> **Trigonometry - Honors**
> **Essential Curriculum**

Unit 0: Triangle Trigonometry

Goal: The student will demonstrate the ability to define trigonometric ratios and apply trigonometry to solve real-world problems.

Objectives - The student will be able to:
    a. Define and evaluate the six trigonometric ratios.
    b. Solve triangles using trigonometric ratios.
    c. Use the Law of Sines and Law of Cosines to solve triangles (AAS, ASA, or SSA).
    d. Use the Law of Sines and Law of Cosines to model and solve real-world problems.
    e. Use triangle trigonometry to model and solve real-world problems, including angles of elevation and depression, and indirect measurement, and areas of triangles.

Unit 1: Geometric Vectors

Goal: The student will demonstrate the ability to use a problem-solving approach in exploring the properties of vectors and applications of parametric equations.

Objectives – The student will be able to:
    a. Define a geometric vector.
    b. Find the norm (or magnitude) and direction of a geometric vector.
    c. Use vectors to model and solve real-world problems, including velocity, force, and air navigation.

Unit 2: Circular and Trigonometric Functions

Goal: The student will demonstrate the ability to define trigonometric ratios and apply trigonometry to solve real-world problems.

Objectives – The student will be able to:
    a. Define radian measure and convert angle measures between degrees and radians, including revolutions.
    b. Find the measures of coterminal angles.
    c. Find and state the six trigonometric functions of special and quadrantal angles.
    d. Find and state the six circular and trigonometric functions.
    e. Identify and distinguish between circular and trigonometric functions.
    f. Develop basic trigonometric identities.
    g. Use trigonometric functions to model and solve real-world problems, including right triangle relations, arc length, speed, and uniform circular motion.

Unit 3: Trigonometric Graphs

Goal: The student 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:
    a. Graph the sine, cosine, and tangent functions.
    b. Identify the domain and range of a basic trigonometric function.
    c. Sketch transformations of the sine, cosine, and tangent graphs.
    d. Sketch the cosecant, secant, and cotangent functions and their transformations.
    e. Identify and sketch the period, amplitude (if any), phase shift, zeroes, and vertical asymptotes (if any) of the six trigonometric functions.
    f. Use trigonometric graphs to model and solve real-world problems.

Unit 4: Inverse Circular and Trigonometric Functions

Goal: The student will demonstrate the ability to investigate and apply inverse circular and inverse trigonometric functions in order to prove basic identities.

Objectives – The student will be able to:
    a. Define the domain and range of the inverse circular functions.
    b. Evaluate the inverse circular functions.
    c. Define the domain and range of the inverse trigonometric functions and sketch the graph.
    d. Evaluate the inverse trigonometric functions.
    e. Use inverse functions to model and solve real-world problems.

Unit 5: Trigonometric Equations and Identities

Goal: The student will demonstrate the ability to solve trigonometric equations, prove and apply trigonometric identities.

Objectives – The student will be able to:
    a. Apply strategies to prove identities, including Pythagorean, and even and odd identities.
    b. Verify trigonometric identities graphically.
    c. Use the addition and subtraction identities for sine, cosine, and tangent functions.
    d. Use the double-angle and half-angle identities.
    e. Use identities to solve trigonometric equations.
    f. Solve trigonometric equations graphically and algebraically.

Unit 6: Analytic Geometry

Goal: The student will demonstrate the ability to explore conic sections algebraically and graphically.

Objectives – The student will be able to:
    a. Define a circle and write its equation.
    b. Analyze and sketch the graph of a circle.
    c. Define an ellipse and write its equation.
    d. Analyze and sketch the graph of an ellipse.
    e. Define a hyperbola and write its equation.
    f. Analyze and sketch the graph of a hyperbola.
    g. Define a parabola and write its equation.
    h. Analyze and sketch the graph of a parabola.
    i. Write the equation of and graph a translated conic section.
    j. Use conic sections to model and solve real-world problems.

Unit 7: Complex Numbers and Polar Equations

Goal: The student will demonstrate the ability to use a problem-solving approach in exploring the relationships between the complex plane, the Cartesian plane and the polar coordinate system.

Objectives – The student will be able to:
    a. Graph complex numbers on the complex plane.
    b. Find the trigonometric form of complex numbers.
    c. Apply DeMoivre's Theorem to complex numbers in trigonometric form.
    d. Change Cartesian coordinates to polar coordinates and vice versa.
    e. Plot points using polar coordinates and graph polar equations.
    f. Change equations from rectangular form to polar form and vice versa.