

Trigonometry

Course Number: MA1403

Grade level: 12

Credits: 0.5

Prerequisite Courses: Algebra II

Course Description

In this one-semester course, students use their geometry and algebra skills to begin their study of trigonometry. Students will be required to express understanding using qualitative, quantitative, algebraic, and graphing skills. This course begins with a quick overview of right triangle relationships before introducing trigonometric functions and their applications. Students explore angles and radian measures, circular trigonometry and the unit circle. Students extend their understanding to trigonometric graphs, including the effects of translations and the inverses of trigonometric functions. This leads to the Laws of Sines and Cosines, followed by an in-depth exploration of trigonometric identities and applications. The course ends with an introduction to the polar coordinate system, complex numbers, and DeMoivre's Theorem.

Course Objectives

Throughout the course, you will meet the following goals:

- Define and apply the six trigonometric functions
- Understand the connection between trigonometric and circular functions
- Graph all six trigonometric functions and their transformations
- Solve problems in oblique triangles using the Law of Sines, Cosines, and area formulas
- Use the basic trigonometric identities to verify other trigonometric identities and to simplify complex trigonometry expressions
- Solve trigonometric equations
- Plot points and graph equations in the polar coordinate system
- Use trigonometry concepts to solve real-world problems

Student Expectations

This course requires the same level of commitment from you as a traditional classroom course would. Throughout the course, you are expected to spend approximately 5–7 hours per week online on the following activities:

- Interactive lessons that include a mixture of instructional videos and tasks
- Assignments in which you apply and extend learning in each lesson
- Assessments including quizzes, tests, and cumulative exams

Communication

Your teacher will communicate with you regularly through discussions, e-mail, chat, and system announcements. Through this communication with your teacher, you will monitor your progress through the course and improve your learning by reviewing material that was challenging for you.

You will also communicate with classmates, either via online tools or face-to-face, as you do the following:

- Collaborate on projects
- Ask and answer questions in your peer group
- Develop speaking and listening skills

Grading Policy

You will be graded on the work you do online and the work you submit electronically to your teacher. The weighting for each category of graded activity is listed below.

Assignments	10%
Lesson Quizzes	20%
Unit Tests	40%
Cumulative Exams	20%
Lab	10%
Additional	0%

Scope and Sequence

When you log into the Virtual Classroom, you can view the entire course map, which provides a scope and sequence of all topics you will study. Clicking a lesson's link in the course map leads to a page listing instructional activities, assignments, and learning objectives specific to that lesson. The units of study are summarized below.

- Unit 1:** Right Triangle Relationships
- Unit 2:** Applying Trigonometric Functions
- Unit 3:** Trigonometric Angles
- Unit 4:** Circular Trigonometry
- Unit 5:** Trigonometric Graphs
- Unit 6:** Translations of Trigonometric Graphs
- Unit 7:** Law of Sines
- Unit 8:** Trigonometric Identities
- Unit 9:** Trigonometric Identity Application
- Unit 10:** Polar Coordinate System

Unit	Topic	Lesson	Lesson Objectives
Right Triangle Relationships			
Right Triangle Relationships			
Angles and Degree Measure			
Convert decimal degree measures to degrees, minutes, and seconds and vice versa			
Find the number of degrees in a given number of rotations			
Identify angles that are conterminal with a given angle			
Pythagorean Theorem			
Apply the Pythagorean theorem to find side lengths of a right triangle			
Solve problems using the Pythagorean theorem in modeling situations			
Special Right Triangles			
Solve problems involving special right triangles in modeling situations			
Use properties of 45° - 45° - 90° and 30° - 60° - 90° triangles to find side lengths			
Trigonometric Ratios			
Apply trigonometric relationships to complementary angles to write equivalent expressions			
Determine the exact values of sine, cosine, and tangent for 30° , 45° , and 60°			
Identify and apply the trigonometric ratios of sine, cosine, and tangent			
Trigonometric Ratios in Right Triangles			
Find the values of trigonometric ratios for acute angles of right triangles			
Applying Trigonometric Functions			
Applying Trigonometric Functions			
Right Triangles			
Determine the sine, cosine, and tangent of an acute angle by using technology			
Determine the sine, cosine, and tangent of an angle using right triangles			
Identify sides and corresponding angles of a right triangle			
Use proportions to determine side lengths of similar right triangles			
Angle Relationships			
Demonstrate that the sine and cosine of complementary angles are equal			
Identify complementary angles			
Angles of Elevation and Depression			
Identify angles of elevation and depression in problem situations			
Solve problems involving angles of elevation and depression			
Inverse Functions			
Determine the inverse sine and cosine of a number using technology			
Determine the inverse tangent of a number			

Unit	Topic	Lesson	Lesson Objectives
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Applying Trigonometric Functions

Use trigonometry to find the measures of the sides of right triangles

Trigonometric Angles**Trigonometric Angles****Angles and Radian Measure**

Change from radian measure to degree measure, and vice versa

Find the area of a sector

Find the length of an arc given the measure of the central angle

Angles of Rotation

Find coterminal and reference angles.

Find the trigonometric function values of angles in standard position.

Functions of Angles

Find values of trigonometric functions for general angles.

Use reference angles to find values of trigonometric functions.

Circular Trigonometry**Circular Trigonometry****Circular Functions**

Define and use the trigonometric functions based on the unit circle.

Find the exact values of trigonometric functions of angles.

Trigonometric Functions on the Unit Circle

Find the values of six trigonometric functions of an angle in standard position given a point on its terminal side

Find the values of six trigonometric functions using the unit circle

Solving Right Triangles

Evaluate inverse trigonometric functions

Find missing angle measurements

Solve right triangles

Trigonometric Graphs**Trigonometric Graphs****The Sine Function**

Graph sine curves.

Identify properties of the sine function.

The Cosine Function

Graph and write cosine functions.

Solve trigonometric equations.

Unit	Topic	Lesson	Lesson Objectives
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Graphs of Sine and Cosine: Sinusoids

Generate graphs of the sine and cosine functions and explore various transformations of these graphs

The Tangent Function

Graph the tangent function.

Graphs of Tangent, Cotangent, Secant, and Cosecant

Learn tangent, cotangent, secant, and cosecant functions

Translations of Trigonometric Graphs

Translations of Trigonometric Graphs

Periodic Graphs and Amplitude

State the period and amplitude (if any) given the function rule or the graph of a sine, cosine, or tangent function

Use the period and amplitude (if any) to sketch the graph of a sine, cosine, or tangent function

Periodic Graphs and Phase Shifts

State the period, amplitude vertical shift, and phase shift given the function rule or graph of a sine or cosine function

Use graphs to determine whether an equation could possibly be an identity

Amplitude and Period

Determine the amplitude of the graph of $y = a \sin(bx)$ and $y = a \cos(bx)$ using a formula

Determine the period of the graph of $y = a \sin(bx)$ and $y = a \cos(bx)$ using a formula

Inverses of Trigonometric Functions

Evaluate trigonometric expressions involving inverses.

Trigonometric Inverses and Their Graphs

Find principal values of inverse trigonometric functions

Graph inverse trigonometric functions

Wavelength and Frequency

Determine the sine model for a given frequency

Know the relationship between wavelength and frequency

Law of Sines and Cosines

Law of Sines and Cosines

The Law of Sines

Find the area of a triangle if the measures of two sides and the included angle or the measures of two angles and a side are given

Solve triangles by using the Law of Sines if the measures of two angles and a side are given

The Ambiguous Case for the Law of Sines

Determine whether a triangle has zero, one, or two solutions

Solve triangles using the Law of Sines

Unit	Topic	Lesson	Lesson Objectives
			<p>The Law of Cosines</p> <p>Find the area of triangles if the measures of the three sides are given</p> <p>Solve triangles by using the Law of Cosines</p>
			<p>Trigonometric Identities</p> <p>Trigonometric Identities</p> <p>Trigonometric Identities</p> <p>Use identities to find trigonometric values.</p> <p>Use trigonometric identities to simplify expressions.</p> <p>Basic Trigonometric Identities</p> <p>Identify and use reciprocal identities, quotient identities, Pythagorean identities, symmetry identities, and opposite-angle identities</p> <p>Verifying Trigonometric Identities</p> <p>Verify trigonometric identities by transforming each side of the equation into the same form.</p> <p>Verify trigonometric identities by transforming one side of an equation into the form of the other side.</p> <p>Verifying Trigonometric Identities</p> <p>Find numerical values of trigonometric functions</p> <p>Use the basic trigonometric identities to verify other identities</p> <p>Sum and Difference Identities</p> <p>Use the sum and difference identities for the sine, cosine, and tangent functions</p> <p>Double-Angle and Half-Angle Identities</p> <p>Use the double- and half-angle identities for the sine, cosine, and tangent functions</p>
			<p>Trigonometric Identity Application</p> <p>Trigonometric Identity Application</p> <p>Solving Trigonometric Equations</p> <p>Solve real-world problems by using trigonometric equations.</p> <p>Solve trigonometric equations algebraically and graphically.</p> <p>Solving Trigonometric Equations</p> <p>Solve trigonometric equations and inequalities</p> <p>Normal Form of a Linear Equation</p> <p>Write linear equations in normal form</p> <p>Write the standard form of a linear equation given the length of the normal and the angle it makes with the x-axis</p> <p>Distance from a Point to a Line</p> <p>Find the distance between two parallel lines</p> <p>Find the distance from a point to a line</p> <p>Write equations of lines that bisect angles formed by intersecting lines.</p>

Unit	Topic	Lesson	Lesson Objectives
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Polar Coordinate System**Polar Coordinate System****Polar Coordinates**

Convert points and equations from polar to rectangular coordinates and vice versa

Graphs of Polar Equations

Graph polar equations and determine the maximum r-value and the symmetry of a graph

Complex Numbers

Add, subtract, multiply, and divide complex numbers; and find complex zeros of quadratic functions

De Moivre's Theorem and nth Roots

Represent complex numbers in trigonometric form and perform operations on them