

**Scope and Sequence**

**Pre-calculus**

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| Unit # | Title of Unit | # of Days | Objectives |
| 1 | Functions & Their Graphs | 15 | Goal. The students will demonstrate the ability to solve equations and use function notation. The students will develop skills in constructing and interpreting graphs of functions.  Objectives – The student will be able to:   * Determine whether a relation is a function. * Determine the domain of a function. * Evaluate functions using function notation * Evaluate piecewise-defined and greatest integer functions. * Analyze graphs to determine domain and range, local maxima and minima, and   intervals where they are increasing and decreasing.   * Find the vertex and intercepts of a quadratic function and sketch its graph. * Transform graphs of parent functions. * Determine whether a graph is symmetric with respect to the x-axis, y-axis, and/or   origin.   * Perform addition, subtraction, multiplication, division, and composition of functions. * Define inverse relations and functions and determine whether an inverse relation is a   function.   * Verify inverses using composition. |
| 2 | Polynomial and Rational Functions | 5 | Goal. The students will demonstrate the ability to solve polynomial equations and  sketch and analyze graphs of polynomial and rational functions.  Objectives – The student will be able to:   1. Analyze and sketch polynomial functions using continuity, end behavior, intercepts,   local extrema, and points of inflections.   1. Use polynomial functions to model and solve real-world problems. 2. Find the domain of a rational function. 3. Identify intercepts, holes, vertical, horizontal, and slant asymptotes in order to sketch   graphs of rational functions. |
| 3 | Exponential and Logarithmic Functions | 15 | Goal. The students will demonstrate the ability to use the laws of exponents and  logarithms and apply them to real-world situations.  Objectives – The student will be able to:   1. Simplify expressions containing radicals or rational exponents. 2. Graph and identify transformations of exponential functions, including the number e. 3. Use exponential functions to model and solve real-world problems. 4. Graph and identify transformations of logarithmic functions. 5. Evaluate logarithms to any base with and without a calculator. 6. Apply properties and laws of logarithms to simplify and evaluate expressions. 7. Solve exponential and logarithmic equations. 8. Use exponential, logarithmic, and logistic models to solve real-world problems. 9. For sets of data, Create and Use Calculator Generated Models. |
| 4 | Trigonometry | 10 | Goal. The students will demonstrate the ability to define trigonometric ratios and  apply trigonometry to solve real-world problems.  Objectives – The student will be able to:   1. Define and evaluate the six trigonometric ratios. 2. Solve triangles using trigonometric ratios. 3. Define radian measure and convert angle measures between degrees and radians. 4. Define the trigonometric functions in terms of the unit circle. 5. Develop basic trigonometric identities. 6. Use trigonometric functions to model and solve real-world problems, including right   triangle relations, arc length, and speed. |
| 5 | Trigonometric Graphs | 5 | Goal. The students will demonstrate the ability to sketch and analyze trigonometric  graphs and apply trigonometry to solve real-world problems.  Objectives – The student will be able to:   * Graph the sine, cosine, and tangent functions. * Identify the domain and range of a basic trigonometric function. * Graph transformations of the sine, cosine, and tangent graphs. * Identify and sketch the period, amplitude (if any), and phase shift of the cosine, sine,   and tangent functions.   * Use trigonometric graphs to model and solve real-world problems. |
| 6 | Trigonometric  Equations and Identities | 10 | Goal. The students will demonstrate the ability to solve trigonometric equations,  investigate inverse trigonometric functions and use trigonometric identities.  Objectives – The student will be able to:   1. Solve trigonometric equations graphically and algebraically. 2. Define the domain and range of the inverse trigonometric functions. 3. Write a trigonometric function to model and solve real-world problems. 4. Apply strategies to prove identities. 5. Use the addition and subtraction identities for sine, cosine, and tangent functions. 6. Use the double-angle and half-angle identities. 7. Use identities to solve trigonometric equations. 8. Solve triangles using the Law of Cosines. 9. Solve triangles using the Law of Sines. |
| 7 | Parametric and Polar Equations | 8 | * Parametric Equations * Polar Coordinates * Graphs of Polar Equations |
| 8 | Sequence and Series | 10 | Goal. The students will demonstrate the ability to identify and evaluate arithmetic and  geometric sequences and series.  Objectives – The student will be able to:   * Identify and graph an arithmetic sequence. * Write an arithmetic sequence recursively and explicitly. * Use summation notation. * Find the nth term and the nth partial sum of an arithmetic sequence. * Recognize a geometric sequence. * Write a geometric sequence recursively and explicitly. * Find partial sums of a geometric sequence. * Find the sum of an infinite geometric series. |
| 9  10 | Limits  Review | 6  4 | Goal. The students will demonstrate the ability to calculate limits algebraically and  estimate limits from graphs and tables of values.  Objectives – The student will be able to:   1. Use the informal definition of limit. 2. Use and apply the properties of limits to find the limit of various functions. 3. Find one-sided limits. 4. Determine if a function is continuous at a point or an interval. 5. Find the limit as x approaches infinity.   All units |