Ontario Mathematics

EP Curriculum Map

Note: the curriculum expectations of Strand A are covered throughout the lessons in strands B through F for Grades 3-9.

Grade 9 Mathematics, De-streamed (MTH1W)

B. Number

B1. Development of Numbers and Number Sets

Development and Use of Numbers

Specific Expectations	Lesson Title
B1.1. research a number concept to tell a story about its development and use in a specific culture, and describe its relevance in a current context	Number Concept Story

Number Sets

Specific Expectations	Lesson Title
B1.2. describe how various subsets of a number system are defined, and describe similarities and differences between these subsets	Number System Subsets
B1.3. use patterns and number relationships to explain density, infinity, and limit as they relate to number sets	Density, Infinity and Limit

B2. Powers

Powers

Specific Expectations	Lesson Title
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	Powers and Scientific Notation
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	Operations with Power Power Rules

B3. Number Sense and Operations

Rational Numbers

Specific Expectations	Lesson Title
B3.1. apply an understanding of integers to describe location, direction, amount, and changes in any of these, in various contexts	Location, Direction, and Amount
B3.2. apply an understanding of unit fractions and their relationship to other fractional amounts, in various contexts, including the use of measuring tools	Unit Fractions
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	Positive and Negative Signs

Applications

Specific Expectations	Lesson Title
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	Operations with Fractions and Mixed 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	Rates, Percents and Proportions

C. Algebra

C1. Algebraic Expressions and Equations

Development and Use of Algebra

Specific Expectations	Lesson Title
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	Algebra Concept Story

Algebraic Expressions and Equations

Specific Expectations	Lesson Title
C1.2. create algebraic expressions to generalize relationships expressed in words, numbers, and visual representations, in various contexts	Algebraic Expressions
C1.3. compare algebraic expressions using concrete, numerical, graphical, and algebraic methods to identify those that are equivalent, and justify their choices	Equivalent Algebraic Expressions
C1.4. simplify algebraic expressions by applying properties of operations of numbers, using various representations and tools, in different contexts	Simplifying Algebraic Expressions
C1.5. create and solve equations for various contexts, and verify their solution	Create and Solve Equations

C2. Coding

Coding

Specific Expectations	Lesson Title
C2.1. use coding to demonstrate an understanding of algebraic concepts including variables, parameters, equations, and inequalities	Coding and Algebraic Concepts
C2.2. create code by decomposing situations into computational steps in order to represent mathematical concepts and relationships, and to solve problems	Create Coding Using Computational Steps
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	Read and Alter Code

C3. Application of Relations

Application of Linear and Non-Linear Relations

Specific Expectations	Lesson Title
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	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	Representations of 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	Comparing Linear Relations

C4. Characteristics of Relations

Characteristics of Linear and Non-Linear Relations

Specific Expectations	Lesson Title
C4.1. compare characteristics of graphs, tables of values, and equations of linear and non-linear relations	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	Graphing Equations and Inequalities
C4.3. translate, reflect, and rotate lines defined by $y = ax$, where a is a constant, and describe how each transformation affects the graphs and equations of the defined lines	Transformations of Lines
C4.4. determine the equations of lines from graphs, tables of values, and concrete representations of linear relations by making connections between rates of change and slopes, and between initial values and y-intercepts, and use these equations to solve problems	Equations of Lines

D. Data

D1. Collection, Representation, and Analysis of Data

Application of Data

Specific Expectations	Lesson Title
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	Large Data

Representation and Analysis of Data

Specific Expectations	Lesson Title
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	Single-Variable Data: Quartile Values & Box Plots
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	Two-Variable Data: Scatter Plots & Correlation

D2. Mathematical Modelling

Application of Mathematical Modelling

Specific Expectations	Lesson Title
D2.1. describe the value of mathematical modelling and how it is used in real life to inform decisions	Mathematical Modelling

Process of Mathematical Modelling

Specific Expectations	Lesson Title
D2.2. identify a question of interest requiring the collection and analysis of data, and identify the information needed to answer the question	Mathematical Modelling: Question of Interest
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	Mathematical Modelling: Collecting Data
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	Mathematical Modelling: Analysing Data
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	Mathematical Modelling: Report Findings

E. Geometry and Measurement

E1. Geometric and Measurement Relationships

Geometric and Measurement Relationships

Specific Expectations	Lesson Title
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	Geometric Concept & Measurement Systems Story
E1.2. create and analyse designs involving geometric relationships and circle and triangle properties, using various tools	Circle and Triangle Properties
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	Measurement Systems
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	Changing Dimensions

E1.5. solve problems involving the side-length relationship for right triangles in real-life situations, including problems that involve composite shapes	Right Triangles
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	Comparing Prisms & Pyramids, and Cylinders & Cones

F. Financial Literacy

F1. Financial Decisions

Financial Decisions

Specific Expectations	Lesson Title
F1.1. identify a past or current financial situation and explain how it can inform financial decisions, by applying an understanding of the context of the situation and related mathematical knowledge	Financial Situations and Decisions
F1.2. identify financial situations that involve appreciation and depreciation, and use associated graphs to answer related questions	Appreciation and Depreciation
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	Comparing Interest and Changing Variables
F1.4. modify budgets displayed in various ways to reflect specific changes in circumstances, and provide a rationale for the modifications	Budgets

Grade 10 Principles of Mathematics, Academic (MPM2D)

Quadratic Relations of the Form $y = ax^2 + bx + c$

Investigating the Basic Properties of Quadratic Relations

Specific Expectations	Lesson Title
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	Quadratic Relations: Collecting Data
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	Quadratic Relations: Graphs and Tables of Values
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	Parabolas: Key Features
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)	Comparing Graphs: Negative and Zero Exponents

Relating the Graph of $y = x^2$ and Its Transformations

Specific Expectations	Lesson Title
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 $y = ax^2$]	Describing 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	Transformations of Quadratic Relations

A2.3. sketch, by hand, the graph of $y = a(x - h)^2 + k$ by applying transformations to the graph of $y = x^2$	Graphing Transformed Quadratic Relations
A2.4. determine the equation, in the form $y = a(x - h)^2 + k$, of a given graph of a parabola	Determining an Equation of a Quadratic Relation

Solving Quadratic Equations

Specific Expectations	Lesson Title
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)	Expand and Simplify Polynomial Expressions
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)	Factoring Polynomial Expressions
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 $y = a(x - r)(x - s)$	Factors of Polynomial Expressions
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	Roots of Quadratic Equations
A3.5. express $y = ax^2 + bx + c$ in the form $y = a(x - h)^2 + k$ by completing the square in situations involving no fractions, using a variety of tools (e.g. concrete materials, diagrams, paper and pencil);	Completing the Square: Standard Form to Vertex Form
A3.6. sketch or graph a quadratic relation whose equation is given in the form $y = ax^2 + bx + c$, 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)	Graphing Quadratic Relations in 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)	The Quadratic Formula
A3.8. solve quadratic equations that have real roots, using a variety of methods (i.e., factoring, using the quadratic formula, graphing)	Solving Quadratic Equations

Solving Problems Involving Quadratic Relations

Specific Expectations	Lesson Title
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)	Determining Zeros and Maximum/Minimum Values
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?)	Solving Problems Involving Quadratic Relations

Analytic Geometry

Using Linear Systems to Solve Problems

Specific Expectations	Lesson Title
B1.1. solve systems of two linear equations involving two variables, using the algebraic method of substitution or elimination	Solving Systems of Equations Algebraically
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	Solving Systems of Equations Algebraically and Graphically
B1.3 identify the relationship between the slopes of parallel and perpendicular lines, and use this relationship to solve related problems	Parallel and Perpendicular Lines
B1.4 develop the formula for the slope of a line (i.e. m=(y2-y1)/(x2-x1)), 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)	Slope of a Line Formula
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	Equations of Lines

Solving Problems Involving Properties of Line Segments

Specific Expectations	Lesson Title
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)	Midpoint of a Line Segment
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)	Length of a Line Segment
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	Equation of a Circle and Length of a Line Segment
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 $x^2 + y^2 = r^2$	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)	Solve Problems Involving Slope, Length and Midpoint

Using Analytic Geometry to Verify Geometric Properties

Specific Expectations	Lesson Title
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)	Investigating Characteristics and Properties of Geometric Figures
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)	Verifying Characteristics and Properties of Geometric Figures
B3.4. 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)	Verifying Complex Geometric Properties

Trigonometry

Investigating Similarity and Solving Problems Involving Similar Triangles

Specific Expectations	Lesson Title
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)	Similar Triangles
C1.2. describe and compare the concepts of similarity and congruence	Similarity and Congruence
C1.3. solve problems involving similar triangles in realistic situations (e.g., shadows, reflections, scale models, surveying)	Solving Problems with Similar Triangles

Solving Problems Involving the Trigonometry of Right Triangles

Specific Expectations	Lesson Title
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 = opposite/hypotenuse)	Investigating Right Triangles
C2.2. determine the measures of the sides and angles in right triangles, using the primary trigonometric ratios and the Pythagorean theorem;	Solving Right Triangles
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	Applications of Right Triangles

Solving Problems Involving the Trigonometry of Acute Triangles

Specific Expectations	Lesson Title
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)	Sine Law
C3.2. explore the development of the cosine law within 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)	Cosine Law
C3.3. determine the measures of sides and angles in acute triangles, using the sine law and the cosine law	Applying Sine and Cosine Laws
C3.4. solve problems involving the measures of sides and angles in acute triangles	Solving Acute Triangles

Grade 10 Foundations of Mathematics, Applied (MFM2P)

Measurement and Trigonometry

Solving Problems Involving Similar Triangles

Specific Expectations	Lesson Title
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)	Investigating Properties of Similar Triangles
A1.2. determine the lengths of sides of similar triangles, using proportional reasoning;	Similar Triangles: Side Lengths
A1.3. solve problems involving similar triangles in realistic situations (e.g., shadows, reflections, scale models, surveying)	Solve Problems with Similar Triangles

Solving Problems Involving the Trigonometry of Right Triangles

Specific Expectations	Lesson Title
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 = opposite/hypotenuse)	Investigating 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;	Solving 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	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).	Applications of Trigonometry

Solving Problems Involving Surface Area and Volume, Using the Imperial and Metric Systems of Measurement

Specific Expectations	Lesson Title
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)	The Imperial System of 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	Measurement Conversions
A3.3. determine, through investigation, the relationship for calculating the surface area of a pyramid (e.g., use the net of a square based pyramid to determine that the surface area is the area of the square base plus the areas of the four congruent triangles)	Surface Area of a Pyramid
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	Surface Area and Volume Problems
A3.5 develop the formula for the volume of a sphere, using concrete materials and the volume relationships between cylinders, cones, and spheres	Volume of a Sphere

Modelling Linear Relations

Manipulating and Solving Algebraic Equations

Specific Expectations	Lesson Title
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)	Solving First-Degree Equations: Balance Analogy
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)	Solving First-Degree Equations: Isolating the Variable
B1.3. express the equation of a line in the form $y = mx + b$, given the form $Ax + By + C = 0$.	Equation of a Line: Standard Form to Slope-Intercept Form

Graphing and Writing Equations of Lines

Specific Expectations	Lesson Title
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 = rise/run	Rate of Change and 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 $x = a$, $y = b$	Investigating $y = mx + b$
B2.3. identify, through investigation with technology, the geometric significance of m and b in the equation $y = mx + b$	Slope and y-Intercept 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	Properties of the Slope of a Line
B2.5. graph lines by hand, using a variety of techniques (e.g., graph $y = 2/3x-4$ using the y-intercept and slope; graph $2x + 3y = 6$ using the x- and y-intercepts)	Graphing Lines
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	Determine the Equation of a Line

Solving and Interpreting Systems of Linear Equations

Specific Expectations	Lesson Title
B3.1. determine graphically the point of intersection of two linear relations (e.g., using graph paper, using technology)	Point of Intersection
B3.2. solve systems of two linear equations involving two variables with integral coefficients, using the algebraic method of substitution or elimination	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	Applications of Solving Systems of Equations

Quadratic Relations of the Form $y = ax^2 + bx + c$

Manipulating Quadratic Expressions

Specific Expectations	Lesson Title
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)	Expand and Simplify Polynomial Expressions
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)	Common Factoring Binomials and Trinomials
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)	Factoring Simple Trinomials
C1.4. factor the difference of squares of the form $x^2 - a^2$ (e.g., $x^2 - 16$)	Factoring Difference of Squares

Identifying Characteristics of Quadratic Relations

Specific Expectations	Lesson Title
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	Quadratic Relations: Collecting Data
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	Quadratic Relations: Graphs and Tables of Values
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 or minimum value), using a given graph or a graph generated with technology from its equation, and use the appropriate terminology to describe the features	Parabolas: Key Features
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 $y = (x - r)(x - s)$]	Quadratic Relations: Standard Form and Factored Form

Solving Problems by Interpreting Graphs of Quadratic Relations

Specific Expectations	Lesson Title
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?)	Quadratic Relations: Interpreting Graphs
C3.2. solve problems by interpreting the significance of the key features of graphs obtained by collecting experimental data involving quadratic relations	Solving Problems Involving Quadratic Relations