**Math 30-1 Specific Outcomes**

**Strand:** Trigonometry

**General Outcome:** Develop trigonometric reasoning.

1. **Angles -** Demonstrate an understanding of angles in standard position, expressed in degrees and radians.

* I can sketch an angle in standard position for
* I can express the measure of an angle in radians.
* I can express a measure in degrees as radians and radians as degrees.
* I can determine co-terminal angles in radians and degrees.
* I can solve problems using radians and degrees.

1. **Unit Circle -** Develop and apply the equation of the unit circle

* I can develop the unit circle.
* I can write the equation of a circle centered at the origin.
* I can relate the unit circle to the primary trigonometric ratios ()
* I can use the unit circle to solve problems.

1. **Sin, Cos, Tan, Csc, Sec, Cot -** solve problems, using the six trigonometric ratios for angles expressed in radians and degrees.

* I can determine the approximate value of a trigonometric ratio for and angle expressed in radians or degrees.
* I can determine the exact value of a trigonometric ratio of angles that are multiples of .
* I can determine the exact value of a trigonometric ratio of angles that are multiples of .
* I can determine the measures of the angles, in degrees, given the trigonometric ratio.
* I can determine the measures of the angles, in radians, given the trigonometric ratio.
* I can determine the exact value of the primary trigonometric ratios given a point on the terminal arm.
* I can determine the angle, in radians and degrees, given a point on the terminal arm.
* I can solve problems using trigonometric ratios.

1. **Sine, Cosine, and Tangent graphs –** Graph and analyze the trigonometric functions sine, cosine and tangent to solve problems.

* I can sketch the graph of , and .
* I can determine the amplitude of a trigonometric graph.
* I can determine the period of a trigonometric graph.
* I can determine the asymptotes of a trigonometric graph.
* I can determine the maximums and minimums of a trigonometric function.
* I can determine the domain and range of a trigonometric graph.
* I can determine the zeros of a trigonometric graph.
* I can write a trigonometric equation given a graph.
* I can use a trigonometric equation to solve a problem.

1. **Trigonometric Equations –** Solve, algebraically and graphically, first and second degree trigonometric equations with the domain expressed in degrees and radians

* I can determine the solution(s) of a trigonometric equation graphically.
* I can determine the solution(s) of a trigonometric equation algebraically.
* I can verify the solution(s) to a trigonometric equation.
* I can determine the general solution to a trigonometric equation. n

1. **Trigonometric Identities -**  Prove trigonometric identities, using:

* Reciprocal identities
* Quotient identities
* Pythagorean identities
* Sum or difference identities (restricted to sine, cosine and tangent)
* Double-angle identities (restricted to sine, cosine and tangent)
* I can verify a trigonometric identity.
* I can prove a trigonometric identity graphically.
* I can prove a trigonometric identity algebraically.
* I can use trigonometric identities to solve problems.

**Strand:** Relations and Functions

**General Outcome:** Develop algebraic and graphical reasoning through the study of relations.

1. **Operations on Composite Functions -** Demonstrate an understanding of operations on, and compositions of, functions.

* I can sketch the graph that is the sum or difference of two given graphs.
* I can sketch the graph that is the product or quotient of two given graphs.
* I can determine the sum, difference, product or quotient of two functions given their equations.
* I can determine the domain and range of the sum, difference, product or quotient of two or more functions.
* I can determine the value of a point of a composite function.
* I can determine the equation of a composite function.
* I can explain any restriction on a composite function.

1. **Translations -** Demonstrate an understanding of the effects of horizontal and vertical translations on the graphs of functions and their related equations.

* I can identify horizontal and vertical translations given graphs.
* I can identify horizontal and vertical translations given equations.
* I can sketch horizontal and vertical translations given a graph.
* I can sketch horizontal and vertical translations given an equation.
* I can write the equation of a graph that has been translated horizontally and/or vertically.

1. **Stretches –** Demonstrate an understanding of the effects of horizontal and vertical stretches on the graphs of functions and their related equations.

* I can identify vertical and horizontal stretches given graphs.
* I can identify vertical and horizontal stretches given equations.
* I can sketch horizontal and vertical stretches given a graph.
* I can sketch horizontal and vertical stretches given an equation.
* I can write the equation of a graph that has been stretched vertically and horizontally.

1. **Translations and Stretches -** Apply translations and stretches to the graphs and equations of functions.

* I can sketch the graph of a function that has had horizontal and/or vertical stretches and/or translations applied, given graphs.
* I can sketch the graph of a function that has had horizontal and/or vertical stretches and/or translations applied, given the equations.
* I can write the equation of a function that has had vertical and/or horizontal stretches and/or translations applied.
* I can solve problems involving stretches and translations.

1. **Reflections –** Demonstrate an understanding of the effects of reflections on the graphs of functions and their related equations, including reflections through the:

* x-axis
* y-axis
* line
* I can sketch the reflection of a graph on the x-axis.
* I can sketch the reflection of a graph on the y-axis.
* I can sketch the reflection of a graph on the line
* I can write the equation of a graph that has been reflected in the x-axis.
* I can write the equation of a graph that has been reflected in the y-axis.
* I can write the equation of a graph that has been reflected in the line
* I can solve problems that involve reflections.

1. **Inverse Functions –** Demonstrate an understanding of inverses of relations.

* I can sketch the graph of an inverse function given a graph.
* I can sketch the graph of an inverse function given an equation.
* I can determine the domain and range of an inverse function.
* I can solve problems that involve inverse functions.

1. **Logarithms –** Demonstrate an understanding of logarithms.

* I can write a logarithmic expression as an exponential expression.
* I can write an exponential expression as a logarithmic expression.
* I can determine the exact value of a logarithm that is exact.
* I can estimate the value of a logarithm that is not exact.

1. **Laws of Logarithms -**  Demonstrate and understanding of the product, quotient and power laws of logarithms.

* I can develop the product law of logarithms.
* I can use the product law of logarithms to simplify expressions.
* I can develop the quotient law of logarithms.
* I can use the quotient law of logarithms to simplify expressions.
* I can develop the power laws of logarithms.
* I can use the power laws of logarithms to simplify expressions.
* I can solve problems using the laws of logarithms.

1. **Graphs of Exponential and Logarithmic Functions –** Graph and analyze exponential and logarithmic functions.

* I can sketch the graph of an exponential function.
* I can determine the domain and range of an exponential function.
* I can determine horizontal asymptotes of an exponential function.
* I can determine the intercepts of an exponential function.
* I can sketch the graph of a logarithmic function.
* I can determine the domain and range of a logarithmic function.
* I can determine the vertical asymptote of a logarithmic function.
* I can determine the intercepts of a logarithmic function.
* I can solve problems involving exponential and logarithmic functions.

1. **Exponential and Logarithmic Equations -** Solve problems that involve exponential and logarithmic equations.

* I can determine the solution to exponential equations.
* I can determine the solution to logarithmic equations.
* I can verify a solution to a logarithmic equation.
* I can explain why a solution to a logarithmic equation may be extraneous.
* I can solve problems that involve exponential growth or decay.
* I can use logarithmic equations to solve problems.

1. **Factoring Polynomials –** Demonstrate an understanding of factoring polynomials of degree greater than 2 (limited to polynomials of degree with integral coefficients).

* I can divide a polynomial by a binomial.
* I can factor a polynomial of degree .
* I can solve problems that involve polynomials.

1. **Graphs of Polynomial Functions -** Graph and analyze polynomial functions (limited to polynomials of degree ).

* I can identify the leading coefficient of a polynomial.
* I can explain the role of the leading coefficient of a polynomial.
* I can explain the role of the constant of a polynomial.
* I can sketch the graph of a polynomial function.
* I can determine the roots, zeros, or x-intercepts of a polynomial.
* I can solve problems using polynomials.

1. **Graphs of Radical Functions –** Graph and analyze radical functions (limited to functions involving one radical).

* I can sketch the graph of a radical function.
* I can determine the domain and range of a radical function.
* I can apply transformations to a radical function.
* I can determine the approximate solution to a radical equation.
* I can solve problems involving the graphs of radical functions.

1. **Graphs of Rational Functions –** Graph and analyze rational functions (limited to numerators and denominators that are monomials, binomials or trinomials).

* I can graph a rational function.
* I can determine the behavior of a rational function near the non-permissible values.
* I can determine, graphically, the approximate solution of a rational equation.
* I can solve problems using the graphs of rational functions.

**Strand:** Permutations and Combinations

**General Outcome:** Develop algebraic and numerical reasoning that involves combinatorics.

1. **Fundamental Counting Principle –** Apply the fundamental counting principle to solve problems.

* I can explain why the fundamental counting principle works.
* I can solve problems using the fundamental counting principle.

1. **Permutations –** Determine the number of permutations of elements taken at a time to solve problems.

* I can write factorial notation.
* I can use factorial notation to solve problems.
* I can solve problems using permutations.

1. **Combinations –** Determine the number of combinations of different elements taken at a time to solve problems.

* I can determine where to use a permutation versus a combination.
* I can solve problems using combinations.

1. **Binomial Theorem –** Expand powers of a binomial in a variety of ways, including using the binomial theorem (restricted to exponents that are natural numbers).

* I can expand a binomial.
* I can write Pascal’s triangle.
* I can use Pascal’s triangle when expanding a binomial.
* I can solve problems involving the binomial theorem.