**COURSE DESCRIPTION**

**Course Title:** Trigonometry

**Course Number:** 00275

**Course Prerequisites:** Grade of 75% or higher in Algebra I College Preparatory, Algebra II College
 Preparatory, and Geometry College Preparatory

**Course Description:** Trigonometry is a specialized branch of geometry that deals with the study of triangles. In trigonometry, mathematicians study the relationships between the sides and angles of triangles. Right triangles are a key area of study in this area of mathematics. The content of this course includes the study of functions and graphs, Pythagorean Theorem, the six trigonometric functions and their graphs, trigonometric identities, the Law of Sine and Cosine applied to triangles and inverse functions and equations. Applications of this branch of mathematics and algebra in real life are many and varied. This course is recommended for students interested in pursuing careers in engineering, surveying, astronomy, architecture, and aeronautical studies. District marking period assessments are required.

**Suggested Grade Level**: Grades 11-12

**Length of Course:** Two Semesters

**Units of Credit:** 1

**PDE Certification and Staffing Policies and Guidelines (CSPG) Required Teacher Certifications:**

CSPG #50 Mathematics (7-12)

To find the CSPG information, go to [CSPG](https://www.education.pa.gov/Educators/Certification/Staffing%20Guidelines/Pages/default.aspx)

**Certification verified by the WCSD Human Resources Department:** [x] Yes [ ] No

**WCSD STUDENT DATA SYSTEM INFORMATION**

**Course Level:** Academic

**Mark Types:** Check all that apply.

[x] F – Final Average [x] MP – Marking Period [x] EXM – Final Exam

**GPA Type**: [ ]  GPAEL-GPA Elementary [ ]  GPAML-GPA for Middle Level [x]  NHS-National Honor Society

[x]  UGPA-Non-Weighted Grade Point Average [x]  GPA-Weighted Grade Point Average

**State Course Code**: 02106

To find the State Course Code, go to [State Course Code](https://nces.ed.gov/forum/sced.asp), download the Excel file for *SCED*, click on SCED 6.0 tab, and choose the correct code that corresponds with the course.

**TEXTBOOKS AND SUPPLEMENTAL MATERIALS**

**Board Approved Textbooks, Software, and Materials:**

**Title:**  *Trigonometry 12th Edition*

**Publisher:** Pearson Education, Inc.

**ISBN #:**  978-0-13-655216-1

**Copyright Date:** 2021

**WCSD Board Approval Date:** 6/29/2020

**Supplemental Materials:** Kuta Software, SAS pdesas.org, Khan Academy, Brainfuse,
 Online Calculator: Desmos, Graphing Calculator: TI-83 Plus

**Curriculum Document**

**WCSD Board Approval:**

**Date Finalized:** 5/23/2022

**Date Approved:**  6/13/2022

**Date(s) Revised:**  6/12/2023 **Implementation Year:**  2022-2023

**SPECIAL EDUCATION, 504, and GIFTED REQUIREMENTS**

The teacher shall make appropriate modifications to instruction and assessment based on a student’s Individual Education Plan (IEP), Chapter 15 Section 504 Plan (504), and/or Gifted Individual Education Plan (GIEP).

**SCOPE AND SEQUENCE OF CONTENT, AND CONCEPTS**

**Marking Period 1: Trigonometric Functions, and Acute Angles and Right Triangles**

* Angles
* Angle Relationships and Similar Triangles
* Trigonometric Functions
* Usage of the Definitions of the Trigonometric Functions
* Trigonometric Functions of Acute Angles
* Trigonometric Functions of Non-Acute Angles
* Approximations of Trigonometric Function Values
* Solutions of Right Triangles
* Applications of Right Triangles
* **Marking Period 1 Review and Assessment**

**Marking Period 2: Radian Measure and the Unit Circle, and Graphs of Circular Functions**

* Radian Measure
* Application of Radian Measure
* The Unit Circle and Circular Functions
* Linear and Angular Speed
* Graphs of the Sine and Cosine Functions
* Translations of the Graphs of the Sine and Cosie Functions
* Graphs of the Tangent and Cotangent Functions
* Graphs of the Secant and Cosecant Functions
* Harmonic Motion
* **Marking Period 2 Review and Assessment**

**Marking Period 3: Trigonometric Identities and Inverse Circular Functions**

* Fundamental Identities
* Verification of Trigonometric Identities
* Sum and Difference Identities for Cosine
* Sum and Difference Identities for Sine and Tangent
* Double-Angle Identities
* Half Angle Identities
* Inverse Circular Functions
* **Marking Period 3 Review and Assessment**

**Marking Period 4: Trigonometric Equations and Applications of Trigonometry**

* Trigonometric Equations I
* Trigonometric Equations II
* Equations Involving Inverse Trigonometric Functions
* Oblique Triangles and the Law of Sines
* The Ambiguous Case of the Law of Sines
* The Law of Cosines
* **Marking Period 4 Review and Assessment**

**Standards/Eligible Content and Skills**

| **Performance Indicator** | **PA Core Standard and/or Eligible Content** | **Marking Period Taught**  |
| --- | --- | --- |
| Identify and describe basic geometric figures | G-CO.1 | MP1 |
| Find measures of complementary and supplementary angles | CC.2.3.HS.A.3 | MP1 |
| Perform calculations with degrees, minutes, and seconds | F-TF.1 | MP1 |
| Convert between angle measures of decimal degrees and degrees, minutes, and seconds | F-TF.1 | MP1 |
| Find measures of coterminal angles | CC.2.3.HS.A.14 | MP1 |
| Solve real-world and mathematical revolution and angle problems | CC.2.3.H.S.A.14 | MP1 |
| Find angle measures: Parallel lines intersected by a transversal, Angle Sum Triangle Property, Similar triangles | CC.2.3.HS.A.6 | MP1 |
| Solve real-world and mathematical problems involving similar triangles | CC.2.3.HS.A.6CC.2.3.HS.A.14 | MP1 |
| Use the Pythagorean Theorem and the distance formula to calculate the six trigonometric ratios | CC.2.2.HS.C.9F-TF.8 G-SRT.8 | MP1 |
| Find the values of the six trigonometric functions of an angle when the terminal side passes through a point or defined by a conditional equation | F-TF.3 G-SRT.6 | MP1 |
| Find the values of the six trigonometric functions of quadrantal angles | F-TF.3 G-SRT.6 | MP1 |
| Use trigonometric function values of quadrantal angles to evaluate expressions | F-TF.3 G-SRT.6 | MP1 |
| Find function values using Reciprocal Identities | F-TF.3 G-SRT.6 | MP1 |
| Determine the signs of non-quadrantal angles | F-TF.3 G-SRT.6 | MP1 |
| Identify the quadrant of an angle | F-TF.3 G-SRT.6 | MP1 |
| Determine whether a value is in the range of a trigonometric function | F-TF.3 G-SRT.6 | MP1 |
| Find all function values given one value and the quadrant | F-TF.3 G-SRT.6 | MP1 |
| Apply the Pythagorean and Quotient Identities to find function values | CC.2.2.HS.C.9F-TF.8 | MP1 |
| Find trigonometric function values of an acute angle | F-TF.3 G-SRT.6 | MP1 |
| Write trigonometric functions in terms of cofunctions | F-TF.7 G-SRT.7 | MP1 |
| Solve equations using cofunction identities | CC.2.2.HS.D.10F-TF.7 G-SRT.7 | MP1 |
| Compare trigonometric function values of acute angles | F-TF.3 G-SRT.6 | MP1 |
| Find exact trigonometric function values of special angles: 30o, 45o, 60o | CC.2.2.HS.C.7G-SRT.6 | MP1 |
| Find reference angle measures | CC.2.2.HS.C.7G-SRT.6 | MP1 |
| Find exact values of the six trigonometric functions of a quadrantal angle | CC.2.2.HS.C.7G-SRT.6 | MP1 |
| Find exact trigonometric function values of expressions using reference angles | CC.2.2.HS.C.7G-SRT.6 | MP1 |
| Evaluate trigonometric expressions using function values of special angles | CC.2.2.HS.C.7G-SRT.6 | MP1 |
| Evaluate trigonometric expressions using coterminal angles to find function values | CC.2.2.HS.C.7G-SRT.6 | MP1 |
| Find an angle measure given an interval and a trigonometric function value | CC.2.2.HS.C.7G-SRT.6 | MP1 |
| Find approximate trigonometric function values with a calculator | F-TF.3 | MP1 |
| Use inverse trigonometric functions to find angles | F-TF.7 | MP1 |
| Solve real-world and mathematical grade resistance problems | CC.2.3.HS.A.7CC.2.3.HS.A.14 | MP1 |
| Solve a right triangle given an angle and a side | CC.2.3.HS.A.7G-SRT.8 | MP1 |
| Solve a right triangle given two sides | CC.2.3.HS.A.7G-SRT.8 | MP1 |
| Solve real-world and mathematical problems involving the angles of elevation and depression | CC.2.3.HS.A.7G-SRT.8 | MP1 |
| Solve real-world and mathematical problems involving bearing | CC.2.3.HS.A.7G-SRT.8 | MP1 |
| Solve real-world and mathematical problems using trigonometry to measure a distance | CC.2.3.HS.A.7G-SRT.8 | MP1 |
| **Marking Period 1 Review and Assessment** |  | **MP1** |
| * Review and demonstrate knowledge of Trigonometric Functions
 |  | MP1 |
| * Review and demonstrate knowledge of Acute Angles – Right Triangles
 |  | MP1 |
| Convert between degrees and radians | F-TF.1 F-TF.2 | MP2 |
| Find exact trigonometric function values of angles in radian measure | CC.2.2.HS.C.7F-TF.1 | MP2 |
| Solve real-world and mathematical problems applying arc length | CC.2.3.HS.A.14F-TF.1 | MP2 |
| Solve real-world and mathematical problems applying the area of a sector | CC.2.3.HS.A.14F-TF.1 | MP2 |
| Find exact circular function values using the unit circle | CC.2.2.HS.C.7 | MP2 |
| Approximate circular function values using a calculator | CC.2.2.HS.C.7 | MP2 |
| Find numbers given circular function values | CC.2.2.HS.C.7 | MP2 |
| Solve real-world and mathematical circular function problems modeling the angle of elevation and lengths of line segments  | CC.2.2.HS.C.7CC.2.3.HS.A.7F-TF.1 | MP2 |
| Solve real-world and mathematical problems using linear and angular speed | CC.2.2.HS.C.7F-TF.1 | MP2 |
| Graph the amplitude and period of sine and cosine functions | CC.2.2.HS.C.8 | MP2 |
| Determine an equation of the form y = a sin bx or y = a cos bx, where b > 0, for the graphs of sine or cosine functions | CC.2.2.HS.C.8 | MP2 |
| Interpret a sine or cosine function model | CC.2.2.HS.C.8 | MP2 |
| Apply horizontal and vertical translations to sine and cosine graphs | CC.2.2.HS.C.8 | MP2 |
| Apply combinations of translations to sine and cosine graphs | CC.2.2.HS.C.8 | MP2 |
| Solve real-world and mathematical problems for natural phenomena using sine function models | CC.2.2.HS.C.6CC.2.2.HS.C.8 | MP2 |
| Graph the translations of tangent and cotangent functions | CC.2.2.HS.C.8 | MP2 |
| Determine the simplest form of an equation for the graphs of tangent and cotangent functions | CC.2.2.HS.C.8 | MP2 |
| Graph the translations of cosecant and secant functions | CC.2.2.HS.C.8 | MP2 |
| Solve real-world and mathematical problems modeling the motion of a spring using trigonometric graphs | CC.2.2.HS.C.8 | MP2 |
| Analyze harmonic and damped oscillatory motion | CC.2.2.HS.C.8 | MP2 |
| **Marking Period 2 Review and Assessment** |  | **MP2** |
| * Review and demonstrate knowledge of Radian Measure and the Unit Circle
 |  | MP2 |
| * Review and demonstrate knowledge of the Graphs of Circular Functions
 |  | MP2 |
| Using the Fundamental Identities find trigonometric values given one value and the quadrant | CC.2.2.HS.C.9 | MP3 |
| Using the Fundamental identities express one trigonometric function in terms of another | CC.2.2.HS.C.9 | MP3 |
| Rewrite an expression in terms of sine and cosine | CC.2.2.HS.D.6 | MP3 |
| Verify that a trigonometric equation is an identity working with one or both sides | CC.2.2.HS.D.9 | MP3 |
| Solve real-world and mathematical problems through modeling using the Fundamental Identities | CC.2.2.HS.D.6 | MP3 |
| Find exact cosine function values using the sum and difference identities | CC.2.2.HS.D.6 | MP3 |
| Use cofunction identities to find *Θ* alone | CC.2.2.HS.C.7G-SRT.7 | MP3 |
| Solve real-world and mathematical problems applying the cosine of sum and difference identities | CC.2.2.HS.D.6CC.2.2.HS.D.10 | MP3 |
| Verify a trigonometric equation is an identity using the cosine sum and difference identities and fundamental identities | CC.2.2.HS.D.9 | MP3 |
| Find exact sine and tangent function values using the sum and difference identities for sine and tangent function values | CC.2.2.HS.D.6 | MP3 |
| Write functions as expressions involving functions of *Θ* alone | CC.2.2.HS.D.2CC.2.2.HS.D.6CC.2.2.HS.D.8 | MP3 |
| Find the function values and the quadrant of A + B | CC.2.2.HS.D.6 | MP3 |
| Verify a trigonometric equation is an identity using sine, cosine, and tangent sum and difference identities | CC.2.2.HS.D.9 | MP3 |
| Find trigonometric function values of double-angles (2*Θ*) given information about single angles (*Θ*) | CC.2.2.HS.C.7 | MP3 |
| Find trigonometric functions values of single values (*Θ*) given double-angle identities (2*Θ*) | CC.2.2.HS.C.7 | MP3 |
| Verify a trigonometric equation is an identity using double-angle identities | CC.2.2.HS.D.9 | MP3 |
| Simplify trigonometric expressions using double-angle identities | CC.2.2.HS.D.2CC.2.2.HS.D.6 | MP3 |
| Derive a multiple-angle identity | CC.2.2.HS.D.9 | MP3 |
| Solve real-world and mathematical wattage consumption problems | CC.2.2.HS.D.10 | MP3 |
| Use a product-to-sum identity to write an equivalent trigonometric expression | CC.2.2.HS.D.2CC.2.2.HS.D.6 | MP3 |
| Use a sum-to-product identity to write an equivalent trigonometric expression | CC.2.2.HS.D.2CC.2.2.HS.D.6 | MP3 |
| Use a half-angle identity to find an exact trigonometric value | CC.2.2.HS.C.7 | MP3 |
| Find trigonometric function values of (s/2) given information about s | CC.2.2.HS.C.7 | MP3 |
| Simplify trigonometric expressions using half-angle identities | CC.2.2.HS.C.7CC.2.2.HS.D.2CC.2.2.HS.D.6 | MP3 |
| Verify a trigonometric equation is an identity by using half-angle identities | CC.2.2.HS.D.9 | MP3 |
| Find inverse sine, cosine, and tangent values if they exist | CC.2.2.HS.C.7F-TF.7 | MP3 |
| Find inverse function values (degree-measured angles) | CC.2.2.HS.C.7F-TF.7 | MP3 |
| Find inverse function values with a calculator | F-TF.7 | MP3 |
| Find function values using definitions of the trigonometric functions (no calculator) | F-TF.8 | MP3 |
| Find function values using identities (no calculator) | F-TF.8 | MP3 |
| Write a trigonometric expression as an algebraic expression in u | CC.2.2.HS.D.2CC.2.2.HS.D.6CC.2.2.HS.D.8 | MP3 |
| Apply inverse circular functions to solve real-world and mathematical problems | CC.2.2.HS.D.10 | MP3 |
| **Marking Period 3 Review and Assessment** |  | **MP3** |
| * Review and demonstrate knowledge of Trigonometric Identities
 |  | MP3 |
| * Review and demonstrate knowledge of Inverse Circular Functions
 |  | MP3 |
| Solve a trigonometric equation: Linear Methods, Zero-Factor Property, Quadratic Formula, Squaring | CC.2.2.HS.D.10 | MP4 |
| Solve real-world and mathematical problems with trigonometric equations using linear equations, the Zero-Factor Property, the Quadratic Formula, and squaring | CC.2.2.HS.D.10 | MP4 |
| Solve a trigonometric equation: Half-Angle Identity, Double-angle Identity, a Multiple Angle | CC.2.2.HS.D.10 | MP4 |
| Solve real-world and mathematical problems with trigonometric equations using: Half-Angle Identity, Double-Angle Identity, a Multiple Angle | CC.2.2.HS.D.10 | MP4 |
| Solve a trigonometric equation for a specified variable | CC.2.2.HS.D.10 | MP4 |
| Solve an equation involving an inverse trigonometric equation | CC.2.2.HS.D.10F-TF.7 | MP4 |
| Solve an inverse trigonometric equation using an identity | CC.2.2.HS.D.10F-TF.7 | MP4 |
| Apply the Law of Sines to solve a triangle: (SAA), (ASA) | G-SRT.10G-SRT.11 | MP4 |
| Find the area of a triangle: (SAS), (ASA) | G-SRT.10G-SRT.11 | MP4 |
| Solve real-world and mathematical problems using the Law of Sines | G-SRT.10G-SRT.11 | MP4 |
| Solve the ambiguous case of the Law of Sines: No such triangle, One triangle, Two triangles | G-SRT.10G-SRT.11 | MP4 |
| Analyze data involving an obtuse angle  | G-SRT.11 | MP4 |
| Apply the Law of Cosines to solve a triangle: (SAS), (SSS) | G-SRT.10G-SRT.11 | MP4 |
| Use Heron’s Formula to find the area of a triangle (SSS) | G-SRT.11 | MP4 |
| Solve real-world and mathematical problems using the Law of Sines and the Law of Cosines | G-SRT.10G-SRT.11 | MP4 |
| **Marking Period 4 Review and Assessment** |  | **MP4** |
| * Review and demonstrate knowledge of Trigonometric Equations
 |  | MP4 |
| * Review and demonstrate knowledge of the Applications of Trigonometry
 |  | MP4 |

**ASSESSMENTS**

**PDE Academic Standards, Assessment Anchors, and Eligible Content:** The teacher must be knowledgeable of the PDE Academic Standards, Assessment Anchors, and Eligible Content and incorporate them regularly into planned instruction.

**Formative Assessments:** The teacher will utilize a variety of assessment methods to conduct in-process evaluations of student learning.

**Effective formative assessments for this course include:
Suggested but not limited to:**

* Pre-assessments of prior knowledge (e.g., Entrance cards or KWL chart)
* Bellringers/Problems of the Day (PODs)
* Discussions
* Exit ticket
* Teacher observations/Questioning
* Graphic organizers (e.g., Venn Diagrams, word mapping, webbing, KWL chart, etc.)
* Outlining
* Cooperative learning
* Written work
* Quizzes
* Oral response
* Self-evaluation
* Homework
* Summarizing
* Note-taking

**Summative Assessments:** The teacher will utilize a variety of assessment methods to evaluate student learning at the end of an instructional task, lesson, and/or unit.

**Effective summative assessments for this course include:
Suggested but not limited to:**

* Performance assessment
* Chapter/unit tests
* Quizzes
* Marking period assessments
* Projects
* Student presentations