Goal 1: Functions and Algebra

The student will demonstrate the ability to investigate, interpret, and communicate solutions to mathematical and real-world problems using patterns, functions, and algebra.

1.1 Expectation: The student will analyze a wide a variety of patterns and functional relationships using the language of mathematics and appropriate technology.

    Indicators
1.1.1   The student will recognize, describe, and/or extend patterns and functional relationships that are expressed numerically, algebraically, and/or geometrically.
    The student will:
        1.1.1.a determine whether a relation that is expressed numerically or graphically is a function.
1.1.1.1 The student will recognize and describe linear functions that are expressed numerically, algebraically, and/or graphically.
1.1.1.2 The student will recognize and describe exponential functions that are expressed numerically, algebraically, and/or graphically.
1.1.1.3 The student will recognize and describe quadratic functions that are expressed numerically, algebraically, and/or graphically.

1.1.2   The student will represent patterns and/or functional relationships in a table, as a graph, and/or by mathematical expression.
1.1.2.1 The student will describe the effect of a change in the parameters a and b on the graph of a linear function $f(x) = ax + b$.
1.1.2.2 The student will represent linear functions numerically, algebraically, and/or graphically.
1.1.2.3 The student will describe the effect of a change in the parameters a and b on the graph of $f(x) = a(b)^x$.
1.1.2.4 The student will represent exponential functions numerically, algebraically, and/or graphically
1.1.2.5 The student will describe the effect of a change in the parameters a, h, and k on the graph of $f(x) = a(x - h)^2 + k$.
1.1.2.6 The student will represent quadratic functions numerically, algebraically, and/or graphically.

1.1.3   The student will apply addition, subtraction, multiplication, and/or division of algebraic expressions to mathematical and real-world problems.

1.1.3.1 The student will simplify expressions using the laws of exponents.

1.1.3.2 The student will write polynomials in standard form.

1.1.3.3 The student will add and subtract polynomials.

1.1.3.4 The student will multiply polynomials.

1.1.3.5 The student will divide a polynomial by a monomial.

1.1.3.6 The student will represent a polynomial as a product of a monomial and a polynomial.

1.1.3.7 The student will represent a quadratic polynomial as a product of two linear factors**.**

1.1.4   The student will describe the graph of a non-linear function and discuss its appearance in terms of the basic concepts of maxima and minima, zeros (roots), rate of change, domain and range, and continuity.

1.1.4.1 The student will identify the properties of a quadratic function.

1.1.4.2 The student will identify the properties of an exponential function.

1.1.4.3 The student will solve a quadratic equation using a graph, factors, or the quadratic formula.

1.1.4.4 The student will compare and contrast the properties of the following functions: linear, exponential, quadratic, absolute value, and piece-wise

1.2 Expectation: The student will model and interpret real-world situations using the language of mathematics and appropriate technology.

Indicators

1.2.1   The student will determine the equation for a line, solve linear equations, and/or describe the solutions using numbers, symbols, and/or graphs.
          The student will:
          1.2.1.a solve an equation for a specified variable.

1.2.1.1 The student will determine the rate of change and the x and y-intercepts of the graph of a linear function represented numerically, algebraically, and graphically.

1.2.1.2 The student will interpret properties of linear functions, including rate of change, intercepts, and continuity, in the context of a real-world situation.

1.2.1.3 The student will identify, describe, and apply the properties of a direct variation.

1.2.2   The student will solve linear inequalities and describe the solutions using numbers, symbols, and/or graphs.
> The student will:
> 1.2.2.a graph an inequality, write and/or solve an inequality, or interpret an inequality in the context of a problem.

1.2.2.1 The student will interpret and solve absolute value equations and inequalities.

1.2.3   The student will solve and describe using numbers, symbols, and/or graphs if and where two straight lines intersect.
> The student will:
> 1.2.3.a write a system of equations for a real world situation that is expressed verbally, numerically, or graphically.
> 1.2.3.b describe the graph of a system of linear relationships.

1.2.4   The student will describe how the graphical model of a non-linear function represents a given problem and will estimate the solution.

1.2.4.1 The student will solve a real-world problem involving inverse variation and discuss its properties.

1.2.4.2 The student will solve a real-world problem involving an exponential function.

1.2.4.3 The student will solve a real-world problem involving a quadratic function.

1.2.5   The student will apply formulas and/or use matrices (arrays of numbers) to solve real-world problems.

Goal 3: Data Analysis and Probability
The student will demonstrate the ability to apply probability and statistical methods for representing and interpreting data and communicating results, using technology as needed.

3.1 Expectation: The student will collect, organize, analyze, and present data.

Indicators
3.1.1   The student will design and/or conduct an investigation that uses statistical methods to analyze data and communicate results.
> The student will:
> 3.1.1.a design an investigation that may include simple random sampling, representative sampling, and/or probability simulations, describe how data will be collected, and justify the method.
> 3.1.1.b decide and justify whether a sample is representative or biased.
> 3.1.1.c decide and justify whether a sampling method is simple random sampling.

3.1.2 **The student will use the measures of central tendency and/or variability to make informed conclusions.**
>   The student will:
>   3.1.2.a use the measures of central tendency and variability to draw informed conclusions.

3.1.2.1 The student will evaluate inferences and predictions that are based on data analysis.

3.1.3 **The student will calculate theoretical probability or use simulations or statistical inference from data to estimate the probability of an event.**
>   The student will:
>   3.1.3.a calculate the theoretical probability of an event for a chance situation.
>   3.1.3b determine the experimental probability of an event using data.

3.2 Expectation: The student will apply the basic concepts of statistics and probability to predict possible outcomes of real-world situation.

Indicators
3.2.1 **The student will make informed decisions and predictions based upon the results of simulations and data from research.**

3.2.2 **The student will interpret data and/or make predications by finding and using a line of best fit and by using a given curve of best fit.**

3.2.2.1 The student will make predictions based on an exponential curve of best fit.

3.2.3 **The student will communicate the use and misuse of statistics.**