Unit 1: Introduction to Functions

Lesson	Topics	Objectives
1.1	Functions vs Relations Function Notation Domain and Range	-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) -represent linear and quadratic functions using function notation, given their equations, tables of values, or graphs, and substitute into and evaluate functions -explain the meanings of the terms domain and range
1.2	Inverse Functions	-relate the process of determining the inverse of a function to their understanding of reverse processes (e.g., applying inverse operations)
1.3	Base Functions and Transformations	sketch graphs of $y = af(k(x – d)) + c$ by applying one or more transformations
1.4	Horizontal and Vertical Translations	
1.5	Horizontal and Vertical Stretches / reflections	
1.6	Generalized Transformation Equation	

Unit 2: Factoring Polynomials

Lesson	Topics	Objectives
2.1	Review of Techniques for trinomials	
2.2	Common factoring	
2.3	Factoring by Grouping	

Unit 3: Quadratic Functions

Lesson	Topics	Objectives
3.1	Properties of Quadratics: Domain and Range Zeros y-Intercept Standard Form Solving for Zeros	
3.2	Determining Maximum/ Minimum by solving for zeros	-determine the maximum or minimum value of a quadratic function whose equation is given in the form f(x) = ax + bx + c, using an algebraic method (e.g., completing the square; factoring to determine the zeros and averaging the zeros)
3.3	Vertex Form and the general transformation equation	-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
3.4	Completing the square	
3.5	Inverse Function	
3.6	Intersections between lines and Quadratics	-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)

Unit 4: Exponential Functions

Lesson	Topics	Objectives
4.1	Exponent Laws - Integer Exponents	-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
4.2	Exponent Laws - Rational Exponents	
4.3	Simplifying Expressions with Exponent Laws	
4.4	Properties of Exponential Functions: Domain and Range y-Intercept Asymptote	-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
4.5	Transformations of Exponential Functions with generalized transformation equations	-graph, with and without technology, an exponential relation, given its equation
4.6	Exponential Growth and Decay	-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

Unit 5: Sinusoidal Functions

Lesson	Topics	Objectives
5.1	Properties of Periodic Functions: Domain and Range y-Intercept Zeros Period Amplitude Frequency Base graph for Sin(x) and Cos(x)	-determine and describe its key properties (i.e., cycle, domain, range, intercepts, amplitude, period, maximum and minimum values, increasing/ decreasing intervals)
5.2	Transformations with Sin(x) and Cos(x)	-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
5.3	Graphing Sin(x) and Cos(x)	-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