

## Advanced Algebra with Trigonometry 3124

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### **Course description:**

Advanced Algebra with Trigonometry is an advanced mathematics course that extends algebraic concepts and applications and that develops trigonometric functions and applications. Through meaningful problems and appropriate technologies, students will study a variety, radical, rational, polynomial, exponential, circular and logarithmic functions.

### **Standard 1.0: Algebra**

Students will extend algebraic concepts to model and solve problems in real-world situations by using a variety of functions, equations, and inequalities.

### **Learning Expectations:**

The student will:

- ☑ 1.1 represent situations that involve variable quantities with expressions, equations, inequalities, and matrices;
- ☑ 1.2 use appropriate methods and technologies to represent and characterize the solutions for a variety of equations, inequalities, and systems of equations and systems of inequalities;
- ☑ 1.3 demonstrate understanding of sequences and series.

### **Student Performance Indicators:**

- ☑ represent (graphically, algebraically, verbally, and numerically) and analyze a variety of functions (polynomial, rational, exponential, and logarithmic) and their characteristics
- ☑ graph a variety of functions using transformations;
- ☑ solve a variety of equations using appropriate methods;
- ☑ solve linear, quadratic, and polynomial inequalities using appropriate methods;
- ☑ solve real-world problems modeled by rational, polynomial, exponential, and logarithmic functions;
- ☑ use data analysis techniques to model real-world phenomena using functions.
- ☑ demonstrate an understanding of operations on matrices;
- ☑ solve real-world problems involving networks, finite graphs, and geometric transformations;
- ☑ recognize the difference between continuous and discrete situations;
- ☑ demonstrate an understanding of recursive and explicit definitions of functions and sequences;
- ☑ use sigma notation to represent arithmetic and geometric series;
- ☑ represent a sequence using a list, graph, symbols, and words;
- ☑ solve problems using permutations and combinations;
- ☑ apply the Binomial Theorem to expansion of binomials
- ☑ use the discriminants of quadratic equations to characterize the nature of the solutions to the equations and the x-intercepts of the graphs of the equations;
- ☑ write equations for conic sections and identify characteristics of the related graphs;
- ☑ recognize direct- and inverse-variation situations and solve real-world problems involving variation;
- ☑ graphs equations of the forms  $y = kx$ ,  $y = kx^2$ ,  $y = k/x$  and  $y = k/x^2$ .

**Standard 2.0: Trigonometry**

Students will demonstrate an understanding of trigonometric functions and apply them to problem situations and real-world phenomena.

**Learning Expectations:**

The student will:

- 2.1 apply trigonometry concepts and applications to problem situations;
- 2.2 connect trigonometric and circular functions;
- 2.3 interpret trigonometric functions represented graphically.

**Student Performance Indicators:**

- define the trigonometric functions using the unit circle;
- determine values of the trigonometric functions for special angles using the unit circle and the symmetry of the circle;
- graph the trigonometric functions;
- understand amplitude, period, phase shift, and vertical shift and apply to graphing trigonometric functions;
- use trigonometric functions with appropriate technology to model periodic phenomena;
- verify trigonometric identities graphically and by substitution;
- solve trigonometric equations graphically
- use degrees and radians interchangeably to represent angle measure in problems and explain the advantages/disadvantages of a particular choice;
- solve real-world problems applying the trigonometric ratios, the Law of Sines, and the Law of Cosines;
- apply the trigonometric formulas for finding the areas of triangles and circular sectors and segments;
- derive the Pythagorean Identities.