## 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.

## Essential Questions

Why are relations and functions represented in multiple ways?

How are the properties of functions and functional operations useful?

## Enduring Understandings

Relations and functions can be represented numerically, graphically, algebraically, and/or verbally.

The properties of functions and function operations are used to model and analyze real-world applications and quantitative relationships.

## Indicators

1.1.A2.10    represent piecewise functions involving linear, absolute value, and step functions numerically, algebraically, and graphically.

1.2.A2.1    describe functions using domain and range, one-to-one, increasing, decreasing, continuous, maximum and minimum values, and symmetry.

1.2.A2.7    describe the properties of a piecewise function involving linear, absolute value, and step functions.

1.3.A2.1    describe the effect of transformations on the graph of $f(x)$, including $af(x), f(x-h),$ and $f(x)+k$.

1.3.A2.4    perform operations on functions, including determining the composition of two functions.

*1.3.A2.5    determine the domain of the composition of two functions.*

1.3.A2.6    determine whether two functions are inverses analytically and graphically.

1.3.A2.7    determine the inverse of a function.

*1.3.A2.9    modify the domain of a function so that its inverse is a function.*

1.4.A2.15    interpret and solve problems involving piecewise functions including linear, absolute value, and step functions.