

Trigonometry | Table of Contents

Chapter 1: Angles and Right Triangle Trigonometry

1.1 Vocabulary of Angles and Triangles

- Types of Angles
 - Identify right, acute, obtuse, and straight angles
 - Understand supplementary and complementary angles
- Angles, Triangles, and the Pythagorean Theorem
 - Find the measures of angles of a triangle using properties
 - Use properties of similar triangles to solve for a missing side
 - Use the Pythagorean theorem

1.2 Angles as Rotations and Arc Length

- Angles as Rotations and Radian Measures
 - Identify the measure of positive and negative angles in standard position and the quadrant of the terminal side
 - Convert between degree and radian measure of an angle
 - Understand when two angles are coterminal
- Arc Length and Area of a Sector
 - Find the length of an arc
 - Find the area of a sector of a circle
 - Understand the relationship between linear and angular speed

1.3 Right Triangle Trigonometry

- The Six Trigonometric Ratios
 - Use right triangles to evaluate sine, cosine, and tangent functions
 - Evaluate reciprocal trigonometric functions using right triangles for a sine, cosine, or tangent function
 - Evaluate trigonometric functions of angles not in standard position
- Use Right Triangle Trigonometry in Solving Problems
 - Find missing side lengths using trig ratios
 - Use right triangle trigonometry to solve applied problems

Chapter 2: The Unit Circle

2.1 Sine and Cosine

- Sine and Cosine Values
 - Understand sine and cosine values on the unit circle
 - Find exact sine and cosine values for angles in the first quadrant of the unit circle

2.2 Reference Angles

- Sine and Cosine Values with Reference Angles
 - Find the reference angle for a given angle
 - Use reference angles to evaluate sine and cosine functions
 - Use reference angles to find coordinates on the unit circle
 - Evaluate sine and cosine functions with a calculator

2.3 The Other Trigonometric Functions

- The Other Trigonometric Ratios on the Unit Circle
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- Find the secant, cosecant, tangent, and cotangent values for angles in the first quadrant of the unit circle
- Use reference angles to evaluate secant, cosecant, tangent, and cotangent functions
- Evaluate trigonometric functions with a calculator
- Use Given Trigonometric Ratios to Find Other Ratios
 - Understand the relationship between the quadrant in which an angle falls and the signs of the trig functions of that angle
 - Use the Pythagorean identity
 - Find the values of all trigonometric functions given coordinates on a unit circle
 - Find the values of all trigonometric functions given the value of one trigonometric function

Chapter 3: Periodic Functions

3.1 Sine and Cosine Graphs

- Characteristics of Sine and Cosine Graphs
 - Graph the sine function and understand its properties
 - Graph the cosine function and understand its properties
- Transformations of Sine and Cosine Graphs
 - Determine the period and amplitude of a sinusoidal function
 - Determine the phase shift and vertical shift of a sinusoidal function
- Graph Sine and Cosine Functions
 - Find the equation of a sinusoidal function given a graph
 - Find the graph of a sinusoidal function given equation
 - Use sinusoidal functions to solve real-world applications

3.2 Graphs of Other Trigonometric Functions

- Characteristics of Tangent and Cotangent Graphs
 - Graph tangent functions
 - Graph cotangent functions
- Transformations of Tangent and Cotangent Functions
 - Graph tangent or cotangent functions over different periods
 - Graph transformations of tangent and cotangent functions
- Characteristics of Secant and Cosecant Graphs
 - Graph cosecant functions
 - Graph secant functions
- Transformations of Secant and Cosecant Functions
 - Graph transformations of cosecant functions
 - Graph transformations of secant functions
 - Find the equation of a cosecant function from a graph
 - Find the equation of a secant function from a graph

3.3 Inverse Trigonometric Functions

- Introduction to Inverse Trigonometric Functions
 - Understand inverse sine, cosine, and tangent functions
 - Understand inverse secant, cosecant, and cotangent functions
 - Use a calculator to evaluate inverse trigonometric functions
 - Solve Triangles with Inverse Trigonometric Functions
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- Find an angle given two sides of a right triangle
- Solve right triangle problems
- Compose Functions with Inverse Trigonometric Functions
 - Evaluate composite functions with inverse trigonometric functions in the form $f(f^{-1}(x))$ or $f(g^{-1}(x))$
 - Evaluate composite functions with inverse trigonometric functions in the form $f^{-1}(f(x))$ or $f^{-1}(g(x))$

Chapter 4: Trigonometric Identities and Equations

4.1 Fundamental Trigonometric Identities

- Simplify Expressions with Basic Trigonometric Identities
 - Understand quotient and reciprocal identities
 - Use even and odd identities in simplifying trigonometric expressions
- Use Pythagorean and Cofunction Identities
 - Understand all forms of the pythagorean identity
 - Use the cofunction identities
- Verify Trigonometric Identities
 - Use all identities to simplify trigonometric expressions
 - Use algebraic techniques to simplify trigonometric expressions

4.2 Sum and Difference Identities

- Sum and Difference Formulas
 - Use the sum and difference formula for cosine
 - Use the sum and difference formula for sine
 - Use the sum and difference formula for tangent
 - Use the sum and difference formulas to simplify trigonometric expressions

4.3 Double-Angle, Half-Angle, and Reduction Formulas

- Double-Angle Formulas
 - Use double-angle formulas to find values of trigonometric functions
 - Use double-angle formulas to simplify trigonometric expressions
- Half-Angle and Power-Reduction Formulas
 - Use reduction formulas to simplify an expression
 - Use half-angle formulas to find values of trigonometric functions

4.4 Sum-to-Product and Product-to-Sum Formulas

- Sum-to-Product and Product-to-Sum Formulas
 - Express the product of trigonometric functions as a sum
 - Express sums of trigonometric functions as a product

4.5 Trigonometric Equations

- Trigonometric Equations in Sine and Cosine
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 - Solve trigonometric equations using a calculator
 - Trigonometric Equations in Quadratic Form or Requiring Factoring
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- Solve equations with a single trigonometric function
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- Solve trigonometric equations in quadratic form requiring the quadratic formula
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 - Solve trigonometric equations using fundamental identities
 - Solve trigonometric equations with multiple angles
 - Solve trigonometric equations using cofunction identities

Chapter 5: Further Applications of Trigonometry

5.1 Non-right Triangles - Law of Sines

- Law of Sines
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 - Use the law of sines to solve SSA triangles
 - Solve applied problems with the law of sines

5.2 Non-right Triangles - Law of Cosines and Area of Oblique Triangles

- Law of Cosines
 - Use the law of cosines to solve SAS triangles
 - Use the law of cosines to solve SSS triangles
 - Solve applied problems with the law of cosines
- Area of Oblique Triangles
 - Find the area of an oblique triangle using the sine function
 - Use Heron's formula to find the area of a triangle

5.3 Polar Coordinates

- Convert Coordinates Between Rectangular and Polar Forms
 - Plot points using polar coordinates
 - Convert from polar coordinates to rectangular coordinates
 - Convert from rectangular coordinates to polar coordinates
- Convert Equations Between Rectangular and Polar Forms
 - Write a cartesian equation in polar form
 - Write a polar equation in cartesian form

5.4 Graphs in Polar Coordinates

- Introduction to Graphing Polar Equations
 - Test a polar equation for symmetry
 - Find zeros and maximum values for a polar equation and graph polar equations by plotting points
 - Graph a circle or a line from a polar equation
- Graph Classic Polar Curves
 - Graph a cardioid from a polar equation
 - Graph a limaçon from a polar equation
 - Graph a lemniscate from a polar equation
 - Graph a rose curve from a polar equation

5.5 Polar Form of Complex Numbers

- Write Complex Numbers in Polar Form
 - Plot complex numbers
 - Find the absolute value of a complex number
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- Write complex numbers in polar form
- Convert a complex number from polar to rectangular form
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 - Find the product of complex numbers in polar form
 - Find the quotient of complex numbers in polar form
- Powers and Roots of Complex Numbers in Polar Form
 - Find powers of complex numbers in polar form
 - Find roots of complex numbers in polar form

5.6 Parametric Equations

- Write Parametric Equations
 - Parameterize a curve
 - Find the parametric equations for a line segment given an orientation
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 - Eliminate the parameter in polynomial and radical equations
 - Eliminate the parameter in exponential and logarithmic equations
 - Eliminate the parameter in trigonometric parametric equations

5.7 Graphs with Parametric Equations

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 - Use parametric equations in applications

5.8 Vectors

- Properties of Vectors
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 - Find magnitude and direction of a vector
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 - Add or subtract vectors
 - Multiply a vector by a scalar
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 - Find the unit vector
 - Perform operations on vectors in terms of i and j
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 - Find the angle between two vectors
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