-space that are represented in a variety of ways (e.g., scalar, vector, parametric equations) and involving distances (e.g., between a point and a plane; between two skew lines) or intersections (e.g., of two lines, of a line and a plane), and interpret the result geometrically	2	Applications of Lines and Planes in R^3

Education Perfect
Mathematics | MDM4U
Grades 12 Ontario Curriculum Alignment

This document outlines how our platform's content and questions sets are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all courses and fostering key mathematical processes to support student success.

This alignment document shows the content scheduled to be released throughout the 2025-2026 school year.

Education Perfect Mathematics MDM4U Mathematics of Data Management, University Preparation		
Expectations	Number of Question Sets	Topic
A. Counting and Probability		
Solving Probability Problems Involving Discrete Sample Spaces		
A1.1 recognize and describe how probabilities are used to represent the likelihood of a result of an experiment (e.g., spinning spinners; drawing blocks from a bag that contains different-coloured blocks; playing a game with number cubes; playing Aboriginal stick-and-stone games) and the likelihood of a real-world event (e.g., that it will rain tomorrow, that an accident will occur, that a product will be defective)	1	Foundations of Probability
A1.2 describe a sample space as a set that contains all possible outcomes of an experiment, and distinguish between a discrete sample space as one whose outcomes can be counted (e.g., all possible outcomes of drawing a card or tossing a coin) and a continuous sample space as one whose outcomes can be measured (e.g., all possible outcomes of the time it takes to complete a task or the maximum distance a ball can be thrown)	1	Foundations of Probability
A1.3 determine the theoretical probability, P_i (i.e., a value from 0 to 1), of each outcome of a discrete sample space (e.g., in situations in which all outcomes are equally likely), recognize that the sum of the probabilities of the outcomes is 1 (i.e., for n outcomes, $P_1 + P_2 + P_3 + ... + P_n = 1$) recognize that the probabilities P_i form the probability distribution associated with the sample space, and solve related problems	2	Foundations of Probability

A1.4 determine, through investigation using class-generated data and technology-based simulation models (e.g., using a random-number generator on a spreadsheet or on a graphing calculator; using dynamic statistical software to simulate repeated trials in an experiment), the tendency of experimental probability to approach theoretical probability as the number of trials in an experiment increases (e.g., "If I simulate tossing two coins 1000 times using technology, the experimental probability that I calculate for getting two tails on the two tosses is likely to be closer to the theoretical probability of $\frac{1}{4}$ than if I simulate tossing the coins only 10 times")	1	Foundations of Probability
A1.5 recognize and describe an event as a set of outcomes and as a subset of a sample space, determine the complement of an event, determine whether two or more events are mutually exclusive or non-mutually exclusive (e.g., the events of getting an even number or getting an odd number of heads from tossing a coin 5 times are mutually exclusive), and solve related probability problems [e.g., calculate $P(\sim A),\ P(A \text{ and } B),\ P(A \text{ or } B)$] using a variety of strategies (e.g., Venn diagrams, lists, formulas)	2	Relationships Between Events
A1.6 determine whether two events are independent or dependent and whether one event is conditional on another event, and solve related probability problems [e.g., calculate $P(A \text{ and } B),\ P(A \text{ or } B),\ P(A \text{ given } B)$] using a variety of strategies (e.g., tree diagrams, lists, formulas)	3	Relationships Between Events
Solving Problems Using Counting Principles		
A2.1 recognize the use of permutations and combinations as counting techniques with advantages over other counting techniques (e.g., making a list; using a tree diagram; making a chart; drawing a Venn diagram), distinguish between situations that involve the use of permutations and those that involve the use of combinations (e.g., by considering whether or not order matters), and make connections between, and calculate, permutations and combinations	2	The Fundamental Counting Principle
A2.2 solve simple problems using techniques for counting permutations and combinations, where all objects are distinct, and express the solutions using standard combinatorial notation [e.g., $n!,\ P(n,\ r), \binom{n}{r}$]	3	The Fundamental Counting Principle
A2.3 solve introductory counting problems involving the additive counting principle (e.g., determining the number of ways of selecting 2 boys *or* 2 girls from a group of 4 boys and 5 girls) and the multiplicative counting principle (e.g., determining the number of ways of selecting 2 boys *and* 2 girls from a group of 4 boys and 5 girls)	2	Counting Applications
A2.4 make connections, through investigation, between combinations (i.e., n choose r) and Pascal's triangle [e.g., between $\binom{2}{r}$ and row 3 of Pascal's triangle, between $\binom{n}{2}$ and diagonal 3 of Pascal's triangle]	2	Counting Applications
A2.5 solve probability problems using counting principles for situations involving equally likely outcomes	1	Counting Applications

B. Probability Distributions		
Understanding Probability Distributions for Discrete Random Variables		
B1.1 recognize and identify a discrete random variable X (i.e., a variable that assumes a unique value for each outcome of a discrete sample space, such as the value x for the outcome of getting x heads in 10 tosses of a coin), generate a probability distribution [i.e., a function that maps each value x of a random variable X to a corresponding probability, $P(X = x)$] by calculating the probabilities associated with all values of a random variable, with and without technology, and represent a probability distribution numerically using a table	1	Foundations of Discrete Distributions
B1.2 calculate the expected value for a given probability distribution [i.e., using $E(X) = \sum xP(X = x)$], interpret the expected value in applications, and make connections between the expected value and the weighted mean of the values of the discrete random variable	1	Foundations of Discrete Distributions
B1.3 represent a probability distribution graphically using a probability histogram (i.e., a histogram on which each rectangle has a base of width 1, centred on the value of the discrete random variable, and a height equal to the probability associated with the value of the random variable), and make connections between the frequency histogram and the probability histogram (e.g., by comparing their shapes)	1	Foundations of Discrete Distributions
B1.4 recognize conditions (e.g., independent trials) that give rise to a random variable that follows a binomial probability distribution, calculate the probability associated with each value of the random variable, represent the distribution numerically using a table and graphically using a probability histogram, and make connections to the algebraic representation $P(X = x) = \binom{n}{x} p^x (1 - p)^{n-x}$	2	Binomial and Hypergeometric Distributions
B1.5 recognize conditions (e.g., dependent trials) that give rise to a random variable that follows a hypergeometric probability distribution, calculate the probability associated with each value of the random variable (e.g., by using a tree diagram; by using combinations), and represent the distribution numerically using a table and graphically using a probability histogram	1	Binomial and Hypergeometric Distributions
B1.6 compare, with technology and using numeric and graphical representations, the probability distributions of discrete random variables (e.g., compare binomial distributions with the same probability of success for increasing numbers of trials; compare the shapes of a hypergeometric distribution and a binomial distribution)	1	Binomial and Hypergeometric Distributions
B1.7 solve problems involving probability distributions (e.g., uniform, binomial, hypergeometric), including problems arising from real-world applications	1	Binomial and Hypergeometric Distributions

Understanding Probability Distributions for Continuous Random Variables		
B2.1 recognize and identify a continuous random variable (i.e., a variable that assumes values from the infinite number of possible outcomes in a continuous sample space), and distinguish between situations that give rise to discrete frequency distributions (e.g., counting the number of outcomes for drawing a card or tossing three coins) and situations that give rise to continuous frequency distributions (e.g., measuring the time taken to complete a task or the maximum distance a ball can be thrown)	1	Introduction to Continuous Distributions
B2.2 recognize standard deviation as a measure of the spread of a distribution, and determine, with and without technology, the mean and standard deviation of a sample of values of a continuous random variable	1	Introduction to Continuous Distributions
B2.3 describe challenges associated with determining a continuous frequency distribution (e.g., the inability to capture all values of the variable, resulting in a need to sample; uncertainties in measured values of the variable), and recognize the need for mathematical models to represent continuous frequency distributions	1	Introduction to Continuous Distributions
B2.4 represent, using intervals, a sample of values of a continuous random variable numerically using a frequency table and graphically using a frequency histogram and a frequency polygon, recognize that the frequency polygon approximates the frequency distribution, and determine, through investigation using technology (e.g., dynamic statistical software, graphing calculator), and compare the effectiveness of the frequency polygon as an approximation of the frequency distribution for different sizes of the intervals	1	Introduction to Continuous Distributions
B2.5 recognize that theoretical probability for a continuous random variable is determined over a range of values (e.g., the probability that the life of a lightbulb is between 90 hours and 115 hours), that the probability that a continuous random variable takes any single value is zero, and that the probabilities of ranges of values form the probability distribution associated with the random variable	1	Introduction to Continuous Distributions
B2.6 recognize that the normal distribution is commonly used to model the frequency and probability distributions of continuous random variables, describe some properties of the normal distribution (e.g., the curve has a central peak; the curve is symmetric about the mean; the mean and median are equal; approximately 68% of the data values are within one standard deviation of the mean and approximately 95% of the data values are within two standard deviations of the mean), and recognize and describe situations that can be modelled using the normal distribution (e.g., birth weights of males or of females, household incomes in a neighbourhood, baseball batting averages)	1	Normal Distribution

B2.7 make connections, through investigation using dynamic statistical software, between the normal distribution and the binomial and hypergeometric distributions for increasing numbers of trials of the discrete distributions (e.g., recognizing that the shape of the hypergeometric distribution of the number of males on a 4-person committee selected from a group of people more closely resembles the shape of a normal distribution as the size of the group from which the committee was drawn increases)	1	Normal Distribution
B2.8 recognize a z-score as the positive or negative number of standard deviations from the mean to a value of the continuous random variable, and solve probability problems involving normal distributions using a variety of tools and strategies (e.g., calculating a z-score and reading a probability from a table; using technology to determine a probability), including problems arising from real-world applications	2	Normal Distribution
C. Organization of Data for Analysis		
Understanding Data Concepts		
C1.1 recognize and describe the role of data in statistical studies (e.g., the use of statistical techniques to extract or mine knowledge of relationships from data), describe examples of applications of statistical studies (e.g., in medical research, political decision making, market research), and recognize that conclusions drawn from statistical studies of the same relationship may differ (e.g., conclusions about the effect of increasing jail sentences on crime rates)	1	Foundations of Data
C1.2 recognize and explain reasons why variability is inherent in data (e.g., arising from limited accuracy in measurement or from variations in the conditions of an experiment; arising from differences in samples in a survey), and distinguish between situations that involve one variable and situations that involve more than one variable	1	Foundations of Data
C1.3 distinguish different types of statistical data (i.e., discrete from continuous, qualitative from quantitative, categorical from numerical, nominal from ordinal, primary from secondary, experimental from observational, microdata from aggregate data) and give examples (e.g., distinguish experimental data used to compare the effectiveness of medical treatments from observational data used to examine the relationship between obesity and type 2 diabetes or between ethnicity and type 2 diabetes)	2	Foundations of Data
Collecting and Organizing Data		
C2.1 determine and describe principles of primary data collection (e.g., the need for randomization, replication, and control in experimental studies; the need for randomization in sample surveys) and criteria that should be considered in order to collect reliable primary data (e.g., the appropriateness of survey questions; potential sources of bias; sample size)	1	Principles of Data Collection

C2.2 explain the distinction between the terms *population* and *sample*, describe the characteristics of a good sample, explain why sampling is necessary (e.g., time, cost, or physical constraints), and describe and compare some sampling techniques (e.g., simple random, systematic, stratified, convenience, voluntary)	1	Principles of Data Collection
C2.3 describe how the use of random samples with a bias (e.g., response bias, measurement bias, non-response bias, sampling bias) or the use of non-random samples can affect the results of a study	1	Principles of Data Collection
C2.4 describe characteristics of an effective survey (e.g., by giving consideration to ethics, privacy, the need for honest responses, and possible sources of bias, including cultural bias), and design questionnaires (e.g., for determining if there is a relationship between a person's age and their hours per week of Internet use, between marks and hours of study, or between income and years of education) or experiments (e.g., growth of plants under different conditions) for gathering data	1	Principles of Data Collection
C2.5 collect data from primary sources, through experimentation, or from secondary sources (e.g., by using the Internet to access reliable data from a well-organized database such as E-STAT; by using print sources such as newspapers and magazines), and organize data with one or more attributes (e.g., organize data about a music collection classified by artist, date of recording, and type of music using dynamic statistical software or a spreadsheet) to answer a question or solve a problem	1	Principles of Data Collection
D. Statistical Analysis		
Analysing One-Variable Data		
D1.1 recognize that the analysis of one-variable data involves the frequencies associated with one attribute, and determine, using technology, the relevant numerical summaries (i.e., mean, median, mode, range, interquartile range, variance, and standard deviation)	3	Analysis of One-Variable Data
D1.2 determine the positions of individual data points within a one-variable data set using quartiles, percentiles, and z-scores, use the normal distribution to model suitable one-variable data sets, and recognize these processes as strategies for one-variable data analysis	2	Analysis of One-Variable Data
D1.3 generate, using technology, the relevant graphical summaries of one-variable data (e.g., circle graphs, bar graphs, histograms, stem-and-leaf plots, boxplots) based on the type of data provided (e.g., categorical, ordinal, quantitative)	1	Visualizing Data and Drawing Conclusions

D1.4 interpret, for a normally distributed population, the meaning of a statistic qualified by a statement describing the margin of error and the confidence level (e.g., the meaning of a statistic that is accurate to within 3 percentage points, 19 times out of 20), and make connections, through investigation using technology (e.g., dynamic statistical software), between the sample size, the margin of error, and the confidence level (e.g., larger sample sizes create higher confidence levels for a given margin of error)	1	Visualizing Data and Drawing Conclusions
D1.5 interpret statistical summaries (e.g., graphical, numerical) to describe the characteristics of a one-variable data set and to compare two related one-variable data sets (e.g., compare the lengths of different species of trout; compare annual incomes in Canada and in a third-world country; compare Aboriginal and non-Aboriginal incomes); describe how statistical summaries (e.g., graphs, measures of central tendency) can be used to misrepresent one-variable data; and make inferences, and make and justify conclusions, from statistical summaries of one-variable data orally and in writing, using convincing arguments	3	Visualizing Data and Drawing Conclusions
Analysing Two-Variable Data		
D2.1 recognize that the analysis of two-variable data involves the relationship between two attributes, recognize the correlation coefficient as a measure of the fit of the data to a linear model, and determine, using technology, the relevant numerical summaries (e.g., summary tables such as contingency tables; correlation coefficients)	2	Investigating Relationships in Two-Variable Data
D2.2 recognize and distinguish different types of relationships between two variables that have a mathematical correlation (e.g., the cause-and-effect relationship between the age of a tree and its diameter; the common-cause relationship between ice cream sales and forest fires over the course of a year; the accidental relationship between the consumer price index and the number of known planets in the universe)	1	Investigating Relationships in Two-Variable Data
D2.3 generate, using technology, the relevant graphical summaries of two-variable data (e.g., scatter plots, side-by-side boxplots) based on the type of data provided (e.g., categorical, ordinal, quantitative)	2	Investigating Relationships in Two-Variable Data
D2.4 determine, by performing a linear regression using technology, the equation of a line that models a suitable two-variable data set, determine the fit of an individual data point to the linear model (e.g., by using residuals to identify outliers), and recognize these processes as strategies for two-variable data analysis	1	Linear Modeling and Regression Analysis

D2.5 interpret statistical summaries (e.g., scatter plot, equation representing a relationship) to describe the characteristics of a two-variable data set and to compare two related two-variable data sets (e.g., compare the relationship between Grade 12 English and mathematics marks with the relationship between Grade 12 science and mathematics marks); describe how statistical summaries (e.g., graphs, linear models) can be used to misrepresent two-variable data; and make inferences, and make and justify conclusions, from statistical summaries of two-variable data orally and in writing, using convincing arguments	1	Linear Modeling and Regression Analysis
Evaluating Validity		
D3.1 interpret statistics presented in the media (e.g., the UN's finding that 2% of the world's population has more than half the world's wealth, whereas half the world's population has only 1% of the world's wealth), and explain how the media, the advertising industry, and others (e.g., marketers, pollsters) use and misuse statistics (e.g., as represented in graphs) to promote a certain point of view (e.g., by making a general statement based on a weak correlation or an assumed cause-and-effect relationship; by starting the vertical scale at a value other than zero; by making statements using general population statistics without reference to data specific to minority groups)	1	Evaluating Statistical Validity
D3.2 assess the validity of conclusions presented in the media by examining sources of data, including Internet sources (i.e., to determine whether they are authoritative, reliable, unbiased, and current), methods of data collection, and possible sources of bias (e.g., sampling bias, non-response bias, cultural bias in a survey question), and by questioning the analysis of the data (e.g., whether there is any indication of the sample size in the analysis) and conclusions drawn from the data (e.g., whether any assumptions are made about cause and effect)	1	Evaluating Statistical Validity
D3.3 gather, interpret, and describe information about applications of data management in occupations (e.g., actuary, statistician, business analyst, sociologist, medical doctor, psychologist, teacher, community planner), and about university programs that explore these applications	1	Evaluating Statistical Validity
E. Culminating Data Management Investigation		
Designing and Carrying Out a Culminating Investigation		
E1.1 pose a significant problem of interest that requires the organization and analysis of a suitable set of primary or secondary quantitative data (e.g., primary data collected from a student-designed game of chance, secondary data from a reliable source such as E-STAT), and conduct appropriate background research related to the topic being studied	1	The Statistical Investigation Process

E1.2 design a plan to study the problem (e.g., identify the variables and the population; develop an ethical survey; establish the procedures for gathering, summarizing, and analysing the primary or secondary data; consider the sample size and possible sources of bias)	1	The Statistical Investigation Process
E1.3 gather data related to the study of the problem (e.g., by using a survey; by using the Internet; by using a simulation) and organize the data (e.g., by setting up a database; by establishing intervals), with or without technology	1	The Statistical Investigation Process
E1.4 interpret, analyse, and summarize data related to the study of the problem (e.g., generate and interpret numerical and graphical statistical summaries; recognize and apply a probability distribution model; calculate the expected value of a probability distribution), with or without technology	1	The Statistical Investigation Process
E1.5 draw conclusions from the analysis of the data (e.g., determine whether the analysis solves the problem), evaluate the strength of the evidence (e.g., by considering factors such as sample size or bias, or the number of times a game is played), specify any limitations of the conclusions, and suggest follow-up problems or investigations	1	The Statistical Investigation Process
Presenting and Critiquing the Culminating Investigation		
E2.1 compile a clear, well-organized, and detailed report of the investigation	1	Communicating and Critiquing Findings
E2.2 present a summary of the culminating investigation to an audience of their peers within a specified length of time, with technology (e.g. presentation software) or without technology	1	Communicating and Critiquing Findings
E2.3 answer questions about the culminating investigation and respond to critiques (e.g., by elaborating on the procedures; by justifying mathematical reasoning)	1	Communicating and Critiquing Findings
E2.4 critique the mathematical work of others in a constructive manner	1	Communicating and Critiquing Findings

Education Perfect
Mathematics | MAP4C
Grades 12 Ontario Curriculum Alignment

This document outlines how our platform's content and questions sets are meticulously aligned with the Ontario Mathematics Curriculum, ensuring comprehensive coverage of all courses and fostering key mathematical processes to support student success.

This alignment document shows the content scheduled to be released throughout the 2025-2026 school year.

Education Perfect Mathematics MAP4C Foundations for College Mathematics, College Preparation		
Expectations	Number of Question Sets	Topic
A. Mathematical Models		
Solving Exponential Equations		
A1.1 determine, through investigation (e.g., by expanding terms and patterning), the exponent laws for multiplying and dividing algebraic expressions involving exponents [e.g. $(x^3)(x^2)$, $x^3 \div x^5$] and the exponent law for simplifying algebraic expressions involving a power of a power [e.g. $(x^6y^3)^2$]	3	Exponent Laws
A1.2 simplify algebraic expressions containing integer exponents using the laws of exponents	1	Exponent Laws
A1.3 determine, through investigation using a variety of tools (e.g., calculator, paper and pencil, graphing technology) and strategies (e.g., patterning; finding values from a graph; interpreting the exponent laws), the value of a power with a rational exponent (i.e., $x^{\frac{m}{n}}$, where $x > 0$ and m and n are integers)	1	Rational Exponents
A1.4 evaluate, with or without technology, numerical expressions involving rational exponents and rational bases [e.g., 2^{-3}, $(-6)^3$, $4^{\frac{1}{2}}$, 1.01^{120}]* **The knowledge and skills described in this expectation are to be introduced as needed, and applied and consolidated, where appropriate, throughout the course.*	1	Rational Exponents
A1.5 solve simple exponential equations numerically and graphically, with technology (e.g., use systematic trial with a scientific calculator to determine the solution to the equation $1.05^x = 1.276$), and recognize that the solutions may not be exact	2	Exponential Equations

A1.6 solve problems involving exponential equations arising from real-world applications by using a graph or table of values generated with technology from a given equation [e.g., $h = 2(0.6)^n$, where h represents the height of a bouncing ball and n represents the number of bounces]	1	Exponential Equations
A1.7 solve exponential equations in one variable by determining a common base (e.g., $2^x = 32$, $4^{5x-1} = 2^{2(x+11)}$, $3^{5x+8} = 27^x$)	1	A1 Exponential Equations
Modelling Graphically		
A2.1 interpret graphs to describe a relationship (e.g., distance travelled depends on driving time, pollution increases with traffic volume, maximum profit occurs at a certain sales volume), using language and units appropriate to the context	1	Graphical Models
A2.2 describe trends based on given graphs, and use the trends to make predictions or justify decisions (e.g., given a graph of the men's 100-m world record versus the year, predict the world record in the year 2050 and state your assumptions; given a graph showing the rising trend in graduation rates among Aboriginal youth, make predictions about future rates)	1	Graphical Models
A2.3 recognize that graphs and tables of values communicate information about rate of change, and use a given graph or table of values for a relation to identify the units used to measure rate of change (e.g., for a distance-time graph, the units of rate of change are kilometres per hour; for a table showing earnings over time, the units of rate of change are dollars per hour)	1	Graphical Models
A2.4 identify when the rate of change is zero, constant, or changing, given a table of values or a graph of a relation, and compare two graphs by describing rate of change (e.g., compare distance-time graphs for a car that is moving at constant speed and a car that is accelerating)	1	Graphical Models
A2.5 compare, through investigation with technology, the graphs of pairs of relations (i.e., linear, quadratic, exponential) by describing the initial conditions and the behaviour of the rates of change (e.g., compare the graphs of amount versus time for equal initial deposits in simple interest and compound interest accounts)	1	Graphical Models
A2.6 recognize that a linear model corresponds to a constant increase or decrease over equal intervals and that an exponential model corresponds to a constant percentage increase or decrease over equal intervals, select a model (i.e., linear, quadratic, exponential) to represent the relationship between numerical data graphically and algebraically, using a variety of tools (e.g., graphing technology) and strategies (e.g., finite differences, regression), and solve related problems	3	Data Models

Modelling Algebraically		
A3.1 solve equations of the form $x^n = a$ using rational exponents (e.g., solve $x^3 = 7$ by raising both sides to the exponent $\frac{1}{3}$)	1	Solving Equations
A3.2 determine the value of a variable of degree no higher than three, using a formula drawn from an application, by first substituting known values and then solving for the variable, and by first isolating the variable and then substituting known values	2	Solving Equations
A3.3 make connections between formulas and linear, quadratic, and exponential functions [e.g., recognize that the compound interest formula, $A = P(1 + i)^n$; is an example of an exponential function $A(n)$ when P and i are constant, and of a linear function $A(P)$ when i and n are constant], using a variety of tools and strategies (e.g., comparing the graphs generated with technology when different variables in a formula are set as constants)	3	Applications of Mathematical Models
A3.4 solve multi-step problems requiring formulas arising from real-world applications (e.g., determining the cost of two coats of paint for a large cylindrical tank)	1	Solving Equations
A3.5 gather, interpret, and describe information about applications of mathematical modelling in occupations, and about college programs that explore these applications	1	Applications of Mathematical Models
B. Personal Finance		
Understanding Annuities		
B1.1 gather and interpret information about annuities, describe the key features of an annuity, and identify real-world applications (e.g., RRSP, mortgage, RRIF, RESP)	1	Fundamentals of Annuities
B1.2 determine, through investigation using technology (e.g., the TVM Solver on a graphing calculator; online tools), the effects of changing the conditions (i.e., the payments, the frequency of the payments, the interest rate, the compounding period) of an ordinary simple annuity (i.e., an annuity in which payments are made at the *end* of each period, and compounding and payment periods are the same) (e.g., long-term savings plans, loans)	2	Fundamentals of Annuities
B1.3 solve problems, using technology (e.g., scientific calculator, spreadsheet, graphing calculator), that involve the amount, the present value, and the regular payment of an ordinary simple annuity	2	Applications of Annuities
	1	Mortgages and Financial Repayments
B1.4 demonstrate, through investigation using technology (e.g., a TVM Solver), the advantages of starting deposits earlier when investing in annuities used as long-term savings plans	1	Applications of Annuities

B1.5 gather and interpret information about mortgages, describe features associated with mortgages (e.g., mortgages are annuities for which the present value is the amount borrowed to purchase a home; the interest on a mortgage is compounded semi-annually but often paid monthly), and compare different types of mortgages (e.g., open mortgage, closed mortgage, variable-rate mortgage)	1	Mortgages and Financial Repayments
B1.6 read and interpret an amortization table for a mortgage	1	Mortgages and Financial Repayments
B1.7 generate an amortization table for a mortgage, using a variety of tools and strategies (e.g., input data into an online mortgage calculator; determine the payments using the TVM Solver on a graphing calculator and generate the amortization table using a spreadsheet), calculate the total interest paid over the life of a mortgage, and compare the total interest with the original principal of the mortgage	1	Mortgages and Financial Repayments
B1.8 determine, through investigation using technology (e.g., TVM Solver, online tools, financial software), the effects of varying payment periods, regular payments, and interest rates on the length of time needed to pay off a mortgage and on the total interest paid	1	Mortgages and Financial Repayments
Renting or Owning Accommodation		
B2.1 gather and interpret information about the procedures and costs involved in owning and in renting accommodation (e.g., apartment, condominium, townhouse, detached home) in the local community	1	Finances of Accommodation
B2.2 compare renting accommodation with owning accommodation by describing the advantages and disadvantages of each	1	Finances of Accommodation
B2.3 solve problems, using technology (e.g., calculator, spreadsheet), that involve the fixed costs (e.g., mortgage, insurance, property tax) and variable costs (e.g., maintenance, utilities) of owning or renting accommodation	1	Finances of Accommodation
Designing Budgets		
B3.1 gather, interpret, and describe information about living costs, and estimate the living costs of different households (e.g., a family of four, including two young children; a single young person; a single parent with one child) in the local community	1	Designing and Managing Budgets
B3.2 design and present a savings plan to facilitate the achievement of a long-term goal (e.g., attending college, purchasing a car, renting or purchasing a house)	1	Designing and Managing Budgets

B3.3 design, explain, and justify a monthly budget suitable for an individual or family described in a given case study that provides the specifics of the situation (e.g., income; personal responsibilities; costs such as utilities, food, rent/mortgage, entertainment, transportation, charitable contributions; long-term savings goals), with technology (e.g., using spreadsheets, budgeting software, online tools) and without technology (e.g., using budget templates)	1	Designing and Managing Budgets
B3.4 identify and describe the factors to be considered in determining the affordability of accommodation in the local community (e.g., income, long-term savings, number of dependants, non-discretionary expenses), and consider the affordability of accommodation under given circumstances	1	Budget Applications and Career Connections
B3.5 make adjustments to a budget to accommodate changes in circumstances (e.g., loss of hours at work, change of job, change in personal responsibilities, move to new accommodation, achievement of a long-term goal, major purchase), with technology (e.g., spreadsheet template, budgeting software)	1	Designing and Managing Budgets
B3.6 gather, interpret, and describe information about applications of the mathematics of personal finance in occupations (e.g., selling real estate, bookkeeping, managing a restaurant, financial planning, mortgage brokering), and about college programs that explore these applications	1	Budget Applications and Career Connections
C. Geometry and Trigonometry		
Solving Problems Involving Measurement and Geometry		
C1.1 perform required conversions between the imperial system and the metric system using a variety of tools (e.g., tables, calculators, online conversion tools), as necessary within applications	1	Measurement and 2D/3D Geometry
C1.2 solve problems involving the areas of rectangles, triangles, and circles, and of related composite shapes, in situations arising from real-world applications	1	Measurement and 2D/3D Geometry
C1.3 solve problems involving the volumes and surface areas of rectangular prisms, triangular prisms, and cylinders, and of related composite figures, in situations arising from real-world applications	1	Measurement and 2D/3D Geometry
Investigating Optimal Dimensions		
C2.1 recognize, through investigation using a variety of tools (e.g., calculators; dynamic geometry software; manipulatives such as tiles, geoboards, toothpicks) and strategies (e.g., modelling; making a table of values; graphing), and explain the significance of optimal perimeter, area, surface area, and volume in various applications (e.g., the minimum amount of packaging material, the relationship between surface area and heat loss)	1	Optimization of Shapes and Figures

C2.2 determine, through investigation using a variety of tools (e.g., calculators, dynamic geometry software, manipulatives) and strategies (e.g., modelling; making a table of values; graphing), the optimal dimensions of a two-dimensional shape in metric or imperial units for a given constraint (e.g., the dimensions that give the minimum perimeter for a given area)	1	Optimization of Shapes and Figures
C2.3 determine, through investigation using a variety of tools and strategies (e.g., modelling with manipulatives; making a table of values; graphing), the optimal dimensions of a right rectangular prism, a right triangular prism, and a right cylinder in metric or imperial units for a given constraint (e.g., the dimensions that give the maximum volume for a given surface area)	1	Optimization of Shapes and Figures
Solving Problems Involving Trigonometry		
C3.1 solve problems in two dimensions using metric or imperial measurements, including problems that arise from real-world applications (e.g., surveying, navigation, building construction), by determining the measures of the sides and angles of right triangles using the primary trigonometric ratios, and of acute triangles using the sine law and the cosine law	4	Solving Triangles with Trigonometry
C3.2 make connections between primary trigonometric ratios (i.e., sine, cosine, tangent) of obtuse angles and of acute angles, through investigation using a variety of tools and strategies (e.g., using dynamic geometry software to identify an obtuse angle with the same sine as a given acute angle; using a circular geoboard to compare congruent triangles; using a scientific calculator to compare trigonometric ratios for supplementary angles)	1	Trigonometry with Obtuse Triangles and Careers
C3.3 determine the values of the sine, cosine, and tangent of obtuse angles	1	Trigonometry with Obtuse Triangles and Careers
C3.4 solve problems involving oblique triangles, including those that arise from real-world applications, using the sine law (in non-ambiguous cases only) and the cosine law, and using metric or imperial units	1	Trigonometry with Obtuse Triangles and Careers
C3.5 gather, interpret, and describe information about applications of trigonometry in occupations, and about college programs that explore these applications	1	Trigonometry with Obtuse Triangles and Careers
D. Data Management		
Working with Two-Variable Data		
D1.1 distinguish situations requiring one-variable and two-variable data analysis, describe the associated numerical summaries (e.g., tally charts, summary tables) and graphical summaries (e.g., bar graphs, scatter plots), and recognize questions that each type of analysis addresses (e.g., What is the frequency of a particular trait in a population? What is the mathematical relationship between two variables?)	1	Foundations of Two-Variable Data

D1.2 describe characteristics of an effective survey (e.g., by giving consideration to ethics, privacy, the need for honest responses, and possible sources of bias, including cultural bias), and design questionnaires (e.g., for determining if there is a relationship between age and hours per week of Internet use, between marks and hours of study, or between income and years of education) or experiments (e.g., growth of plants under different conditions) for gathering two-variable data	1	Foundations of Two-Variable Data
D1.3 collect two-variable data from primary sources, through experimentation involving observation or measurement, or from secondary sources (e.g., Internet databases, newspapers, magazines), and organize and store the data using a variety of tools (e.g., spreadsheets, dynamic statistical software)	1	Foundations of Two-Variable Data
D1.4 create a graphical summary of two-variable data using a scatter plot (e.g., by identifying and justifying the dependent and independent variables; by drawing the line of best fit, when appropriate), with and without technology	1	Foundations of Two-Variable Data
D1.5 determine an algebraic summary of the relationship between two variables that appear to be linearly related (i.e., the equation of the line of best fit of the scatter plot), using a variety of tools (e.g., graphing calculators, graphing software) and strategies (e.g., using systematic trials to determine the slope and y-intercept of the line of best fit; using the regression capabilities of a graphing calculator), and solve related problems (e.g., use the equation of the line of best fit to interpolate or extrapolate from the given data set)	1	Analyzing Linear Relationships
D1.6 describe possible interpretations of the line of best fit of a scatter plot (e.g., the variables are linearly related) and reasons for misinterpretations (e.g., using too small a sample; failing to consider the effect of outliers; interpolating from a weak correlation; extrapolating non-linearly related data)	1	Analyzing Linear Relationships
D1.7 determine whether a linear model (i.e., a line of best fit) is appropriate given a set of two-variable data, by assessing the correlation between the two variables (i.e., by describing the type of correlation as positive, negative, or none; by describing the strength as strong or weak; by examining the context to determine whether a linear relationship is reasonable)	1	Analyzing Linear Relationships
D1.8 make conclusions from the analysis of two-variable data (e.g., by using a correlation to suggest a possible cause-and-effect relationship), and judge the reasonableness of the conclusions (e.g., by assessing the strength of the correlation; by considering if there are enough data)	1	Analyzing Linear Relationships

Applying Data Management		
D2.1 recognize and interpret common statistical terms (e.g., percentile, quartile) and expressions (e.g., accurate 19 times out of 20) used in the media (e.g., television, Internet, radio, newspapers)	1	Data in the Media
D2.2 describe examples of indices used by the media (e.g., consumer price index, S&P/TSX composite index, new housing price index) and solve problems by interpreting and using indices (e.g., by using the consumer price index to calculate the annual inflation rate)	1	Data in the Media
D2.3 interpret statistics presented in the media (e.g., the UN's finding that 2% of the world's population has more than half the world's wealth, whereas half the world's population has only 1% of the world's wealth), and explain how the media, the advertising industry, and others (e.g., marketers, pollsters) use and misuse statistics (e.g., as represented in graphs) to promote a certain point of view (e.g., by making a general statement based on a weak correlation or an assumed cause-and-effect relationship; by starting the vertical scale on a graph at a value other than zero; by making statements using general population statistics without reference to data specific to minority groups)	1	Data in the Media
D2.4 assess the validity of conclusions presented in the media by examining sources of data, including Internet sources (i.e., to determine whether they are authoritative, reliable, unbiased, and current), methods of data collection, and possible sources of bias (e.g., sampling bias, non-response bias, a bias in a survey question), and by questioning the analysis of the data (e.g., whether there is any indication of the sample size in the analysis) and conclusions drawn from the data (e.g., whether any assumptions are made about cause and effect)	1	Data in the Media
D2.5 gather, interpret, and describe information about applications of data management in occupations, and about college programs that explore these applications	1	Data in the Media

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Education Perfect Mathematics MEL4E Mathematics for WOrk and Everyday Life, Workplace Preparation		
Expectations	Number of Question Sets	Topic
A. Reasoning with Data		
Interpreting and Displaying Data		
A1.1 read and interpret graphs (e.g., bar graph, broken-line graph, histogram) obtained from various sources (e.g., newspapers, magazines, Statistics Canada website)	3	Understanding Graphs
A1.2 explain the distinction between the terms population and sample, describe the characteristics of a good sample, and explain why sampling is necessary (e.g., time, cost, or physical constraints)	3	Data Samples
A1.3 collect categorical data from primary sources, through experimentation involving observation (e.g., by tracking food orders in restaurants offering healthy food options) or measurement, or from secondary sources (e.g., Internet databases, newspapers, magazines), and organize and store the data using a variety of tools (e.g., spreadsheets, dynamic statistical software)	2	Categorical Data
A1.4 represent categorical data by constructing graphs (e.g., bar graph, broken-line graph, circle graph) using a variety of tools (e.g., dynamic statistical software, graphing calculator, spreadsheet)	1	Categorical Data
A1.5 make inferences based on the graphical representation of data (e.g., an inference about a sample from the graphical representation of a population), and justify conclusions orally or in writing using convincing arguments (e.g., by showing that it is reasonable to assume that a sample is representative of a population)	2	Using Data to Draw Conclusions

A1.6 make and justify conclusions about a topic of personal interest by collecting, organizing (e.g., using spreadsheets), representing (e.g., using graphs), and making inferences from categorical data from primary sources (i.e., collected through measurement or observation) or secondary sources (e.g., electronic data from databases such as E-STAT, data from newspapers or magazines)	2	Using Data to Draw Conclusions
A1.7 explain how the media, the advertising industry, and others (e.g., marketers, pollsters) use and misuse statistics (e.g., as represented in graphs) to promote a certain point of view (e.g., by making general statements based on small samples; by making statements using general population statistics without reference to data specific to minority groups)	1	Data in Real Life
A1.8 gather, interpret, and describe information about applications of data management in the workplace and in everyday life	1	Data in Real Life
Investigating Probability		
A2.1 determine the theoretical probability of an event (i.e., the ratio of the number of favourable outcomes to the total number of possible outcomes, where all outcomes are equally likely), and represent the probability in a variety of ways (e.g., as a fraction, as a percent, as a decimal in the range 0 to 1)	2	Theoretical Probability
A2.2 identify examples of the use of probability in the media (e.g., the probability of rain, of winning a lottery, of wait times for a service exceeding specified amounts) and various ways in which probability is represented (e.g., as a fraction, as a percent, as a decimal in the range 0 to 1)	2	Probability in Real Life
A2.3 perform simple probability experiments (e.g., rolling number cubes, spinning spinners, flipping coins, playing Aboriginal stick-and-stone games), record the results, and determine the experimental probability of an event	1	Experimental Probability
A2.4 compare, through investigation, the theoretical probability of an event with the experimental probability, and describe how uncertainty explains why they might differ (e.g., "I know that the theoretical probability of getting tails is 0.5, but that does not mean that I will always obtain 3 tails when I toss the coin 6 times"; "If a lottery has a 1 in 9 chance of winning, am I certain to win if I buy 9 tickets?")	1	Experimental Probability
A2.5 determine, through investigation using class-generated data and technology-based simulation models (e.g., using a random-number generator on a spreadsheet or on a graphing calculator), the tendency of experimental probability to approach theoretical probability as the number of trials in an experiment increases (e.g., "If I simulate tossing a coin 1000 times using technology, the experimental probability that I calculate for getting tails in any one toss is likely to be closer to the theoretical probability than if I simulate tossing the coin only 10 times")	1	Experimental Probability

A2.6 interpret information involving the use of probability and statistics in the media, and describe how probability and statistics can help in making informed decisions in a variety of situations (e.g., weighing the risk of injury when considering different occupations; using a weather forecast to plan outdoor activities; using sales data to stock a clothing store with appropriate styles and sizes)	1	Probability in Real Life
B. Personal Finance		
Renting or Owning Accommodation		
B1.1 identify the financial implications (e.g., responsibility for paying the cost of accommodation and furnishings; greater responsibility for financial decision making) and the non-financial implications (e.g., greater freedom to make decisions; the demands of time management or of adapting to a new environment; the possibility of loneliness or of the need to share responsibilities) associated with living independently	1	Costs of Accommodation
B1.2 gather and compare, through investigation, information about the costs and the advantages and disadvantages of different types of rental accommodation in the local community (e.g., renting a room in someone's house; renting a hotel room; renting or leasing an apartment)	1	Costs of Accommodation
B1.3 gather and compare, through investigation, information about purchase prices of different types of owned accommodation in the local community (e.g., trailer, condominium, townhouse, detached home)	2	Costs of Accommodation
B1.4 gather, interpret, and compare information about the different types of ongoing living expenses associated with renting and owning accommodation (e.g., hydro, cable, telephone, Internet, heating, parking, laundry, groceries, cleaning supplies, transportation) and related costs	2	Budgeting for Accommodation
B1.5 gather, interpret, and describe information about the rights and responsibilities of tenants and landlords	1	Accommodation Logistics
B1.6 generate a checklist of necessary tasks associated with moving (e.g., change of address, set-up of utilities and services, truck rental), and estimate the total cost involved under various conditions (e.g., moving out of province; hiring a moving company)	1	Accommodation Logistics
Designing Budgets		
B2.1 categorize personal expenses as non-discretionary (e.g., rent, groceries, utilities, loan payments) or discretionary (e.g., entertainment, vacations)	1	Budgeting Foundations
B2.2 categorize personal non-discretionary expenses as fixed (e.g., rent, cable, car insurance) or variable (e.g., groceries, clothing, vehicle maintenance)	1	Budgeting Foundations

B2.3 read and interpret prepared individual or family budgets, identify and describe the key components of a budget, and describe how budgets can reflect personal values (e.g., as they relate to shopping, saving for a long-term goal, recreational activities, family, community)	2	Budgeting Foundations
B2.4 design, with technology (e.g., using spreadsheet templates, budgeting software, online tools) and without technology (e.g., using budget templates), explain, and justify a monthly budget suitable for an individual or family described in a given case study that provides the specifics of the situation (e.g., income; personal responsibilities; expenses such as utilities, food, rent/mortgage, entertainment, transportation, charitable contributions; long-term savings goals)	1	Budgeting Foundations
B2.5 identify and describe factors to be considered in determining the affordability of accommodation in the local community (e.g., income, long-term savings, number of dependants, non-discretionary expenses)	1	Advanced Budgeting
B2.6 make adjustments to a budget to accommodate changes in circumstances (e.g., loss of hours at work, change of job, change in personal responsibilities, move to new accommodation, achievement of a long-term goal, major purchase), with technology (e.g., spreadsheet template, budgeting software)	1	Advanced Budgeting
Filing Income Tax		
B3.1 explain why most Canadians are expected to file a personal income tax return each year, and identify and describe the major parts of a personal income tax return (i.e., identification, total income, net income, taxable income, refund or balance owing)	1	Tax Fundamentals
B3.2 gather, interpret, and describe the information and documents required for filing a personal income tax return (e.g., CRA guides, forms, and schedules; T4 slips; receipts for charitable donations), and explain why they are required	1	Tax Fundamentals
B3.3 gather, interpret, and compare information about common tax credits (e.g., tuition fees, medical expenses, charitable donations) and tax deductions (e.g., moving expenses, child care expenses, union dues)	1	Tax Fundamentals
B3.4 complete a simple personal income tax return (i.e., forms and schedules), with or without tax preparation software	1	Tax Fundamentals
B3.5 gather, interpret, and describe some additional information that a self-employed individual should provide when filing a personal income tax return (e.g., a statement of business activities that includes business expenses such as insurance, advertising, and motor-vehicle expenses)	1	Tax Fundamentals

B3.6 gather, interpret, and describe information about services that will complete a personal income tax return (e.g., tax preparation service, chartered accountant, voluntary service in the community) and resources that will help with completing a personal income tax return (e.g., forms and publications available on the Canada Revenue Agency website, tax preparation software for which rebates are available), and compare the services and resources on the basis of the assistance they provide and their cost	1	Tax Support and Career Finances
B3.7 gather, interpret, and describe information about applications of the mathematics of personal finance in the workplace (e.g., selling real estate, bookkeeping, managing a restaurant)	1	Tax Support and Career Finances
C. Applications of Measurement		
Measuring and Estimating		
C1.1 measure, using a variety of tools (e.g., measuring tape, metre or yard stick, measuring cups, graduated cylinders), the lengths of common objects and the capacities of common containers, using the metric system and the imperial system	1	Measurement Systems and Estimation
C1.2 estimate lengths, distances, and capacities in metric units and in imperial units by applying personal referents (e.g., the width of a finger is approximately 1 cm; the length of a piece of standard loose-leaf paper is about 1 ft; the capacity of a pop bottle is 2 L)	2	Measurement Systems and Estimation
C1.3 estimate quantities (e.g., bricks in a pile, time to complete a job, people in a crowd), and describe the strategies used	1	Measurement Systems and Estimation
C1.4 convert measures within systems (e.g., centimetres and metres, kilograms and grams, litres and millilitres, feet and inches, ounces and pounds), as required within applications that arise from familiar contexts	1	Converting Units
C1.5 convert measures between systems (e.g., centimetres and inches, pounds and kilograms, square feet and square metres, litres and U.S. gallons, kilometres and miles, cups and millilitres, millilitres and teaspoons, degrees Celsius and degrees Fahrenheit), as required within applications that arise from familiar contexts	1	Converting Units
Applying Measurement and Design		
C2.1 construct accurate right angles in practical contexts (e.g., by using the 3-4-5 triplet to construct a region with right-angled corners on a floor), and explain connections to the Pythagorean theorem	2	Length and Perimeter
C2.2 apply the concept of perimeter in familiar contexts (e.g., baseboard, fencing, door and window trim)	1	Length and Perimeter

C2.3 estimate the areas and volumes of irregular shapes and figures, using a variety of strategies (e.g., counting grid squares; displacing water)	1	Area, Surface Area, and Volume
C2.4 solve problems involving the areas of rectangles, triangles, and circles, and of related composite shapes, in situations arising from real-world applications	1	Area, Surface Area, and Volume
C2.5 solve problems involving the volumes and surface areas of rectangular prisms, triangular prisms, and cylinders, and of related composite figures, in situations arising from real-world applications	2	Area, Surface Area, and Volume
C2.6 construct a two-dimensional scale drawing of a familiar setting (e.g., classroom, flower bed, playground) on grid paper or using design or drawing software	1	Scale Drawings and Models
C2.7 construct, with reasonable accuracy, a three-dimensional scale model of an object or environment of personal interest (e.g., appliance, room, building, garden, bridge)	1	Scale Drawings and Models
C2.8 investigate, plan, design, and prepare a budget for a household improvement (e.g., landscaping a property; renovating a room), using appropriate technologies (e.g., design or decorating websites, design or drawing software, spreadsheet)	2	Home Improvement Budgets
Solving Measurement Problems Using Proportional Reasoning		
C3.1 identify and describe applications of ratio and rate, and recognize and represent equivalent ratios (e.g., show that 4:6 represents the same ratio as 2:3 by showing that a ramp with a height of 4 m and a base of 6 m and a ramp with a height of 2 m and a base of 3 m are equally steep) and equivalent rates (e.g., recognize that paying $1.25 for 250 mL of tomato sauce is equivalent to paying $3.75 for 750 mL of the same sauce), using a variety of tools (e.g., concrete materials, diagrams, dynamic geometry software)	2	Rates, Ratios, and Proportions
C3.2 identify situations in which it is useful to make comparisons using unit rates, and solve problems that involve comparisons of unit rates	1	Rates, Ratios, and Proportions
C3.3 identify and describe real-world applications of proportional reasoning (e.g., mixing concrete; calculating dosages; converting units; painting walls; calculating fuel consumption; calculating pay; enlarging patterns), distinguish between a situation involving a proportional relationship (e.g., recipes, where doubling the quantity of each ingredient doubles the number of servings; long-distance phone calls billed at a fixed cost per minute, where talking for half as many minutes costs half as much) and a situation involving a non-proportional relationship (e.g., cellular phone packages, where doubling the minutes purchased does not double the cost of the package; food purchases, where it can be less expensive to buy the same quantity of a product in one large package than in two or more small packages; hydro bills, where doubling consumption does not double the cost) in a personal and/or workplace context, and explain their reasoning	2	Proportions in Real Life

C3.4 identify and describe the possible consequences (e.g., overdoses of medication; seized engines; ruined clothing; cracked or crumbling concrete) of errors in proportional reasoning (e.g., not recognizing the importance of maintaining proportionality; not correctly calculating the amount of each component in a mixture)	1	Proportions in Real Life
C3.5 solve problems involving proportional reasoning in everyday life (e.g., applying fertilizers; mixing gasoline and oil for use in small engines; mixing cement; buying plants for flower beds; using pool or laundry chemicals; doubling recipes; estimating cooking time from the time needed per pound; determining the fibre content of different sizes of food servings)	1	Proportions in Real Life
C3.6 solve problems involving proportional reasoning in work-related situations (e.g., calculating overtime pay; calculating pay for piecework; mixing concrete for small or large jobs)	1	Proportions in Real Life