

Trigonometry Course Objectives

At the conclusion of the course, students will be able to:

1. Recognize and use the vocabulary of angles (including standard position, initial and terminal sides, quadrantal angles, coterminal angles, acute, right, and obtuse angles)
2. Use right triangles to evaluate the six trigonometric functions
3. Compute the six trigonometric functions of any angle and use the unit circle to define the six trigonometric functions for all real numbers
4. Know and draw the graphs of the six trigonometric functions and their variations
5. Understand the definitions of the inverse trigonometric functions
6. Know and apply identities involving the trigonometric functions
7. Find all solutions of a trigonometric equation
8. Recognize polar coordinates and use them to perform arithmetic on complex numbers
9. Recognize and use the vocabulary of vectors (vector, scalar, magnitude, direction) to perform arithmetic on vectors and to solve application problems

Trigonometry Learning Objectives

1. Recognize and use the vocabulary of angles (including standard position, initial and terminal sides, quadrantal angles, coterminal angles, acute, right, and obtuse angles)
 - (a) Use degrees and radians to measure angles
 - (b) Convert angles from degrees to radians and vice versa
 - (c) Compute the length of a circular arc given the radius and the interior angle ($s = r\theta$)
 - (d) Apply the concepts of linear and angular speed to solve problems concerning motion on a circular path
2. Use right triangles to evaluate the trigonometric functions
 - (a) State the trigonometric function values for 30° ($\frac{\pi}{6}$), 45° ($\frac{\pi}{4}$), and 60° ($\frac{\pi}{3}$)
 - (b) Evaluate trigonometric functions with a calculator
 - (c) Use right triangle trigonometry to solve application problems that can be visualized using right triangles
3. Compute the trigonometric functions of any angle and use the unit circle to define the trigonometric functions for all real numbers
 - (a) Define the trigonometric functions for any angle
 - (b) Identify the signs of the trigonometric functions
 - (c) Find reference angles and use them to evaluate trigonometric functions
 - (d) Identify even and odd trigonometric functions
4. Know and draw the graphs of the trigonometric functions and their variations

- (a) Compute the amplitude, period, phase shift, vertical shift, domain, and range of a sinusoidal function
 - (b) Compute the period, domain, range, vertical asymptotes, and x -intercepts of the tangent and cotangent functions
 - (c) Draw the graphs of $y = \csc x$ and $y = \sec x$; recognize the relationship between the graph of a cosecant function (respectively, secant) and the graph of a sine (respectively, cosine) function
5. Understand the definitions of the inverse trigonometric functions
- (a) Compute the domain and range of the inverse trigonometric functions
 - (b) Evaluate inverse trigonometric functions using a calculator
 - (c) Find exact values of composite functions with inverse trigonometric functions
6. Know and apply identities involving the trigonometric functions
- (a) Use fundamental trigonometric identities to verify other identities
 - (b) Apply the sum and difference formulas for sine, cosine, and tangent
 - (c) Apply the double-angle and half-angle formulas for sine, cosine, and tangent
 - (d) Apply the Law of Sines and/or the Law of Cosines either to solve oblique triangles, solve application problems, or both
7. Find all solutions of a trigonometric equation
- (a) Solve equations with multiple angles
 - (b) Solve trigonometric equations quadratic in form
 - (c) Use factoring to separate different functions in trigonometric equations
 - (d) Use identities to solve trigonometric equations
 - (e) Use a calculator to solve trigonometric equations
8. Use polar coordinates to perform arithmetic on complex numbers
- (a) Plot points in the polar coordinate system
 - (b) Convert a point from polar to rectangular coordinates and vice versa
 - (c) Convert an equation from rectangular to polar coordinates and vice versa
 - (d) Plot complex numbers in the complex plane
 - (e) Convert a complex number from polar to rectangular form and vice versa
 - (f) Compute products, quotients, powers, and complex roots of complex numbers in polar form
9. Use the vocabulary of vectors (vector, scalar, magnitude, direction) to perform arithmetic on vectors and to solve application problems
- (a) Construct a visual representation of scalar multiplication, vector addition, and vector subtraction
 - (b) Find the dot product of two vectors; find the angle between two vectors
 - (c) Use the dot product to determine if two vectors are orthogonal, parallel, or neither
 - (d) Find the projection of a vector onto another vector
 - (e) Write a vector as the sum of two orthogonal vectors
 - (f) Compute the work done by a constant force acting upon an object