Expectations

1.1 The student will represent functions and relations numerically, graphically, and algebraically.
1.2 The student will describe and apply properties of functions and relations.
1.3 The student will perform a variety of operations and geometrical transformations on functions and relations.
1.4 The student will use numerical, algebraic, and graphical representations of functions and relations in order to solve real-world problems.
4.1 The student will describe and represent numbers and their relationships.
4.2 The student will estimate and compute using mental strategies, paper and pencil, and technology.

Essential Questions

How do exponential functions model real-world problems and their solutions?

How do logarithmic functions model real-world problems and their solutions?

How are expressions involving exponents and logarithms related?

Enduring Understanding

The characteristics of exponential and logarithmic functions and their representations are useful in solving real-world problems.

Indicators

1.1.A2.7	represent exponential functions, including base *e*, numerically, algebraically, and graphically.
1.1.A2.8	represent logarithmic functions, including base *e*, numerically, algebraically, and graphically.
1.2.A2.3	describe the properties of exponential functions including domain and range, increasing, decreasing, continuous, maximum and minimum values, end behaviors, symmetry, asymptotes, and zeros.
1.2.A2.4	describe the properties of logarithmic functions including domain and range, increasing, decreasing, continuous, maximum and minimum values, end behaviors, symmetry, asymptotes, and zeros.
1.2.A2.5	describe the inverse relationship between exponential and logarithmic functions numerically, graphically, and algebraically.
1.3.A2.2	describe the effect of transformations on graphs of exponential functions, $f(x) = a(b)^{x-h} + k$.
1.4.A2.2	solve exponential equations using graphs, the laws of exponents, or the inverse relationship with logarithms.
1.4.A2.3	solve logarithmic equations using graphs and the inverse relationship with exponents.
1.4.A2.12	interpret and solve problems involving exponential functions.
4.1.A2.1	write equivalent forms for exponential and logarithmic expressions and equations.
4.2.A2.3	evaluate logarithmic expressions.
1.4.A2.16	make predictions using quadratic, exponential, or logarithmic mathematical models given a set of data.
1.4.A2.17	choose appropriate models, quadratic, exponential, or logarithmic, based on an analysis of the patterns of change in data.